



Runestone Electric
A s s o c i a t i o n

Energy Management Wiring Guide

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Updated: November 2021

Basic Energy Management Requirements

No application is required but the homeowner is urged to contact REA to make certain that the proposed system meets requirements. See Energy Management Programs for the basic requirements.

Homeowner responsibilities

- 1) Select a contractor
- 2) Arrange for installation
- 3) Sign a Energy Management Agreement when the job is complete

Contractor responsibilities

- 1) Arrange with REA to get a radio receiver and meter socket
- 2) Install off-peak system
- 3) Notify REA of completion and request a meter
- 4) All wiring must meet minimum code requirements
- 5) File a wiring permit with the State Board of Electricity

Installation Requirements

- 1) Off-peak systems require the installation of a subtractive meter or a separate service (dual metering).
- 2) Subtractive metering and radio receivers will be outside the home or other building and mounted at a height of 5-6 feet. (Eye level)
- 3) A subtractive meter must be energized from a dedicated 20 amp circuit.
Exception: If powered from water heater circuit, a disconnect must be installed to isolate the water heater.
- 4) If dual metering originates from a meter pedestal, call REA to determine whether it is necessary to add an additional meter socket or provide CT metering at the transformer. All loads approaching 200 amp and larger will be CT metered.
- 5) If dual metering originates at an overhead service (pole), the contractor will pick up the meter socket from REA and install the overhead loop. An REA crew will make the overhead connections and install the meter after notification that the service is ready to be energized.
- 6) Cycled air conditioners and water heater only systems are not metered on the off-peak rate.

ENERGY MANAGEMENT PROGRAMS

Space Heating

Dual Fuel (Including heat pumps and hydronic in-floor heating):

A dual fuel system may be controlled up to 400 hours during the heating season. Heat pumps will be cycle controlled in the summer. Typical control periods in the summer run about 6 hours and the cycle time is 15 minutes off and 15 minutes on. The blower is not interrupted by the Energy management system.

In the case of geothermal heat pumps, using the well, the well can be metered at the off-peak rate, but not controlled during the peak.

Electric water heaters can tag along on the same dual fuel rate, but must be controlled on a separate function at the radio receiver. Normally, dual fuel is a combination of electric heat and a fossil fuel backup system. Space that is heated with hydronic in-floor does not require a backup heater.

Storage Space Heating:

Electric storage furnaces, storage room heaters, and under-floor deep heating cables are options that allow homeowners with electrically heated homes to avoid a fossil backup heating system. For additions or multi-level homes, all areas will be required to be heated.

Storage space heating equipment is heated or charged between the hours of 11:00 pm and 7:00 am. A 2-hour bump may be possible in the afternoon for systems that are slightly under sized.

An electric water heater can tag along on the same off-peak rate, but will be controlled separately.

Water Heating

Storage Water Heating

REA sells the water heater to a member (see information on page 8). The cost includes the water heater, a mixing valve, and a radio receiver, if needed. Water heaters in dairy barns do not use a mixing valve. The homeowner is responsible for the complete installation, including the radio receiver. The water is heated during the night, from 11:00 p.m. to 7:00 a.m. Monday – Friday and limited control 11:00 p.m. – 3:00 p.m. on weekends and holidays. Dairy barns and households requiring more than normal amounts of hot water, may receive a 2-hour bump in the afternoon. Control times are normally limited as much as possible.

8-Hour Peak Shaved Water Heating

Any water heater, other than storage water heaters that tag along with controlled electric heat, may receive the applicable off-peak rate and will be subject to an 8-hour control strategy, typically between 4:00 – 10:00 p.m.

Cycled Central Air Conditioning

REA will likely be promoting cycled central air conditioning each year. Incentives may change each year, but as of now, the homeowner will receive a \$7.50 electric service credit during the months of July, August and September each year while on the program. Radio receivers are installed by REA at no cost.

Central Air Conditioning & Air Source Heat Pump Quality Installation Program

Studies have shown that more than 75% of central air conditioners are operating below their rated performance. This causes wasted energy, decreases comfort and shortens the life of air conditioning equipment. These problems can be addressed when units are properly installed and maintained.

That is why we have developed the Quality Installation rebate. To qualify for the Quality Installation rebate, the central air conditioner unit or heat pump must be installed by a qualified HVAC contractor on our list.

Contractors can register for the program on our website at www.RunestoneElectric.com.

Qualified installations focus on 4 key areas:

- Equipment sizing
- Refrigerant charge
- Air flow
- Duct sealing (exposed ducts only)

Rebates available to REA members:

Air Source Heat Pump:

≥SEER 14.5\$480

≥SEER15\$580

≥SEER 16+\$630

Central Air Conditioning:

≥SEER 14.5\$50

≥SEER15\$50

≥SEER 16+\$50

Applying for the rebate will automatically enroll the member in our Cycled Central Air Conditioning program.

EV Program

Electric vehicle owners with in home charging systems are able to participate in REA's EV storage rate program. Charging equipment requires a dedicated circuit to qualify for the rate.

Home EV charging systems will be available between the hours of 10:00 pm and 6:00 am.

Irrigation

Center pivot irrigation systems that are controlled during the summer peaks receive a reduction in demand charges. At present, if controlling is necessary, REA's irrigators are limited to being controlled for 4 hours, normally 4:00 to 8:00 p.m. Controls starting later may be needed for the month of May. REA personnel will install the radio receivers.

Commercial, Industrial, & Agricultural (Interruptible / Gen-Sets)

Under the interruptible energy program, an entire load is either transferred to a backup generator or turned off. REA will install special metering and a radio receiver that is capable of starting the generator and transferring the load to the generator. An electrician is responsible for the wiring beyond the radio receiver. The business or farmer is required to contact REA for program specifics.

ENERGY WISE® OFF-PEAK HEATING RATES

ETS (Electric Thermal Storage)	4.69¢/kWh
Must be primary heating system	
Dual Fuel (electric plenum heater, electric boiler, baseboard heat)	
Automatic back-up system.....	6.04¢/kWh
Without automatic back-up.....	6.34¢/kWh
Air Source Heat Pump (without complimentary Dual Fuel system)	
Automatic back-up.....	7.24¢/kWh
Geothermal Heat Pump (with Dual Fuel control).....	6.04¢/kWh
General Service Rate is available for uncontrolled geothermal heat pumps	

- The entire electric heating system must be 7kW or larger to be eligible for the rate
- A Wholesale Power Cost Adjustment (WPCA) may apply to above rates with off-peak heating, off-peak rates may apply to electric water heating.

