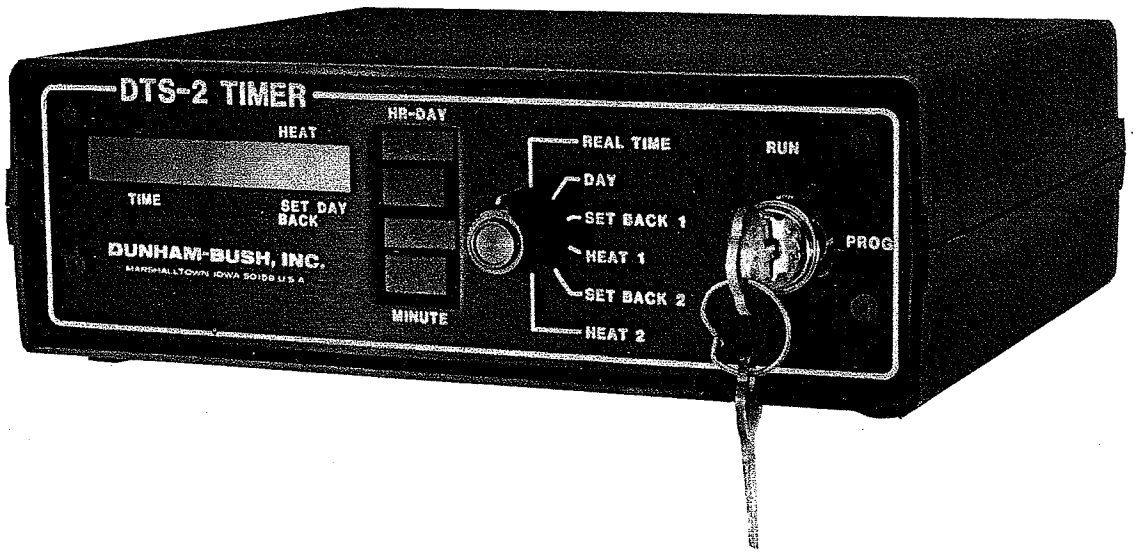
FORM NO. IO-2101



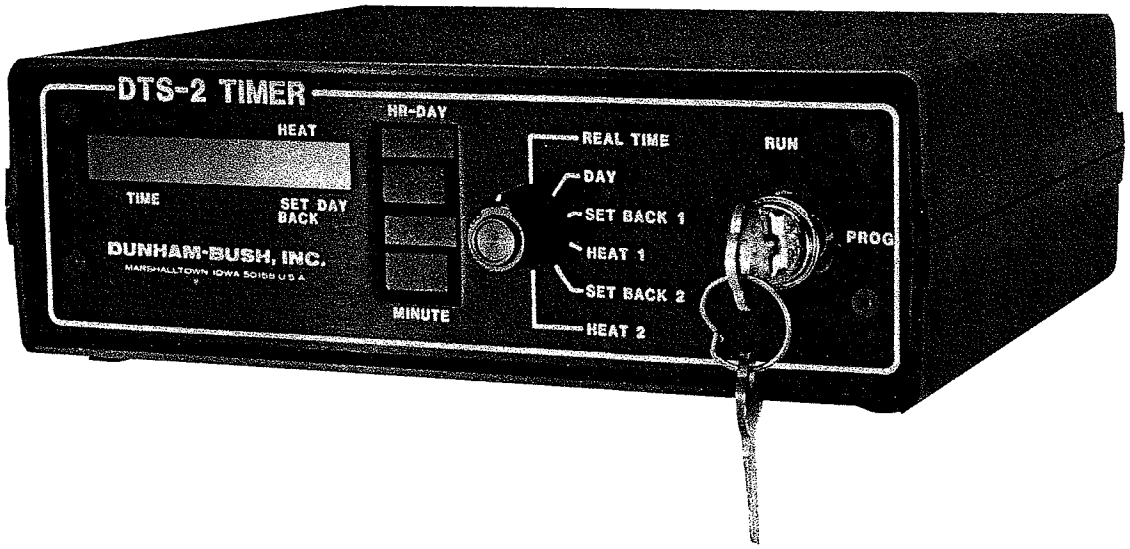
DUNHAM-BUSH

VARI-VAC DTS-2 PROGRAMMABLE TIMER

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

INTRODUCTION

The DTS-2 Programmable Timer is an optional feature of the Vari-Vac Heating Control System and is used in conjunction with the P1A3AM Control Center. The timer adds automatic, timed temperture control to the system with a microprocessor-based system which offers up to two daily programmable heat and setback periods. If the timer is to be used with other than Vari-Vac System Components, the factory should be consulted. In addition to its programmable functions, the correct time of day is also indicated.



