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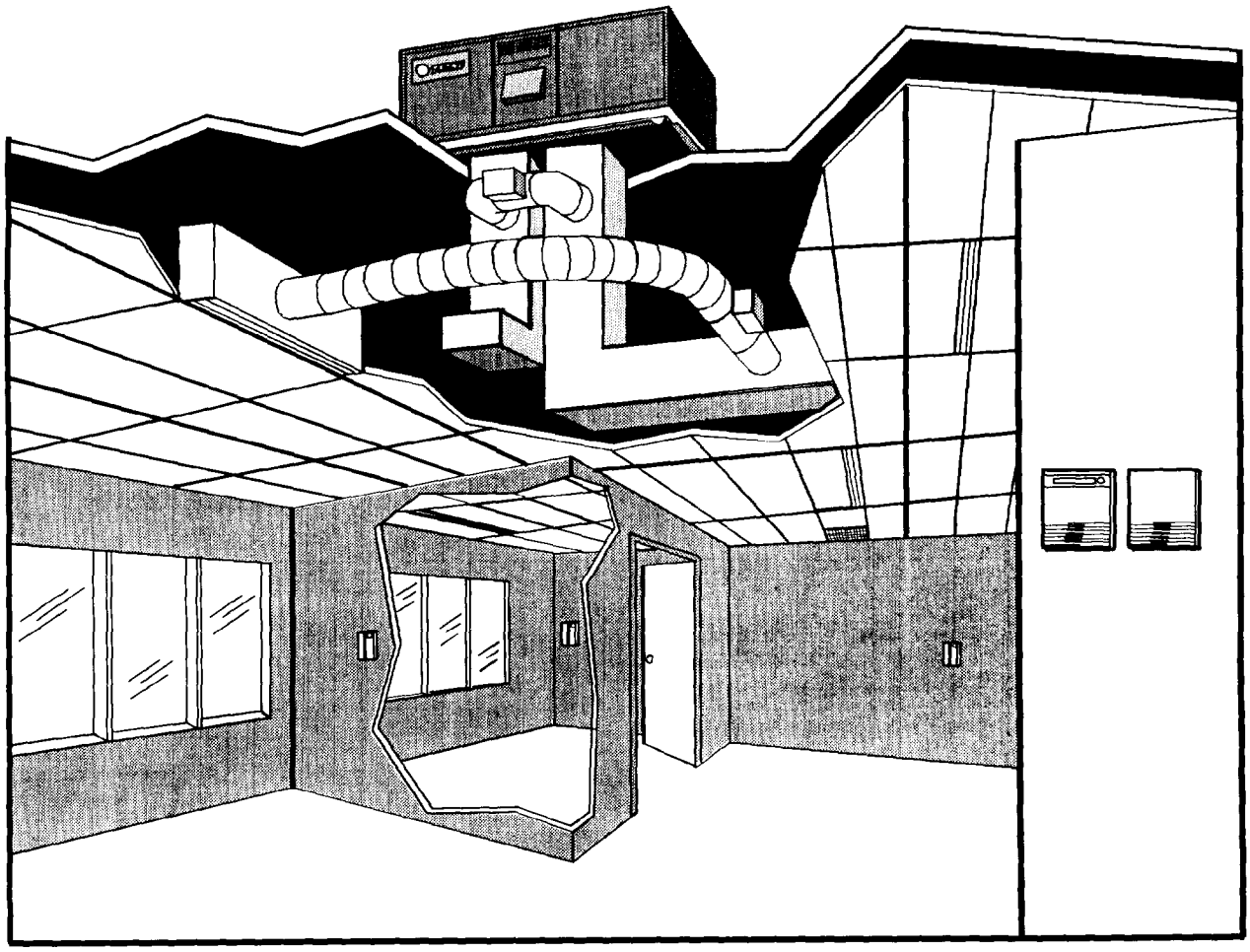
VariTrac™ II
Central Control Panel