ENERGY WISE® OFF-PEAK HEATING REBATES

ETS (Electric Thermal Storage)

Space heating & room storage heating
\$50/kw up to \$5,000 or 100kw

Geothermal Heat Pumps - \$400

Quality Installation

Air Source Heat Pump:

≥SEER 14.5	\$480	
≥SEER15	\$580	≥SEER 16+ \$630

Central Air Conditioning:

≥SEER 14.5	\$50	
≥SEER15	\$50	≥SEER 16+ \$50

Plenum Heater or Boiler

\$25/kw up to \$500 max.
Plenum heater must be designed to the heat loss of the home.

Air-Source Heat Pump Paired with Plenum Heater or Boiler

Efficiency Rebate - \$100

Electrically Commutated Motors (ECM) - \$25

Smart Thermostat - \$25 (see REA for details and restrictions)

Ductless Air Source Heat Pump (must be Energy Star® Rated) - \$200

Fuel Cost Comparison

REA Off-Peak Rate	Propane 70% Efficiency	Propane 90% Efficiency	Fuel Oil 70% Efficiency	Natural Gas 90% Efficiency
6.04¢	\$1.13	\$1.45	\$1.97	\$1.58 per therm

Example: You would need to buy LP at **less than** \$1.45 per gallon to beat our off-peak rate of 6.04¢ per kWh.

Storage Water Heating

General Service Rate

Suggested Retail: **\$1,800.00**
 - **1300.00** Discount
 \$500.00 REA price

Off-peak Electric Heat Rate

Suggested Retail: **\$1,800.00**
 - **1050.00** Discount
 \$750.00 REA price



Runestone Electric Association's (REA) Energy Wise® water heating program uses electricity efficiently to save you money. This program offers several high efficiency storage water heater options and the use of electricity during non-peak usage times.

How it works: With a storage water heater from REA, your water heater will heat from 11:00 PM until 7:00 AM Monday thru Friday. Currently, weekends and holidays are control-free with the exception of peak demand events in which control times are typically between 4:00 – 10:00 p.m. if it is a control day. If you have a large family or use large quantities of hot water on weekdays, we can program your controller to heat for a few hours in the afternoon at no additional charge. This program is for residential and agricultural use. Interest-free payment plans available. Price includes a mixing valve, radio controller and sales tax. Installation is not included.

Residential Warranty: Storage water heaters sold by REA and enrolled in an off-peak program come with a limited lifetime warranty* against leaking. In addition, the water heater parts have a 6 year manufacture warranty. Ask us about labor reimbursement.

**Warranty is only valid for original owner. 10 year leak warranty for subsequent owners*

Commercial Warranty: Please contact REA for details. Labor reimbursement is available for qualifying events.

ELECTRIC VEHICLE RATES

RATES

Electric Vehicle Charging Rate4.69¢/kWh (as of May 1, 2019)

REBATES

EV Charging System on EV rate*Up to \$500

EV Charging System on general service*Up to \$250

**Installation of meter socket required for rebate eligibility*

Wholesale Power Cost Adjustment additional

Rates subject to change

IRRIGATION SERVICE RATES

RATES

Annual Fixed Charge\$352.00 (as of May 1, 2019)

Demand Charge\$20.00/KW (IRRIG)

Demand Charge on controlled\$6.00/KW (IRRCL)
load in accordance with Association policy

Energy Charge9.07¢/kWh

Wholesale Power Cost Adjustment additional

Rates subject to change

INTERRUPTIBLE SERVICE RATES

MONTHLY RATE

Service Charge

Single Phase\$47.70 (IS1) (as of May 1, 2019)

Three Phase\$63.60 (IS3) (as of May 1, 2019)

Energy Charge7.80¢/kWh

Coincidental Demand Charge\$14.00/KW

Excess Demand Charge\$5.00/KW

Wholesale Power Cost Adjustment additional

Rates subject to change

Interruptible Gen-Sets

In an effort to reduce peak demand and provide a fair and competitive electric rate to our members, Runestone Electric Association (Cooperative) offers the following interruptible service. The policy will be consistent with Great River Energy's S C & I Curtailable Rate and Special Rate Rider L.

Availability:

This service is available to consumers requiring a transformer capacity of at least 15 KVA and less than 350 KVA, subject to the established rules and regulations of the Cooperative. The generator system, including the transfer switch and all associated wiring and equipment must be installed in a safe manner and meet the National Electrical Code or any other applicable standards. This program is not available for seasonal services with the exception of certain natural air grain drying systems.

All existing off-peak rates or credits on the applicable account will be forfeited and superseded by the monthly rate above. An existing radio receiver, controlling such loads as storage water heaters, storage space heating, cycled cooling, dual fuel, etc. may still be maintained, but not be metered separately from the other load.

General Program Description:

Electric service to the member may be interrupted for up to 10 hours per day. The Cooperative has the right to vary the times and lengths of interruptions within the hourly daily limit.

Power during the interruption periods will be supplied by the member's standby generator. The member will have the choice of either an automatic system or manual start and transfer type equipment.

In return for allowing the above interruption of service, the Cooperative will apply the monthly rate above to all electricity purchased by the member at the applicable account.

Coincidental Demand Billing:

It is recognized that the member must have a continuous supply of power to protect their investments. It must be further recognized that for the member to qualify for this program, the normal electric service must be de-energized during all of the Cooperative's control periods. Currently the Cooperative is billed monthly by its wholesale power supplier for coincident demand.

In the event of an emergency and/or an error on the part of the member, and the load is energized on any of these billing peaks, peak demand costs will be recovered as defined in monthly rate. After the fifth such occurrence on a billing peak or a non-billing control day, the Cooperative will terminate this agreement and the member will be placed on the previous or appropriate rate.

Members choosing this program must agree to participate for a minimum of one year. After 1 year (12 months) a request to change to another rate can be made if the member has satisfied all associated peak demand costs incurred under rate monthly rate.

Excess Demand Charge:

A control period is defined as the period of time during which the energy management system is operated with the intent of minimizing the Cooperative's coincident demand with GRE. The excess demand charge will be added when the consumer does not control or fails to control for the required length of time during a control period.