GENERAL

Real time (AM or PM), the current mode of operation (Heat or Setback) and the day of the week are displayed simultaneously. In case of a power failure or "brown out" condition, timekeeping functions are automatically switched to a self-charging Ni-Cad battery support system. There is no need to periodically replace back-up batteries.

When the program is "written" into the unit, it is placed in non-volatile memory. This type of memory requires no back up from batteries, and even if power is interrupted, the program will not be "lost" and have to be re-programmed into the timer.

There is a full system automatic reset built into the DTS-2, so that even after extended periods of power loss, the unit sets itself to the correct time and resumes operation. In cases where power is lost for more than 48 hours, it is adviseable to check "REAL TIME", but none of the program will be lost.

A setback override feature allows the operator to bring the system out of setback and return to setback without altering the program or control panel. Setback temperatures are switch selected in 5 degree increments to 20° F below the "DAY CONTROL" setpoint. This feature is handy in multi-purpose buildings where unscheduled events take place. Setback override may be remotely controlled.

The "HEAT UP" mode found in all previous Dunham-Bush programmable clocks has been removed from the DTS-2. This prevents possible zone temperature overshooting when the system comes out of setback, and allows the system to monitor and control the temperature more accurately.

INSTALLATION

RECEIVING INSPECTION

When the unit is delivered an immediate visual inspection of the unit should be made in the presence of the carrier's representative. If there is any evidence of rough handling or damage, a notation should be made on the delivery receipt. Shipping damages are the responsibility of the carrier and it is the obligation of the customer to file a claim. If requested, Dunham-Bush will assist in the filing of the claim.

UNPACKING

When unpacking the timer, be sure that all the parts necessary for proper operation are enclosed:

1. Programming keys
2. Velcro for feet and cabinet of control panel
3. 24" piece of 3 conductor cable (red, black, green)
4. Split grommet for top of cabinet

ASSEMBLY

The DTS-2 Programmable Timer arrives to you fully assembled and ready for operation.

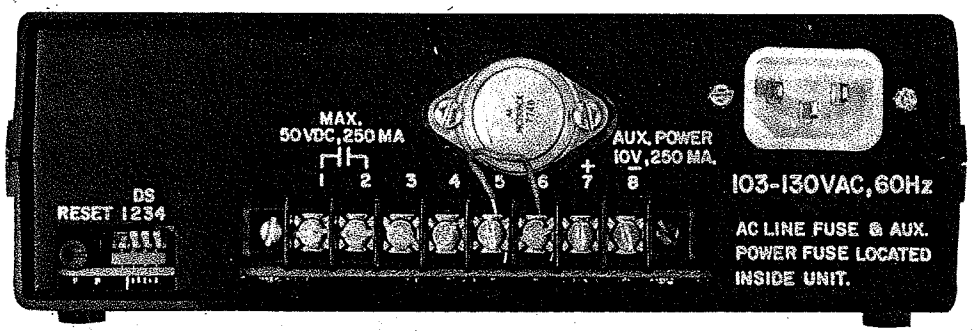
MOUNTING

Suggested locations for timer placement are as follows:

1. May be mounted on top of control panel cabinet using the 4 velcro tabs supplied.
2. May be mounted on an accessory shelf **near** the control cabinet.

WIRING

Terminals 1 & 2 - No Connection *
Terminal 3 - Red wire to Terminal #22 of the Vari-Vac Control Center
Terminal 4 - Black wire to Terminal #23 of the Vari-Vac Control Center
Terminal 5 - Green wire to Terminal #24 of the Vari-Vac Control Center
Terminal 6 - Normally jumpered to DTS-2 Terminal #5
Terminals 7 & 8 - No Connection **



*Terminals 1 and 2 are relay contacts used to gang program more than one zone.

**Terminals 7 and 8 are power supply outputs for expansion purposes. Make no connections to these terminals.

FUNCTIONS

REAL TIME

The real time display includes the letters A (for AM), and P (for PM) to assist in programming. Setting the minutes has no effect on the hours, i.e. minutes change from :59 to :00 without advancing the hour register.

MODE

The mode indicator is a red horizontal bar. It moves to the top of the labeled display to indicate normal temperature setpoint, and to the bottom of the display to indicate the setback mode.

DAY

The day display is a one character representation of the day of the week. Monday is 1, Tuesday is 2, etc.

