

Computerized
Energy Management

**MODEL 9308
ENERGY MANAGEMENT
COMPUTER**

OWNER'S MANUAL



Helping you to use
energy more efficiently

Energy Sentry 9308 Owner's Manual

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Notice to Users

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient the receiving antenna.
2. Relocate the controller with respect to the receiver.
3. Move the controller away from the receiver.
4. Plug the controller into a different outlet so that controller and receiver are different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402, Stock No. 0004-0000-00345-4.

9308 QUICK START GUIDE

How to Decrease Your Electric Bill (And Increase Your Savings)

Open the housing of the unit marked “Energy Sentry” by opening or removing the cover. Locate the knob labeled “Demand Limit”. Turn the knob counterclockwise 1 or 2 KW, depending upon how much you wish to save. The lower the demand limit, the greater your savings. See Table 1 on page 7 for typical demand limit settings.

How to Increase the Comfort of Your Home (And Increase Your Electric Bill)

Open the housing of the unit marked “Energy Sentry” by opening or removing the cover. Locate the knob labeled “Demand Limit”. Turn the knob clockwise by 0.5 KW. Replace or close the cover. Wait about one day to give the house a chance to cool down or heat up, whichever is applicable for the current season. If the change you just made does not feel sufficient, then turn the knob clockwise another 0.5 KW. Repeat until satisfied. See Table 1 on page 7 for typical demand limit settings. Remember, each KW that you increase the demand limit costs you additional money on your electric bill.

* Also see “Hints for Maximum Savings” on Page 12.

INTRODUCTION AND OVERVIEW OF THE 9308 ENERGY MANAGEMENT COMPUTER

Congratulations on your decision to purchase the Energy Sentry 9308 Energy Management Computer. As the owner of an all-electric home metered under the Time-Of-Use or TOU Demand Billing rate, you fall into a special group of consumers who can lower their monthly electric bills by reducing energy demand peaks and shifting energy usage to off-peak times. The Energy Sentry 9308 enables you to reduce these peaks while maintaining efficient use of energy. Your decision to purchase a 9308 represents a sound and intelligent investment which will repay you many times over in the years to come with reduced electric bills, added convenience and peace of mind. The 9308 is the most user-friendly, easiest to use Energy Management Computer on the market today.

The Time-Of-Use (TOU) Demand Billing Rate

Not all electricity costs the same. The reason for this is the billing rates which your utility makes available to you. The most common are the Energy and Declining Block rates. However, the 9308 is specifically designed to work in conjunction with TOU Demand rates which reward the user by providing incentives for using energy in "Off-Peak" times.

Under the Energy rate, you are billed for total energy used per month (total kilowatt-hour use) regardless of how you use this energy. Owner A in Figure 1 illustrates a typical daily energy use pattern. Notice the demand peaks in the morning and evening. Under the Energy rate, these peaks do not affect Owner A's bill since he pays for the total Kwh use only.

Utility companies are concerned about these demand peaks since they increase the costs of supplying electricity to their customers. As a result, they have devised the TOU Demand Billing rate, which is a preferred rate, to reward customers who control their peak usage of electricity in On-Peak times. Billing under the TOU Demand rate works like this: Suppose you are heating or cooling your home, washing dishes, drying clothes and cooking the family dinner all at the same time. Chances are your home is at peak energy usage or drawing electricity from the electric company at a maximum rate. This peak energy usage is illustrated by Owner A in Figure 1. Under the TOU Demand rate you pay for both total energy used (in Kwh like the Energy rate) and for your highest average peak energy usage during the On-Peak time over the billing period (highest average KW demand).

However, utilities offer reduced kilowatt-hour (Kwh) and demand (KW) charges for energy usage during the Off-Peak times. Many utilities do not measure or charge for demand during off-peak times. Check with your utility to get exact details of the TOU/Demand rate available in your area.