Operator's Guide
Software Version 2.0



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About This Manual

Contents

This manual describes the steps required to properly set up and operate the VariTrac II Changeover-Bypass-Zoning system. Sections in this manual are as follows:

- Software Change History: A chronology of version changes to VariTrac II software.
- Introduction: General information about the VariTrac II Central Control Panel.
- Operation Overview: Basic operation information covering start-up, Heat/Cool decision, UCM and Zone Sensor operations.
- Terminal Operation: Information and procedures for operating the edit terminal and modem interfaces.
- VariTrac II Menu System: Operation and configuration information for the five major screens in the VariTrac II Menu System:
  - UCM Data
  - Group Data
  - AHU Status
  - VariTrac II Central Control Panel Setup
  - VariTrac II Central Control Panel Control Inputs
  - VariTrac II Central Control Panel Service Summary

VariTrac II Naming Conventions

The use of the name *VariTrac II* in this manual implies VariTrac II Central Control Panel and the VariTrac II system software . In any case where information is unique to one model, the model will be specified.

Warnings and Cautions

Where appropriate, cautionary statements are used to signal procedures or conditions that require particular attention. A WARNING alerts installing contractors and service personnel to potential hazards that could result in personal injury or death. A CAUTION alerts the user to the risk of equipment damage. Your personal safety and the proper operation of these systems depend upon the strict observance of these precautions.

Related Literature

The following literature is referred to or pertains to equipment referred to in this manual.

- VariTrac II Central Control Panel Installation Guide
- Voyager Service Literature

Software Change History

New software versions are developed to add capabilities and improve existing software operation. Each new software version includes all of the features in prior versions. Only the latest software version is shipped in new VariTrac II units. Existing units may have a previous version.

The following traces the history of version changes made to VariTrac II software.

Version 1.0

- Initial release of VariTrac II Central Control Panel.

Version 2.0

- Changed UCM tagging to 3°F deviation from setpoint for more than 60 minutes.
- Allowed UCMs to untag when deviation reaches 1°F or less.
- Changed Supply Air Limiting algorithm to prevent unnecessary upstaging if the supply air is already at the desired temperature.
- Changed upstaging to require stage one operation for 15 minutes and one strong caller or stage one operation for five minutes and two strong callers.
- Changed Minimum Opposite Calls to Changeover to require all current mode callers to be satisfied before changeover is allowed.
- Added Minimum Opposite Strong Calls to Changeover to allow as few as one zone to force changeover when it deviates more than 2°F from setpoint.
- Made Minimum Time to Changeover an editable factor.
- Added support for Voyager Commercial (Voyager III) constant volume units only.
- Allowed compatibility with UCM 2.1 and 2.2
- Allowed Control Offset to function with setpoint thumbwheels on UCM 3.0 or later.

Introduction

The VariTrac II Comfort Control System brings individual temperature control to each comfort zone in a building while using the same single zone air conditioning unit. It varies the flow of supply air to each zone , providing the heating and cooling capacity required to match the load in each particular zone.

The VariTrac II system is composed of the following components:

- VariTrac II Central Control Panel
- Main Duct Velocity/Static Pressure Sensor
- Main Duct Supply Air Temperature Sensor
- Main Duct Supply Air Bypass Damper
- VariTrac Zone Dampers with UCM Control Module and Zone Temperature Sensor
- Optional Stat 4 Operators Panel

The Central Control Panel provides coordination, monitoring, and diagnostics for the VariTrac zone control system. It is responsible for communicating with the Zone Dampers to determine space heating and cooling requirements, and selecting the mode and number of stages for the heating and cooling unit to meet those needs.

The main duct Velocity/Static Pressure Sensor measures the air pressure in the main supply duct and provides this information to the VariTrac II Central Control Panel so it can control the bypass damper system.

The main duct Supply Air Temperature Sensor monitors the temperature of the air in the main supply duct and provides this information to the Central Control Panel so it can maintain the air conditioning unit within the specified limits, and share the temperature information with the zone UCMs.