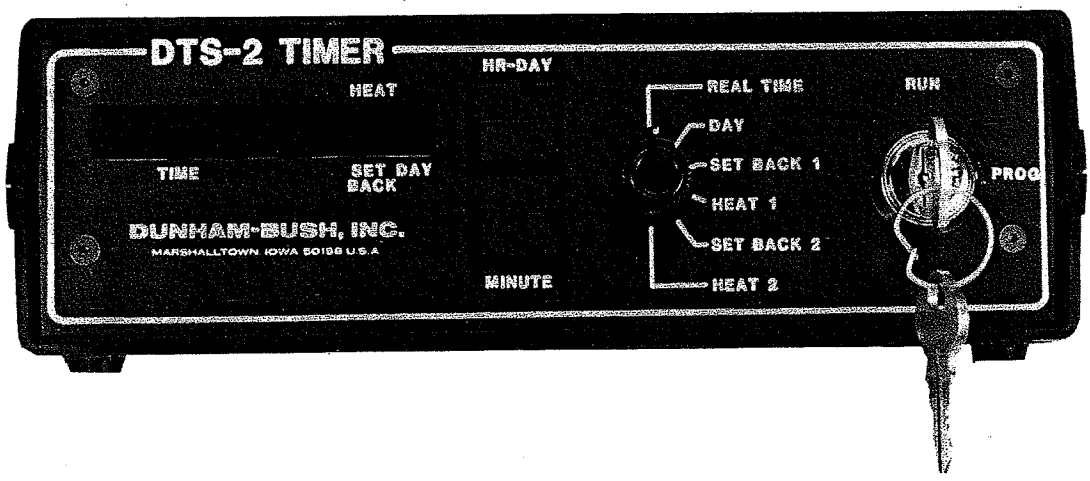
SETBACK AND HEAT TIMES

These are programmed like "REAL TIME". They are used to indicate the times of day when temperatures will be normal (HEAT) or reduced (SETBACK). Setting the hours to 0:00 facilitates skipped cycles or days. Refer to the programming instructions in this manual for further information.

SETBACK SELECT SWITCHES

There are four miniature switches in the lower left-hand corner on the back of the DTS-2. The setback values are preset at the factory. Switch 1 is 5°, 2 is 10°, 3 is 15°, and 4 is 20° setback. Engage **only one** switch at a time.

OPERATION



PROGRAMMING INSTRUCTIONS

1. Apply 115 VAC, 60 hz to the unit. The supply **must** be 3 wire (grounded).

2. Press "Reset" on back of unit.

3. To set "REAL TIME"
   A. Turn keyed Run/Program switch to "PROGRAM".
   B. Turn function selector to "REAL TIME".
   C. Use the "HR-DAY" and "MIN" pushbuttons to set the time. Holding either switch will automatically "scroll" the time. Note the A and P indicators on the display for A.M. and P.M.

4. Set the "HEAT" and "SETBACK" times.
   A. Turn the function selector to "DAY".
   B. Press "HR-DAY" until display indicates correct day of the week (1 is Monday, 7 is Sunday).
   C. Turn selector to "SETBACK 1" to program the time of temperature reduction.
   D. Advance time as before. NOTE: Setback "skips" are achieved by setting the clock to 0:00 A.M. or P.M. "Setback Skip" leaves the controlled zone at the "DAY CONTROL" setpoint.
   E. Turn the selector to "HEAT 1".
   F. Advance the time as before. NOTE: Heatup "skips" are achieved by setting the clock to 0:00 A.M. or P.M. "Heat-up Skip" leaves the controlled zone at the setback temperature.

> Notice that the function selector also lists "SETBACK 2" and "HEAT 2". These provide a second daily period of temperature control for multi-purpose buildings or intermittently occupied spaces. "SETBACK 2" and "HEAT 2" are programmed like "SETBACK 1" and "HEAT 1" - repeating steps 4C through 4F. Make sure that these two periods are in chronological order. "HEAT 1" and "SETBACK 1" before "HEAT 2" and "SETBACK 2".

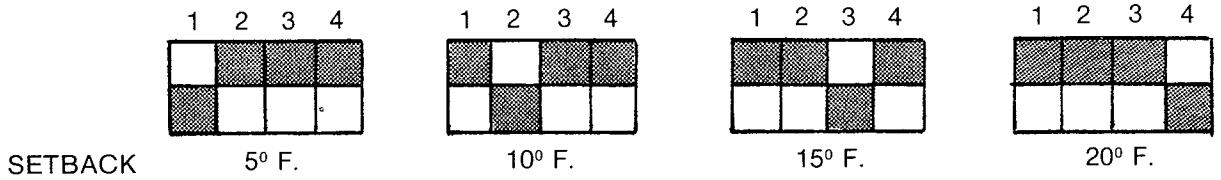
   G. Turn the selector to "DAY".
   H. Advance to the next day.
   I. Perform steps C through H for all seven days.

When setting the "HEAT" times, remember to allow a sufficient period of time for the zone to warm up to the desired temperature. For example, if it takes one hour for the controlled zone to heat to the desired temperature, and it is to be occupied at 7 A.M., set the "HEAT" time at 6:00 A.M. to make sure the zone is warm at the time of occupation. The same is true when setback override is used. Keep in mind that fine tuning the length of time the zone requires to reach optimum temperature will result in energy savings.