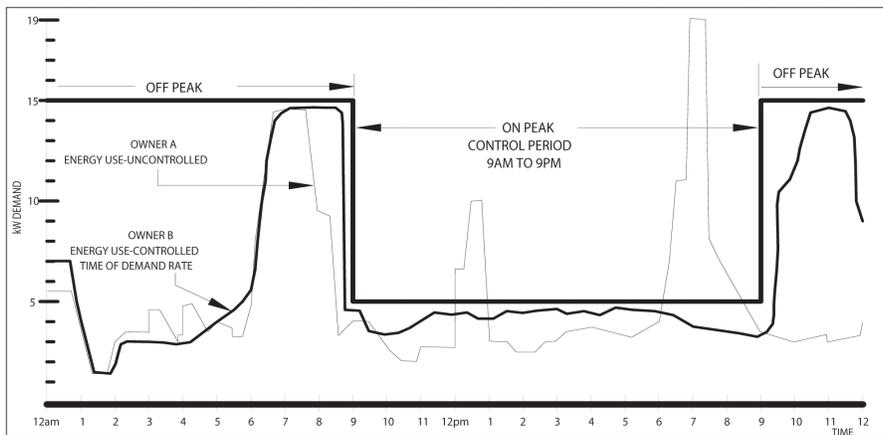


Figure 1.

When compared to the Energy Rate, the TOU Demand rate offers a much lower charge for total Kwh used. Although, since there is also a Demand charge for the highest average peak energy usage during the billing period, the savings could be offset if this demand peak is high.

Now let's look at Owner B in Figure 1. In this case, Owner B is billed under the TOU Demand rate. He has controlled his peak demand during the On-Peak time and has consequently reduced his Demand charge. The result will be a lower electric bill for using the same amount of electricity as Owner A. The key to his savings is in controlling his peak energy usage by leveling his energy demand during the utility's On-Peak time.

Different Meters

TOU Demand rates require a special electric meter which records not only the total energy consumed, just like the standard watt-hour meter, but also records the highest average peak energy usage over a 15, 30 or 60 minute demand interval depending on your utility's demand averaging period. Once this demand peak is registered on the meter, a corresponding Demand charge results even if this peak occurred only once during the billing period.

In addition a special TOU Demand meter keeps track of the On-Peak and Off-Peak Kilowatt Demand and Kilowatt-hour usage. Depending on the way your utility's TOU demand billing rate is structured, your meter may not record Off-Peak Demands. On-Peak period starting and ending times may vary from utility to utility as well as by season.

Where Energy Sentry 9308 Technology Comes In

If it was humanly possible to go through your home continuously and manually turn on and off heating or cooling circuits and major appliances to level out peak demand whenever necessary, you wouldn't need a demand controller to take advantage of the TOU Demand rate offered by your utility company. Remember... one slip in any one demand interval and your utility bill would reflect a high Demand charge.

The 9308 takes over this difficult, continuous burden for you. The 9308 is one of the most sophisticated products available for controlling electrical peak demand. When properly used, it can result in average monthly savings of up to 35% and as much as 50% during heavy use months. The sole purpose of the 9308 is to efficiently allocate the usage of electricity to electrical loads so that demand peaks are kept below the level which you have set.

How the 9308 Works

The 9308 contains a microcomputer which turns certain circuits off to keep peak demand below a limit that you preset. Not all circuits need to be controlled by the 9308. Circuits controlled usually include the air conditioning, all heating zones, the dryer, the water heater, or any other load with some thermal storage or “momentum”.

In a typical all-electric home, the morning routine may involve turning up some thermostats, operating the range, water heater and other appliances. Normally, operation of these loads causes a morning peak (such as that illustrated in Figure 1) which registers on the Demand meter.

Now, let’s put the 9308 to work. The start time of the On-Peak period has just passed. The 9308 measures the amount of power being used by the home. It calculates that if you continue to use power at this rate that the demand limit will be exceeded. It waits for a few minutes to see if you are going to turn anything off. If the power consumption continues to exceed the limit, it begins to turn off loads. It turns off the least important loads first, using the control strategy that your dealer programmed into it. As the power consumption drops it allows the most important loads to come back on first.

There are several optional control strategies. A typical strategy might provide power to a higher priority load such as the dryer and cut back on the heating or cooling loads in one or more rooms, or the water heater while this load is on. When the dryer turns off, the power it had been using is channelled back to the room heating or cooling, thus maintaining comfort but reducing peak demand. The end result is that while you have still used the amount of energy normally called upon by your lifestyle, this usage has been leveled out to reduce the On-Peak demand.