Method of interruption:

The method of interruption will vary slightly, depending on whether the system is automatic or manual.

A radio receiver will be provided by the Cooperative and installed adjacent to the electric meter. The radio receiver remains the property of the Cooperative and the Cooperative will be responsible for maintenance of the device. It would, however be in the best interest of the member, to notify the Cooperative of any possible problems with the device. With a totally automatic gen-set system, the radio receiver can be connected as to start the generator and transfer the load during the control period.

With a manual gen-set system, the radio receiver is simply connected to the warning device. The member will be responsible for having the generator running and the load switched by the designated control time and also for restoring the load at the completion of the control period. Another function of the radio receiver is the verification of the signal and it is recorded at the meter.

The Cooperative will provide, maintain, and read all metering equipment needed to provide this service.

Control length and days/year:

The Cooperative guarantees the maximum control time per year will not exceed 300 hours. It is not possible to project the number of days per year that control will occur, as weather has a significant impact on the need for energy management. Typical controls occur during extreme weather conditions in the region.

CT Metering

If sub-metering is used at the house, CT metering is usually the simplest and least cost way to meter off-peak loads. REA will provide a 5-terminal meter socket. The electrical contractor will provide the CT (200:5) and install the entire off-peak system.

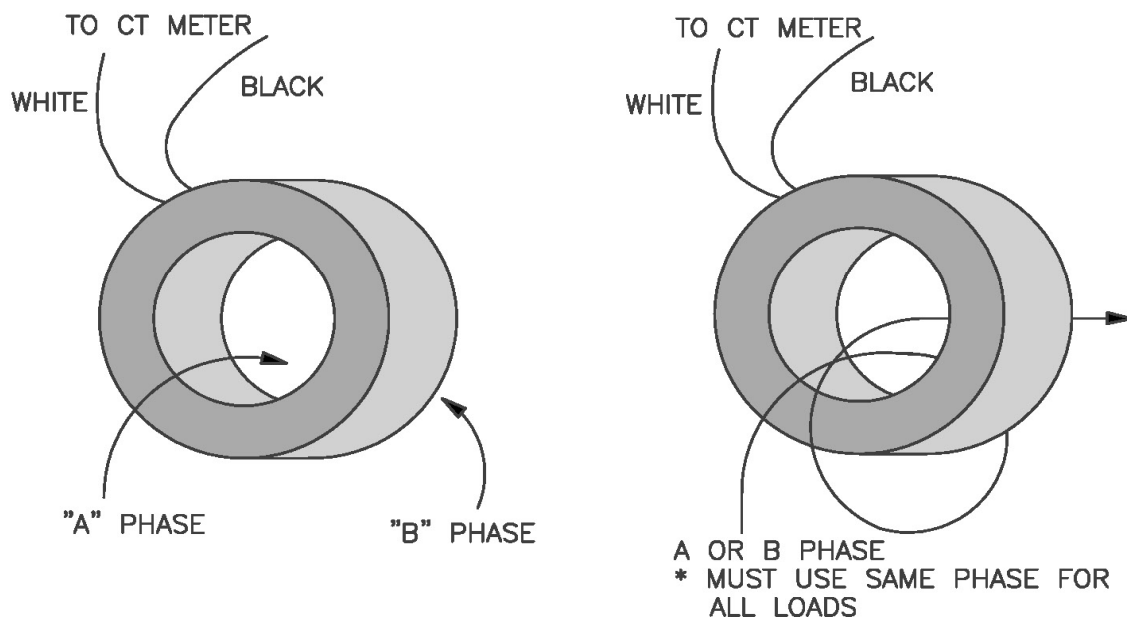
A 200:5 ratio CT is used and usually installed in a separate enclosure that is nipped to the breaker panel. REA will also allow the CT to be installed in the breaker panel as long as it is acceptable by the National Electric code and your area electrical inspector.

There are two different methods for running off-peak loads through the CT.
240-volt loads-

1. Run 1 phase through the CT twice. All circuits run through the CT must be the same phase and passing through the same direction.
OR
2. Run both phases through once and in opposite directions. All circuits must be in phase with each other.
3. 120v loads require only 1 pass through the CT to meter accurately.

The power source (240volts) for the meter socket and radio receiver is usually the water heater circuit. However, it must be an un-interrupted supply, so a separate circuit would be needed where the water heater is shut off for periods such as with snowbirds or vacation homes. A loss of power to the meter would move the electric heat usage to the general service rate.

CT METERING



Accuracy and burden becomes primarily a function of installation and wire resistance between the CT itself and the Class 1ø, KWH meter. A CT will support ANSI ø.1 when the CT to meter wiring hookup is as follows:

1. Standard wire is preferred.
2. Make sure the stripped wire is clean and properly prepared for a firm copper-to-copper connection.
3. If using wire nuts at the CT pigtails (stranded wire only), twist the strands first prior to twisting on the wire nut.
4. If solid conductor wire is used, only a screw clamp terminal (not wire nut) shall be used for joining the solid conductor to the stranded CT pigtails.
5. If the meter socket terminals are for large conductors, strip sufficient length to double back at least twice under the screw down connector.
6. The following wire gauge must be used:

#14 wire	10 feet
#12 wire	16 feet
#10 wire	23 feet
7. If you cannot use the wire gauge specified above or if the length is longer than shown, consult the REA metering department for another specified metering component.