5. Prepare the DTS-2 for normal operation.
   A. Turn the function switch to "DAY".
   B. Use the "HR-DAY" button to scroll the display to the current day.
   C. Return the function selector to the "REAL TIME" position.
   D. Turn the "RUN/PROGRAM" key switch to RUN.

6. When finished with all programming, PRESS THE RESET BUTTON on the back of the DTS-2 to commit the program to memory.

7. Select the appropriate temperature setback. USE ONLY **ONE** SETBACK SWITCH AT A TIME. In the switch diagram below the darkened squares indicate the toggle position. **Example:** For 5° setback, switch one is down and switches 2, 3, 4 are up.



SWITCH DIAGRAM

PROGRAM REVIEW INSTRUCTIONS

To review the DTS-2 program at any time:

1. Turn the key switch to PROGRAM.

2. Turn the function selector to "DAY" and scroll to the day you wish to review.

3. Rotating the selector to the heat or setback positions displays the time of the respective events (the mode flag will remain in the current operating status).

4. While reviewing the program, if you find that one of the time, day, or mode commands is incorrect or should be changed, simply change it at that time. Each event can be addressed individually, so there is no need to rewrite the entire program.

5. When you have finished reviewing and/or altering the program, return the clock to the current day. Turn the key switch to "RUN", and press the reset button. Check the display for the correct "REAL TIME".

MAINTENANCE

The DTS-2 has been designed to require no regular maintenance.

Should control system malfunctions occur, such as incorrect heat or setback time or temperature, review the program (pg. 6, program review instructions), and setback switch positions (pg. 6 programming instructions #7.)

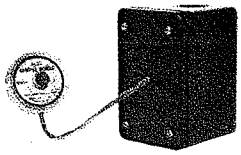
Repair questions should be directed to the factory. Dunham-Bush, 811 Main St., Marshalltown, Iowa 50158, 515-752-4291.

REFERENCES

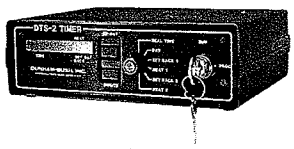
Please consult the latest edition of the following forms for additional information. Forms are available from your local Dunham-Bush heating representative or from the Dunham-Bush Literature Distribution Center, 101 Burgess Rd., Harrisonburg, VA. 22801

Catalog	Form
Vari-Vac Heating Control Systems	2140
Vari-Vac Application Manual	2195
Vari-Vac Control Center Installation, Operation and Maintenance Manual	IO-2100

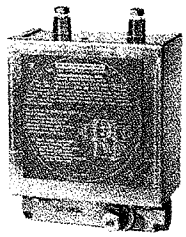
DUNHAM-BUSH RESERVES THE RIGHT TO MAKE CHANGES IN SPECIFICATIONS AND DESIGN WITHOUT NOTICE.



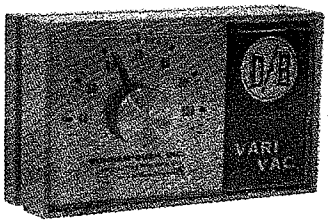
WINDOW SENSOR



PROGRAMMABLE TIMER

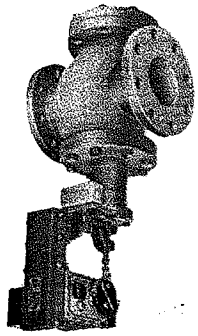


DIFFERENTIAL PRESSURE CONTROLLER

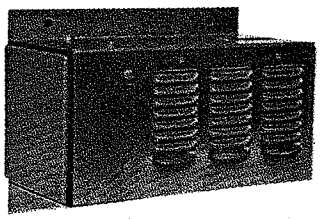


RESISTANCE THERMOMETER

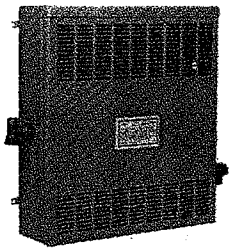
CONTROL CENTER



CONTROL VALVE



OUTDOOR SENSOR



HEAT BALANCER

VARI-VAC

COMPONENTS

DUNHAM-BUSH

AIR CONDITIONING, REFRIGERATION, HEATING PRODUCTS AND ACCESSORIES

MAIN OFFICES

CORPORATE HEADQUARTERS
175 South Street West Hartford, Connecticut 06110

FACTORIES

WEST HARTFORD DIVISION
179 South Street
West Hartford, Connecticut
06110

HARRISONBURG DIVISION
101 Burgess Road
Harrisonburg, Virginia
22801

MARSHALLTOWN DIVISION
811 East Main Street
Marshalltown, Iowa
50158

RIVERSIDE DIVISION
1850 Massachusetts Ave.
Riverside, California
92507

REPRESENTED BY:

DUNHAM-BUSH, INC. • Marshalltown, Iowa 50158, U.S.A.

IO-2101-1.5-385