How the 9308 Saves

Now that we’ve examined how the 9308 enables you to use the energy you are accustomed to, but spreads this usage out by turning off non-critical loads for short periods of time, let’s look at how this saves you money. Remember, the utility company helps you save by offering the TOU Demand Rate which is a lower rate per unit of total energy consumed(Kwh). You can save money under this rate if you control your peak energy usage to keep the corresponding Demand charge low.

SUPERIOR FEATURES OF THE 9308 ENERGY MANAGEMENT COMPUTER

Real-Time Control

The 9308 Energy Management Computer contains a real-time clock which allows the computer to take advantage of TOU Demand rates available from some utilities and modify the control strategy accordingly. This feature can enhance the money savings and comfort capabilities of the 9308.

Unmatched Simplicity

For unmatched simplicity, the 9308 incorporates a simple dial control knob to set your home's demand limit. All other unit operations are completely automatic. Your dealer has preset all system operating parameters for you when your computer was installed. All you have to do is to set your On-Peak KW demand limit.

Eight Separate Control Points

High peak demands occur when electrical loads are used simultaneously. The 9308 can control up to sixteen individual electric loads on eight separate control points. The appliances which are controlled can be turned off for brief periods of time with little or no interruption to your lifestyle. These loads usually consist of heating or cooling circuits, dryer heating element and hot water heater. On the average these loads are responsible for 60% to 80% of your electrical consumption. With eight separate control points, the 9308 provides maximum flexibility in utilization of energy. That's because the loads which are turned on and off are smaller, permitting a more regular and even demand level.

Microcomputer for Maximum Accuracy and Reliability

Use of a microcomputer allows the 9308 to precisely measure KW power demand and accurately compute the average KW demand. In addition, by using a microcomputer, the 9308 can adapt to any user lifestyle or load requirement by allowing virtually unlimited flexibility in choosing control strategies and minimum on/off times.

EEPROM Non-Volatile Memory for Maximum Flexibility

Energy Sentry's EEPROM memory "remembers" all system settings, even when power is lost to your unit. In this way utility power interruptions do not affect the settings in your 9308.

Choice of Control Strategies

The choice of control strategies, made possible by the use of a microcomputer, offers unlimited flexibility as to how loads may be controlled. This means the 9308 can be adapted to almost any application, requirement, or lifestyle. Your dealer can individually set the priority of each controlled load to create the optimum control strategy for a particular home.

Minimum On/Off Times to Protect Heat Pump and Air Conditioning

All eight control points of the 9308 can be programmed with minimum on and off times, each variable from zero to 20 minutes. This feature allows the 9308 to be used with heat pump and air conditioning motor loads by providing compressor timing protection.

SYSTEM DESCRIPTION

Your Energy Sentry 9308 Energy Management Computer consists of two basic components. These include the Control/Relay Unit and the Current Transformers.

Your 9308 can control only those loads to which it is connected. These loads will vary depending on application and should be listed in the space provided at the end of this manual. If you are in doubt as to which loads are controlled, you should ask the electrician or authorized dealer who installed your 9308.

The basic function of your 9308 is to maintain the total electrical demand below a peak value which is set according to your desired level of comfort and minimum load requirements. Each of the components which make up the 9308 has a separate and unique function in accomplishing this task as described below:

Control/Relay Unit

The Control/Relay Unit consists of control unit and up to eight power switching relays. The computer is mounted next to the main circuit breaker panel. A rotary knob with a Demand Limit (KW) scale (Figure 1) is provided to set the demand limit and allows for increasing or decreasing the demand level to balance savings with comfort.

Current Transformers

Two current transformers, usually mounted inside the load center serve to monitor total electrical usage. They tell the computer in the control relay unit how much electricity you are using for all loads, not just those controlled by the 9308. By monitoring the total usage, loads may be turned on and off to keep total demand below the limit you set.

SYSTEM OPERATION

Your 9308 has been designed for ease of operation and to provide efficient energy use. Please read carefully the following instructions concerning unit operation as they will enable you to maximize efficient energy use and minimize your electric bill.