Service of Radio Receivers

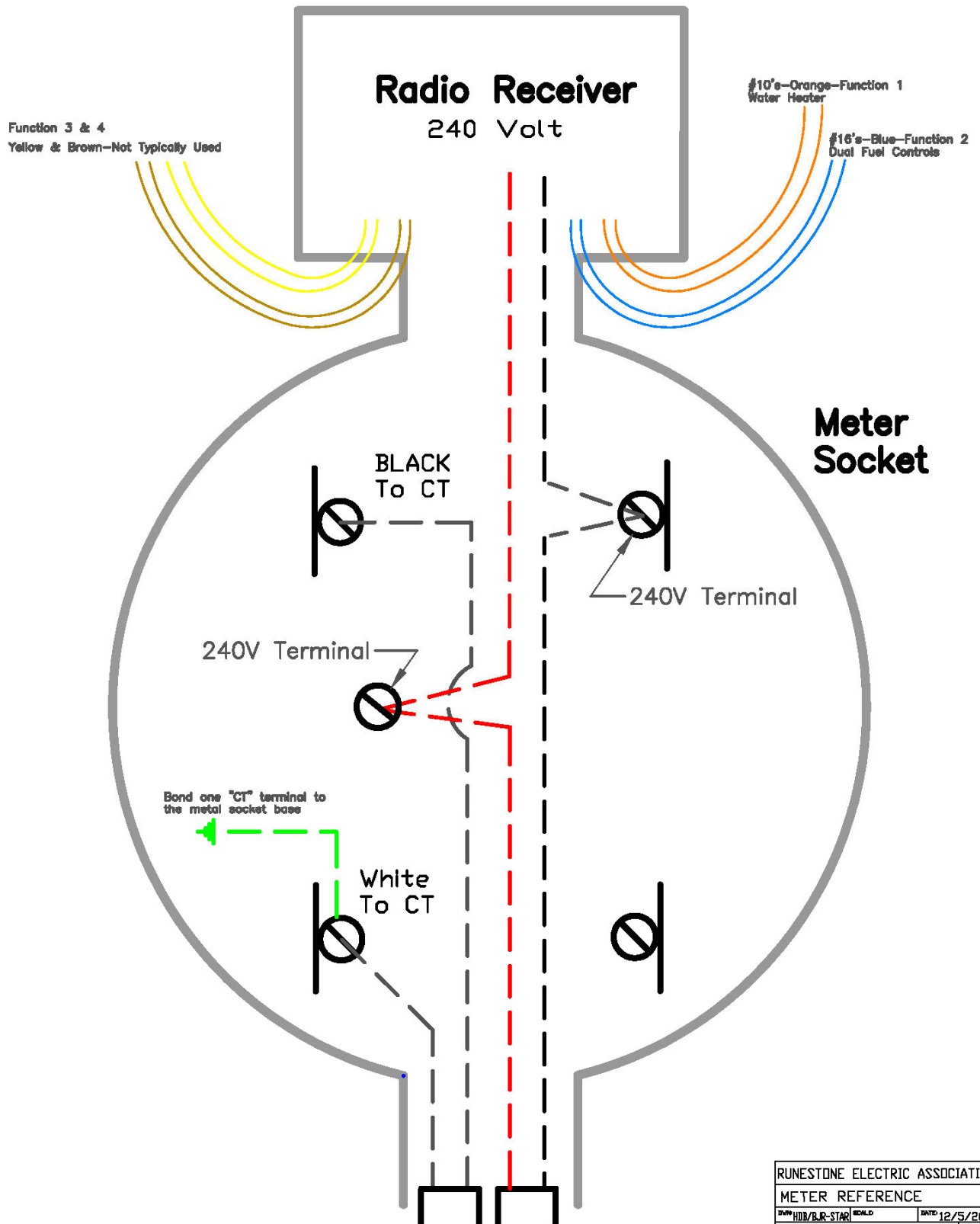
REA provides and maintains radio receivers. The contacts are normally closed so in the event of a failed radio receiver, the off-peak load is unable to be controlled. If a member has no heat or hot water and it is not due to planned load control, it is likely there is a problem with member owned-equipment. Members are advised to call their own serviceperson to find the problem. If the serviceperson can verify that the problem was due to the radio receiver, the bill should be sent to REA for payment.

Peak interrupter panels such as the 8-circuit panel that is used on multi-zone heating systems is the homeowner's responsibility. REA seals that may be on the panels can be removed for service. It isn't necessary to reseal these unless the homeowner requests it for safety reasons.

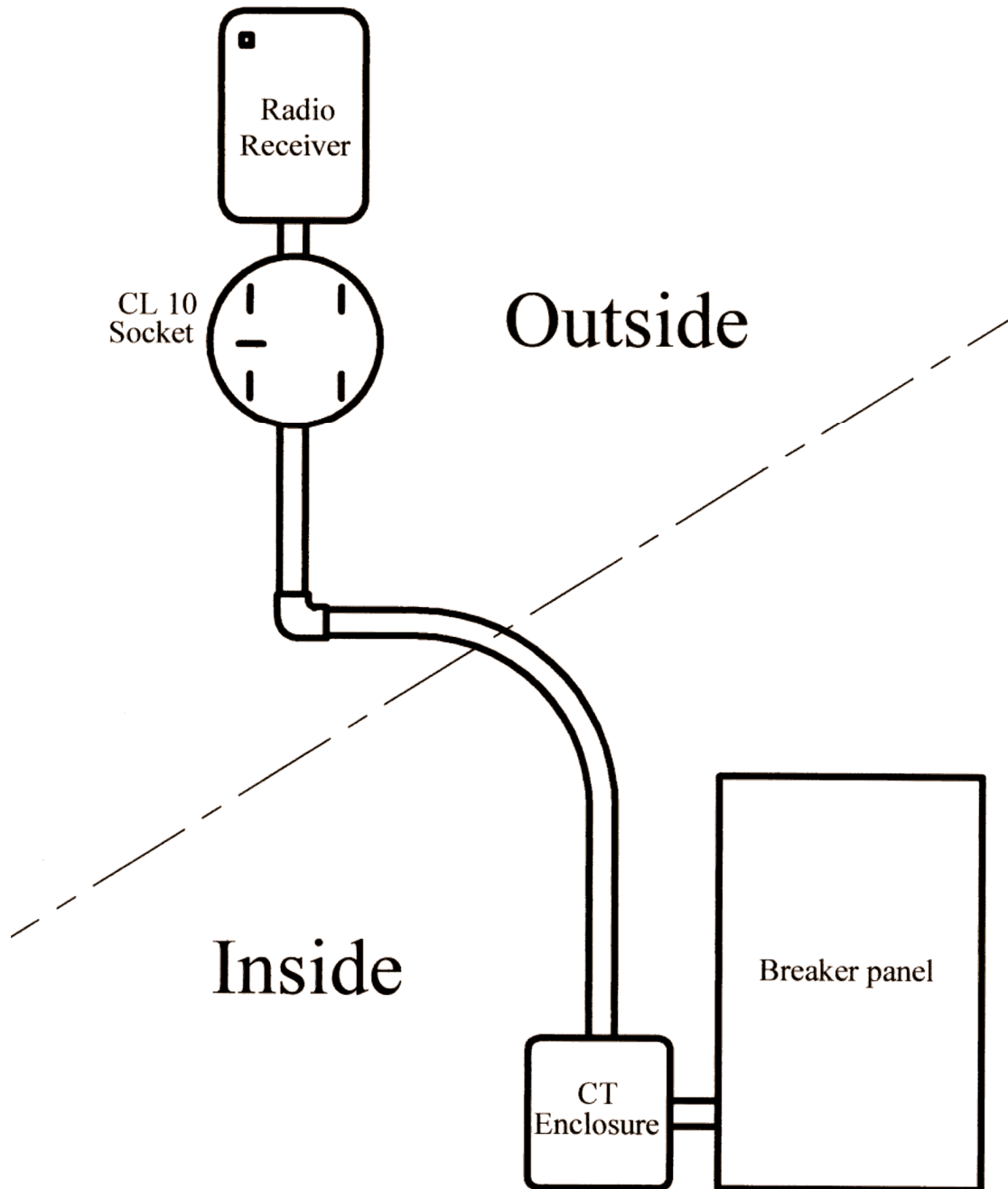
If a serviceperson is called out after hours and has to disable a radio receiver in order to fix a problem, please call REA as soon as possible to notify that the receiver is disabled. The procedure for disabling a receiver is to pull the low voltage connection on the circuit board. There is no need to change the load wiring in the house, as this will require REA to get in and reconnect