Your Energy Sentry Energy Management Computer is controlling approximately 60% to 80% of the total electrical load in your home. Except for the stove, the uncontrolled loads are relatively small and do not create much of a demand.

If your demand limit is set below 5 or 6 KW, the total of your **uncontrolled** loads may exceed the limit setting.

Setting The Limit and Other System Settings

There is no single setting that will be suitable for everyone. The level of energy usage (demand) that is required to satisfy comfort, economy, and convenience will vary, perhaps widely, with the uniqueness of each house and its occupants.

To arrive at the best setting for you, we recommend that you start with the lowest KW that you think you will need during the present billing period. The 9308 has a limit setting range of 2 to 15 KW in .5 KW increments on the 200AMP scale, and 4 to 30 in 1KW increments on the 400AMP scale. If you need more energy to maintain comfort, just increase the KW level by .5 KW. If, after a day, this is not enough, increase it by .5 KW again until you are comfortable.

It is important to remember that once the meter increases, it will not come down until it is reset to zero each month by the meter reader. So it will not benefit you to lower your setting below what is already registered on the meter. (See "Hints for Maximum Savings" on page 10).

The KW values in Table 1 are given as a guideline to assist you in setting your demand limit:

TABLE 1
Typical KW Values by Month

Month	Summer (A/C) Area	Winter (Heating) Area	Month	Summer (A/C) Area	Winter (Heating) Area
Jan	4-6 KW	7-10 KW	Jul	6-10 KW	5-6 KW
Feb	4-6	7-10	Aug	6-10	5-6
Mar	5-7	6-9	Sep	6-8	5-7
Apr	5-8	5-7	Oct	5-7	6-8
May	6-10	5-6	Nov	4-6	7-9
Jun	6-10	5-6	Dec	4-6	7-10

At a comfortable inside temperature, the KW demand level will be directly proportional to the heat loss or gain of your home. Homes that have high power consumption (Kwh) and/or poor insulation will generally require higher demand limit settings than those homes with low power consumption and/or good insulation. To set the Demand Limit simply turn the control dial to the desired limit. The control dial can be located in Fig 2.

LOGIC COVER

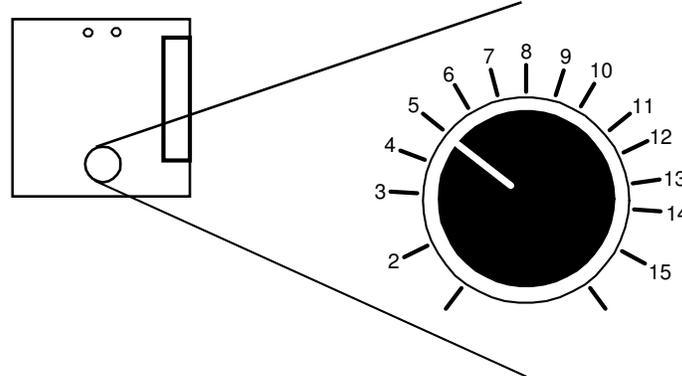


Fig. 2 Control Dial

Load Shedding Sequence

When your total power consumption starts to exceed the limit setting, the computer turns off (sheds) the first load. If necessary, additional loads will be shed to keep the **average** demand below the limit setting. Loads are shed according to the priority strategy selected: either the fixed priority strategy, the rotating strategy, or a combination.

The load shedding priority selected is based on the type of heating and cooling equipment and the design of your house. If desired, the priorities may be changed by your dealer. The following are typical priorities:

TABLE 2
Baseboard Heated Home

Load Control Strategy:		Combination Fixed/Rotate		
<u>Control Point #</u>	<u>Priority</u>	<u>Shed Sequence</u>	<u>Load</u>	<u>Demand</u>
1	1 (Highest)	Last	Dryer	5.5 KW
2	2	Second	Water Heater	4.5 KW
3	3 (Lowest)*	First*	Living Room Heat	3.5 KW
4	3 (Lowest)*	First*	Basement Heat	4.0 KW
5	3 (Lowest)*	First*	Entry Heat	1.5 KW
6	3 (Lowest)*	First*	Bedroom Heat	2.0 KW
7	3 (Lowest)*	First*	Bedroom Heat	2.0 KW
8	3 (Lowest)*	First*	Family Room Heat	3.0 KW

NOTE: Shedding sequence of rotating loads begins with the load which has been restored the longest. When all #3 priority loads are all shed, the #2 priority load is shed next. The #1 priority load is shed last, if necessary.

TABLE 3
Heat Pump/Air Conditioner Home

Load Control Strategy: Fixed Priority

<u>Control Point #</u>	<u>Priority</u>	<u>Shed Sequence</u>	<u>Load</u>	<u>Demand</u>
1	1 (Highest)	Last	Dryer	5.5 KW
2	2	Seventh	Compressor #1	3.0-7.0 KW
3	3	Sixth	Compressor #2	3.0-7.0 KW
4	4	Fifth	Water Heater	4.5 KW
5	5	Fourth	Strip Heat #1 Electric Furnace	5.0 KW
6	6	Third	Strip Heat #2 Electric Furnace	5.0 KW
7	7	Second	Strip Heat #3 Electric Furnace	5.0 KW
8	8 (Lowest)	First	Strip Heat #4 Electric Furnace	5.0 KW

NOTE: (1) Compressor is not shed when outside temperature is below 30° F (when an outside thermostat is installed). (2) Compressor cannot be restarted for at least five minutes after it is shed. This delay feature is for compressor protection.

Changing Control Strategies

When your 9308 was installed, the strategy most appropriate to your existing load requirements was selected. If your load requirements have since changed, or if you would like to change your control strategy, contact your dealer.

Control of Clothes Dryer

The clothes dryer is usually one of the last circuits the 9308 sheds. When the dryer is shed, the dryer motor continues to tumble clothes. Only the heating element is cut off during this brief period. This means that when your limit is at 5 or 6 KW and cooking a large meal, the dryer will be shed when the oven element (4.5 to 5.5 KW) is on. When the oven element is off, the dryer element is restored. This may result in your clothes being slightly damp at the end of the drying period and may require longer drying times.

NOTE: If the dryer cannot be restarted (or stops) each time it is shed, it is not properly wired to the controller. Have your electrician change it. It will only take a few minutes at the breaker panel.

CAUTION: If you purchased a new dryer or if you move into a home with an Energy Management Computer already installed, your dryer may not work properly. Since not all dryers are wired the same, the dryer wires in the circuit breaker panel may have to be reversed. (See note above)

HINTS FOR MAXIMUM SAVINGS

When the setting is to be decreased (for example from 10 KW to 8 KW), the setting should be decreased **BEFORE** your utility meter is read. You can check past bills to determine this date or call the utility company directly.

When the setting is to be increased (for example, from 6 KW to 7 KW), the setting should be increased **AFTER** your utility meter is read. You can help increase the effectiveness of your 9308 controller by trying to avoid turning on two or more major appliances at the same time whenever possible. This will assist the computer not only in controlling demand but will increase the comfort level of your home; (e.g., dry clothes at times when the range is not in use).

Additionally, shifting use of any loads possible to Off-Peak times will help to reduce your On-Peak energy usage charge. In most TOU Demand rates, not only is the On-Peak demand charge substantially more costly per KW than the Off-Peak demand charge, but On-Peak kilowatt-hours of energy are more costly than Off-Peak kilowatt-hours.

SERVICE OF HEATING/AIR CONDITIONING, WATER HEATER AND CLOTHES DRYER

When technicians service any electrical equipment that is controlled by the computer, they should be advised that you have an energy management computer. They should also be warned not to disconnect the computer wiring or leave its power supply (circuit breaker) off. Otherwise, they may unknowingly disable your computer which could result in a very high electric bill. If your computer is turned off by service technicians, avoid using heating/cooling systems, the dryer and water heater.

The Energy Sentry 9308 energy management computer simply acts as another switch on the water heater, dryer, or heating/cooling equipment. It cannot cause damage or premature failure of the equipment when it is installed and set correctly. Nor can it cause a higher electric bill than you would have had without a computer.