Typical CT Metering Connections

Typical CT Metering Connections

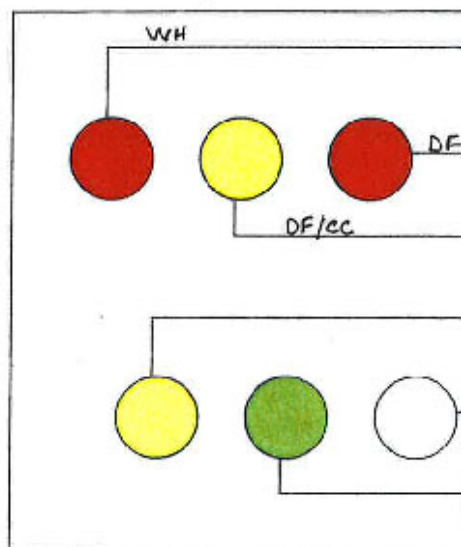


Typical Off-Peak System



Radio Receiver Functions

Your Load Management Radio Receiver



COMVERGE CV326

What the lights indicate

- Upper left **RED** light
Function One
When light is on, appliance is turned off
- Upper right **RED** light
Function Three
When light is on, appliance is turned off
- Upper middle **YELLOW** light
Function Two
When light is on, appliance is turned off
- Lower left **YELLOW** light
Function Four
When light is on, appliance is turned off
- Future Use
- Lower middle **GREEN** light
Test
GREEN light is only on briefly when receive is first energized or when power is restored

Note: Any time power is interrupted to the unit – for any reason – the radio receiver is “programmed” not to run for 15 to 30 minutes after the last time power was restored. DO NOT turn the breakers on and off if your Off-Peak system(s) has not been operating. Instead, wait 15 to 30 minutes and the system should operate. During the 15 to 30 minute period, both red lights will usually remain on.

Storage Water Heater Installation Guidelines

Households: 1) Member purchases water heater from REA, purchase includes a mixing valve, and a radio receiver.

(Member is responsible for complete installation)

2) See attached plumbing and wiring schematics.

3) Thermostat adjustments:

Upper thermostat - No adjustment needed (factory set)

Lower thermostat - 150-160 degrees

4) Recommended mixing valve setting – follow manufacturer's directions

5) Operate the disconnect switch for the lower element so it's to the left in the ON position

6) Failure to install as above will affect the capacity and may result in insufficient hot water supply.

Dairy Barns: 1) Member purchases water heater from REA, purchase includes a radio receiver.

2) No mixing valve is used.

3) Thermostat settings for dairy applications:

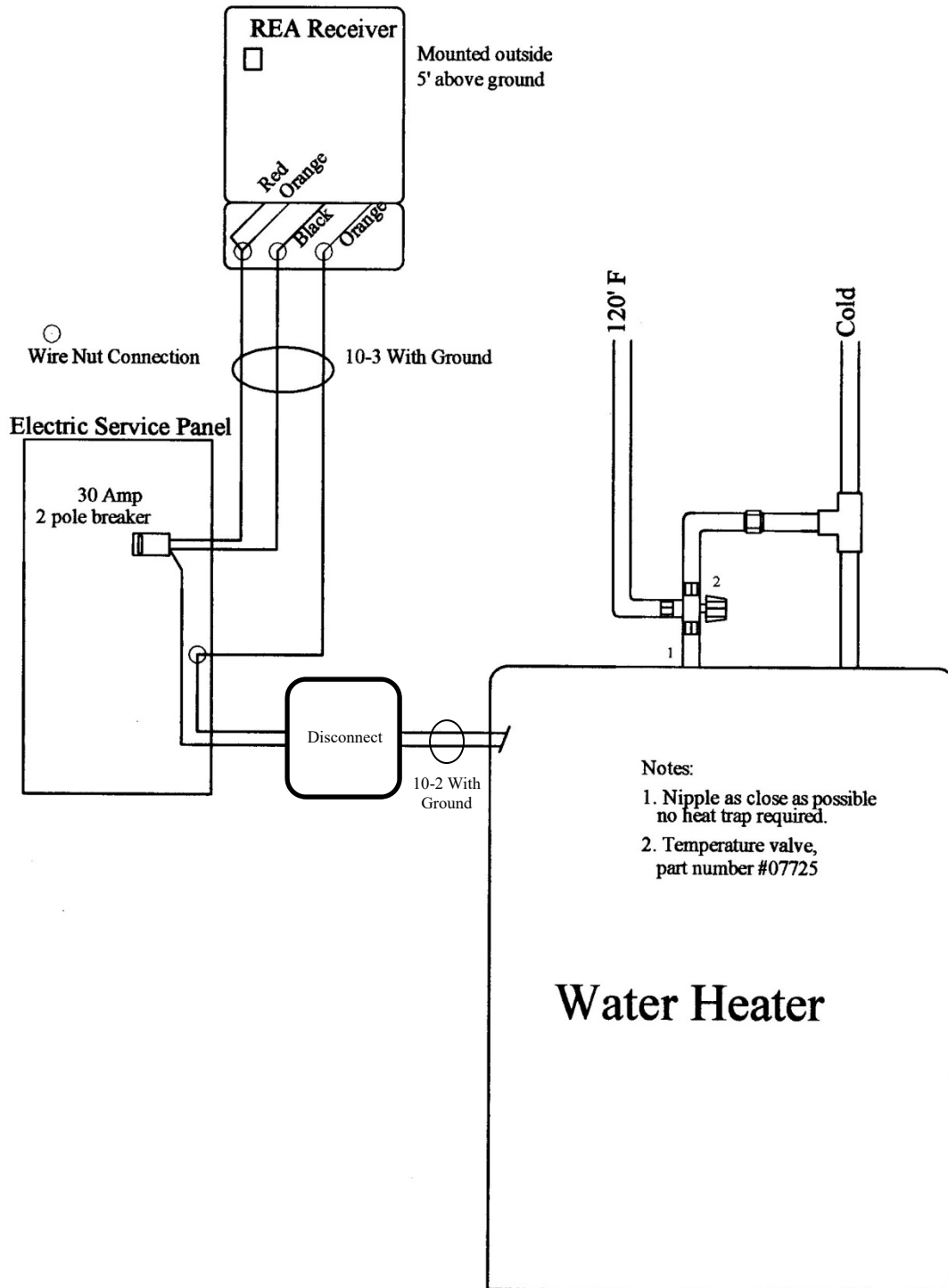
Upper thermostat - No adjustment needed (factory set)