When the power to the 9308 energy management computer is OFF at the breaker panel, power will be available to all controlled loads. Without power, the 9308 computer cannot control your demand. This is why the power must be restored to the computer after a service call. If your service technician is unfamiliar with the operation of the Energy Sentry 9308, direct them to contact your dealer or call the factory.

IF YOU NEED SERVICE

Your Energy Sentry Model 9308 has been carefully assembled and tested at the factory. Only components having a high degree of reliability and long life have been used in its manufacture. In the event that a failure does occur, your 9308 has been designed so household appliances and loads will continue to function. The only difference is that there will be no demand control, and high demand peaks can occur. If a malfunction should occur, you may turn off the 9308 breaker labeled "9308", "Energy Management Computer", or "EMC", located in the load center (breaker panel). To avoid unnecessary demand peaks you may control your demand manually as follows:

1. Heat or cool only those rooms which are occupied by keeping the thermostat set only while you are in each room.
2. When cooking meals, all heating or cooling zones, the water heater, and dryer should be turned off.
3. Avoid using appliances simultaneously. For example, do not use the dryer and the range at the same time.
4. You may monitor your highest demand peak on the utility meter to determine the effectiveness of manual control.
5. Since there are no user servicable parts or components in the 9308, refer all service to the installing electrician, authorized Energy Sentry dealer or distributor, as described in the Warranty.

APPENDIX A - GLOSSARY

The following terms are used throughout this manual. They are defined here so as to assist you in understanding their meaning and use.

Declining Block Rate - A method of charging for electric service used by electric utilities based on total energy consumed (KWh) and cost per KWh. The cost per KWh is usually reduced as total KWh use increases.

Demand - The rate of usage of electrical power, expressed in KW (or kilowatts).

Demand Billing Rate - A method of charging for electric service used by electric utilities where the cost of electricity is based on both total energy consumed (KWh) and demand peak (KW).

Demand Meter - A utility meter which measures both total energy consumed in KWh and the highest average demand peak in KW.

Demand Peak - The highest average KW demand over the billing period. Averages may be determined over 15, 30 or 60 minute intervals depending upon the utility.

Energy Rate - A method of charging for electric service used by utilities where the cost of electricity is based only on KWh consumption multiplied by a fixed cost per KWh. Cost per KWh remains the same regardless of the number of KWh's used. Also called "Flat" rate.

Kilowatt (KW) - 1,000 watts

Kilowatt Hour (KWh) - The basic measurement of electric power (energy) consumption as metered by the electric utility. (If you were to turn on ten 100 watt lights for one hour, you would have consumed one kilowatt hour of electrical energy).

Time-Of-Use Demand Rate - A method of charging for electric service used by electric utilities which charges a higher price for KWh's used in Peak periods, and a lower price for KWh's used in the Off-Peak periods. The Demand Peak is usually monitored and recorded only in the Peak periods. The cost of electricity is based on both total energy consumed (KWh) and demand peak (KW). Depending on the particular utility and rate, one or more Peak periods, varying in length, may exist during a 24 hour period.

Watt - A measure of electrical power or rate of doing work. It is analogous to horsepower where one horsepower is equivalent to approximately 746 watts.

REQUIRED WARRANTY INFORMATION

Installing Electrician: Fill out applicable information on this page.

1. Strategy selected (check applicable strategy):

Fixed _____ Rotating _____ Combination (Fixed/Rotate) _____

Control Circuit	Priority	Circuit Assignment/Description (if applicable)	Minimum on/off Time *
1	_____	_____	mins on___/off___
2	_____	_____	* mins on___/off___
3	_____	_____	* mins on___/off___
4	_____	_____	mins on___/off___
5	_____	_____	mins on___/off___
6	_____	_____	mins on___/off___
7	_____	_____	mins on___/off___
8	_____	_____	mins on___/off___

* Control Points 2 and 3 are shipped with 8 minutes on and 5 minutes off.

Owner:

1. Record circuit assignments above.
2. Fill out warranty card and mail today!
3. Record items 5, 6, 7, and 8 from warranty card below for your records.

Date of installation _____

Serial number _____

Installing Electrical Contractor _____

Phone # _____