Lower thermostat - 160 degrees

4) If higher temperature water is needed, it is recommended to raise the lower thermostat to achieve the higher temperature. The upper thermostat needs to be set 15-20 degrees cooler in order to avoid high limit trips.

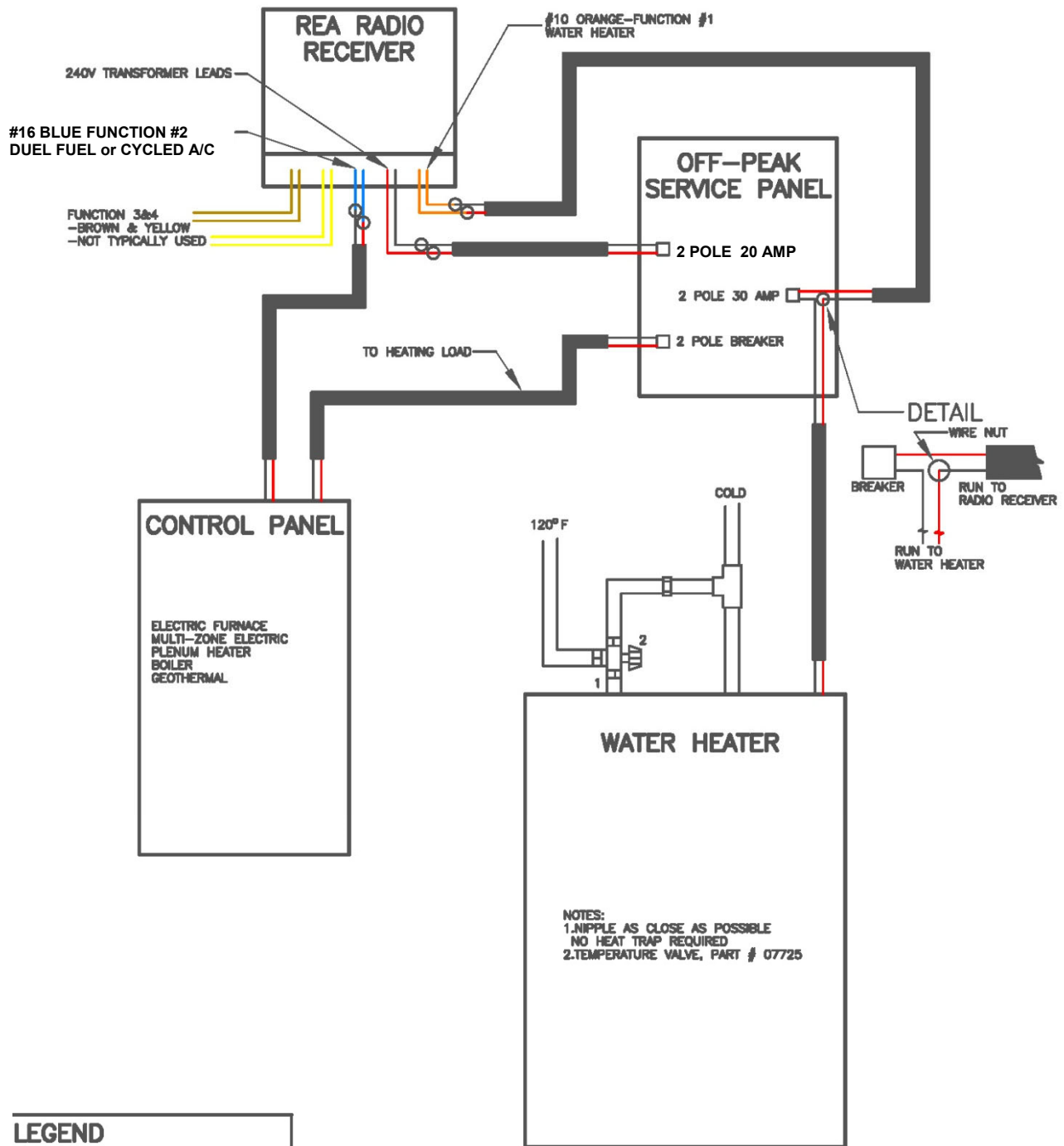
5) CAUTION - water temperatures could reach 185 degrees and would be extremely dangerous if there is contact to skin.

Storage Water Heater Only Typical Plumbing & Wiring Diagram



Dual Metered Installation

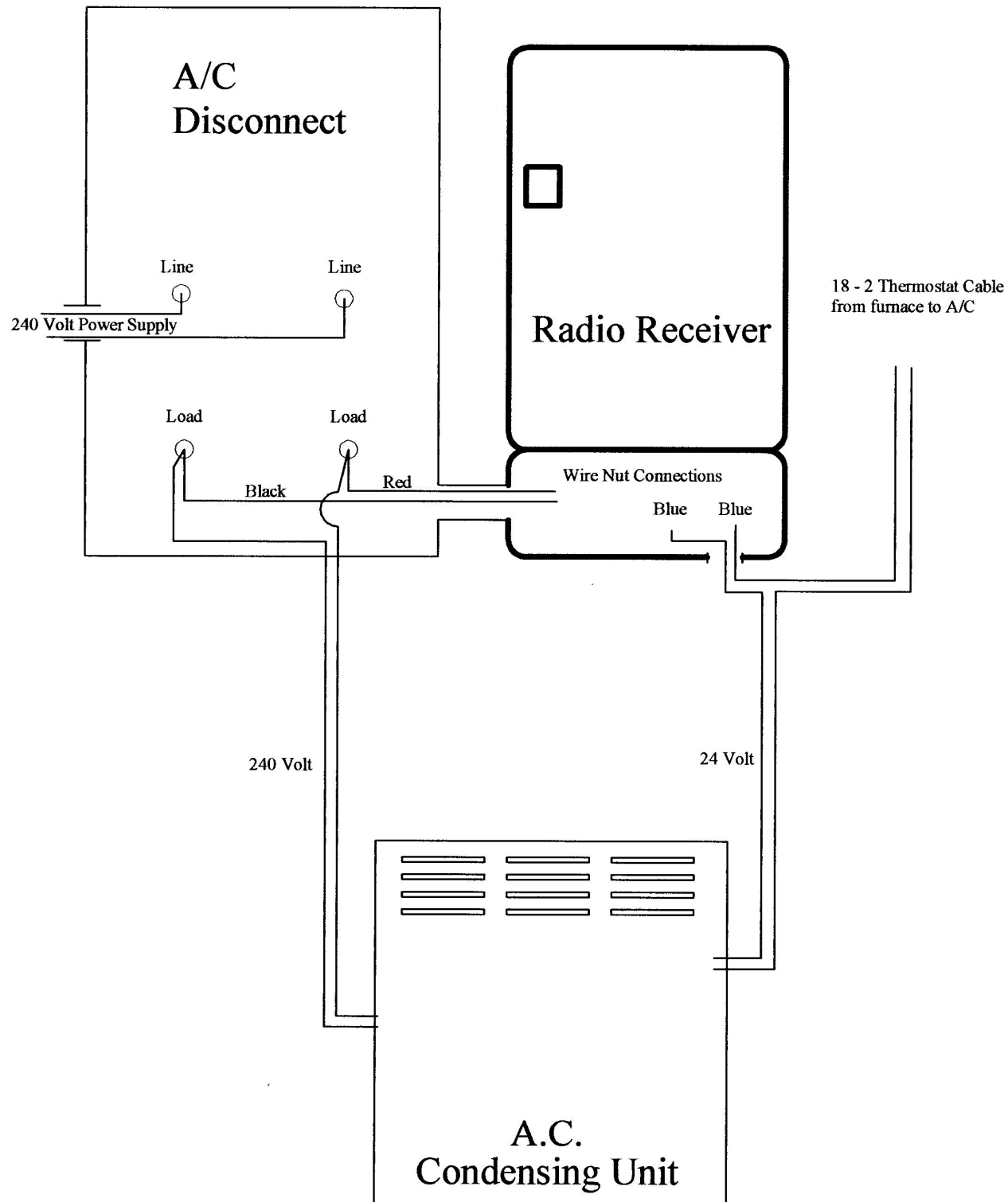
DUAL METERED INSTALLATION



LEGEND	
○	WIRE NUT
■	WIRING METHOD
□	BREAKER

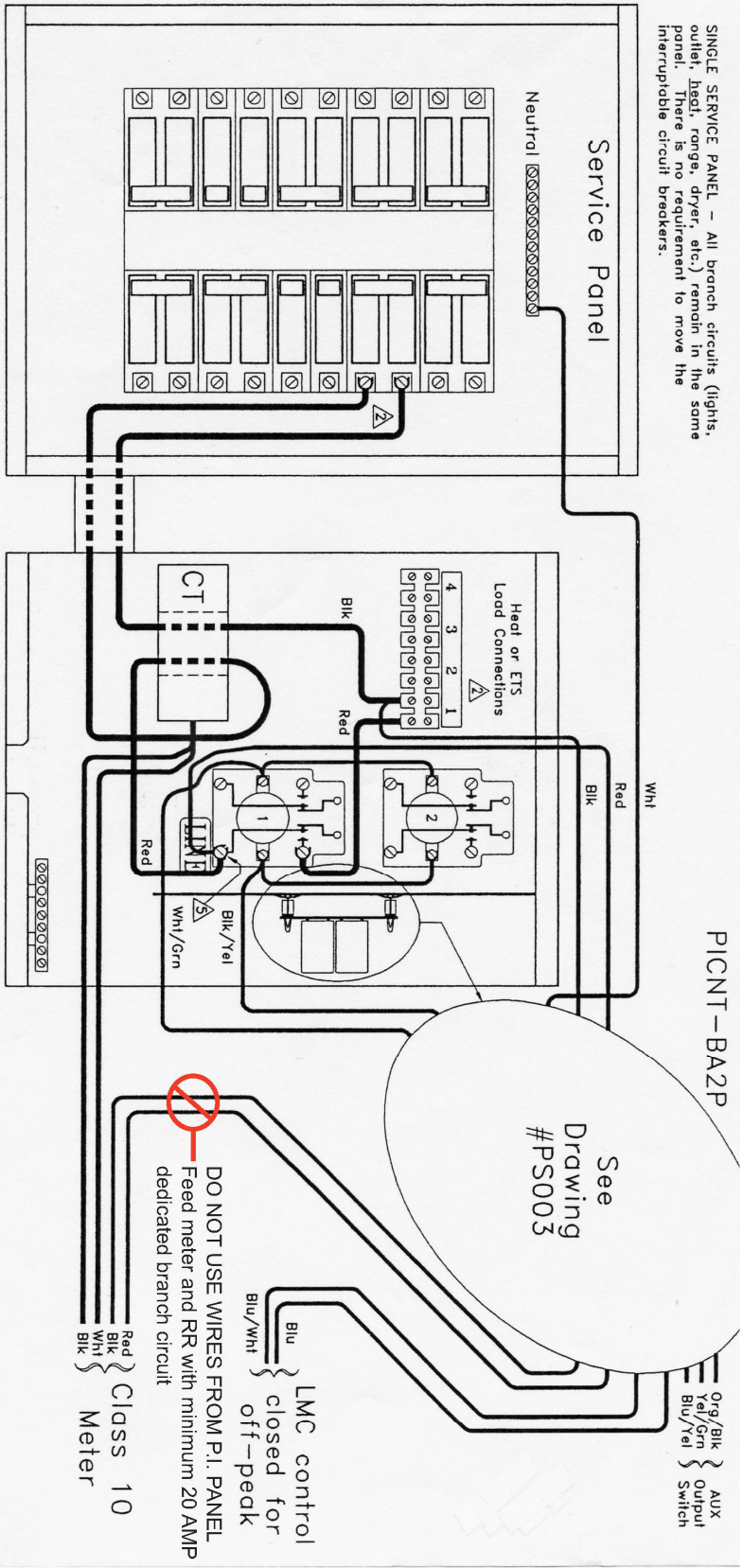
RUNESTONE ELECTRIC ASSOCIATION			
METER REFERENCE			
DATE	10/10/2010	SCALE	12/25/2010
TITLE	DUAL METERED INSTALLATION	NO	10F1

Typical Cycled A/C Diagram



Peak Interrupter Panel

SINGLE SERVICE PANEL - All branch circuits (lights, outlet, heat, range, dryer, etc.) remain in the same panel. There is no requirement to move the interruptible circuit breakers.



Notes:

1. Grounding and bonding not shown.
2. Circuit numbers correlate with numbers on pigtail wires and relays (two circuits per relay).
3. The circuits with #10 wire (see note #5) have internal ratings of 30 amp continuous, but as #10 wires, the maximum service panel rating is probably 30A CB. ARL product listing report #28861 may provide additional information concerning product circuit current rating.
4. An additional metered only circuit pair (typically water heater usage) is provided, untermiated.
5. This circuit is also used for internal operating power.
6. For peak alert hook-up see Ref. Dwg #PH002.
7. Shown is a two relay model PI-03A23R. The following models are also available:

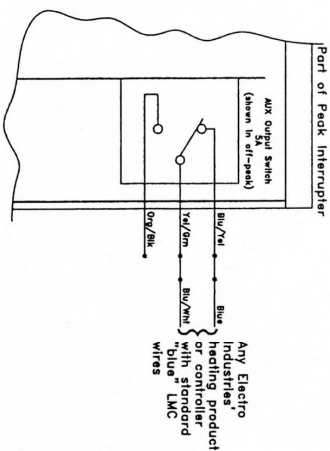
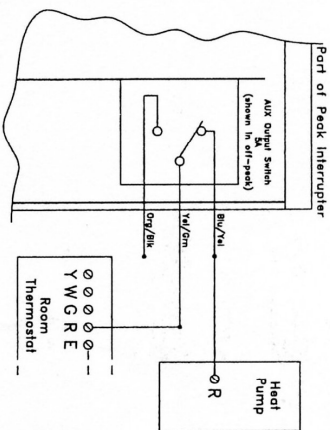
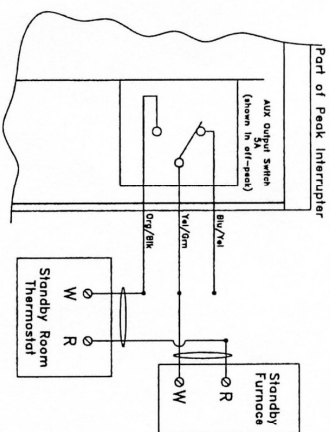
1" x 14" surface
16" x 18" surface

4PNO PI-03A423R
6PNO PI-03A623R
8PNO PI-03A823R
10PNO PI-03A1023R
12PNO PI-03A1223R

Electro Industries, Inc.				
Monticello, MN 55362				
Date	Rev	Drn By	Appd	
04-07-92		DJH		
Description:				ETI #
PI-A, CT Series, w/PA				---
w/LMC Control				PH414

Peak Interrupter Panel, cont.

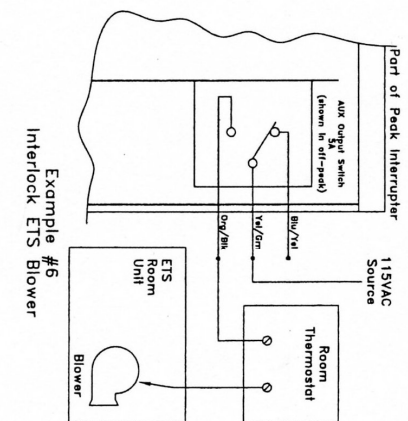
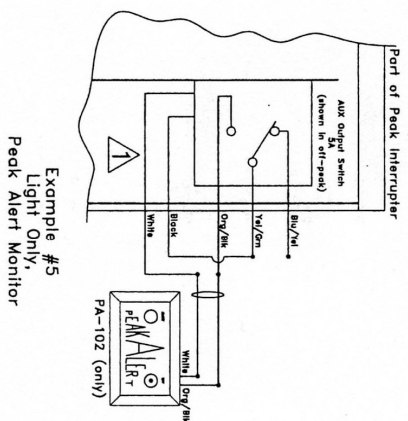
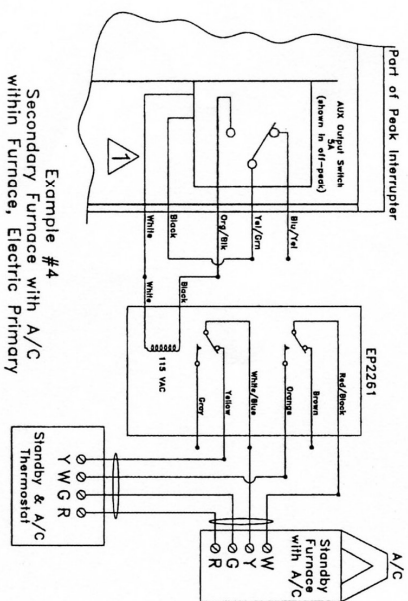
PI AUX OUTPUT SWITCH WIRING OPTIONS OR EXAMPLES (4143)



Example #1
Secondary Furnace with
Baseboard Electric

Example #2
Water Heat Pump, No Strip Heat,
PI Interrupts Other Loads

Example #3
Adding or Controlling Other
Electro Industries' Products



Example #4
Secondary Furnace with A/C
within Furnace, Electric Primary

Example #5
Light Only,
Peak Alert Monitor

Example #6
Interlock ETS Blower

Note:

1. When available, the black and white wires represent a fused output voltage source.