The main duct Supply Air Bypass Damper is modulated by the VariTrac II Central Control Panel to bypass air from the supply duct to prevent over-pressurization of the system.

The VariTrac Zone Damper with a Unit Control Module (UCM) and a Zone Temperature Sensor measures the space temperature and modulates the damper to provide the proper amount of heating or cooling air to meet comfort conditions. It also provides the VariTrac II Central Control Panel with information about the current comfort conditions of the space.

The VariTrac II Central Control Panel is designed to provide coordinated control of up to 16 VAV UCMs and one air handling unit. The Central Control Panel can function as a standalone device with its control mode functions initiated by binary inputs from a time clock and other contact closures. The VariTrac II Central Control Panel can also be controlled and monitored from an upper level system such as a Tracer or the Stat 4, 7, or 16.

Operation Overview

VariTrac II Central Control Panel

Central Control Panel Start-up

Upon power up, the VariTrac II Central Control Panel executes the following sequence of events:

1. Calibrates the bypass control loop. See bypass control section of this manual.
2. Scans all UCMs and collects UCM information.
3. Determines the system mode.
4. Communicates the system operating mode to all UCMs (occupied/unoccupied and individual UCM heat/cool mode)
5. Begins normal operation.

Bypass System Calibration

Upon power-up or a change from the occupied to the unoccupied mode the bypass system will go through its calibration procedure. All UCMs drive their dampers open to perform their position calibration. After 3 minutes, the UCMs are driven to their MAX position, and the bypass damper is driven closed. The "zero flow" voltage reading is taken with the fan off. The system fan is turned on for 45 seconds, and the "high flow" voltage reading is taken and stored in the Central Control Panel. The bypass damper is then driven to 50%, and the UCMs are released from their MAX position.

Velocity Bypass Control

The VariTrac II Central Control Panel will modulate one or more bypass dampers to protect air handling components from excessively low air flow or high duct velocity pressure. A velocity sensor located in the supply air duct measures system air flow velocity and passes the information to the Central Control Panel. The Central Control Panel compares the measured air flow against the "Minimum supply flow setpoint" edited in the Setup menu. If the measured flow is lower than the setpoint the bypass dampers will be driven towards the open position. If the measured airflow is greater than the setpoint plus 6%, the dampers will be driven towards the closed position. If the airflow is in the deadband between setpoint and setpoint plus 6%, the dampers will remain stationary. The bypass can be repositioned up to four times per minute.

Static Pressure Bypass Control

The VariTrac II Central Control Panel is also capable of controlling the bypass dampers using measured duct Static Pressure. The selection is made with a dip switch located on the Central Control Panel. A static pressure sensor (which is a field-converted velocity sensor) located in the supply air duct measures system static pressure and passes the information to the Central Control Panel. The Central Control Panel compares the measured static pressure against the "reference static" (determined during calibration) and the "static pressure setpoint %" edited in the Setup menu. If the measured static is lower than the [reference static X (setpoint % minus the control band %)] the bypass dampers will be driven towards the closed position. If the measured static pressure is greater than the [reference static X setpoint %], the dampers will be driven towards the open position. If the static is in the deadband between these two points, the dampers will remain stationary. The bypass can be repositioned up to four times per minute.

If the duct velocity or static sensor should fail, the bypass damper will be driven to the "fail safe position" edited in the Central Control Panel setup menu.

In the unoccupied mode the bypass damper is driven to 50%.

Heat/Cool Mode Decision for UCMs

The heat/cool "control action" for the individual UCMs is determined by the VariTrac II Central Control Panel, and then sent to the UCM to be executed. The Central Control Panel compares the supply air temperature of the system to the individual UCM zone temperature and zone setpoint.

If the supply air temperature is:

<=(less than or equal to) the zone temperature the control action will be "Cool"

>=(greater than or equal to) the zone temperature +10°F or more, the control action will be "Heat"

If the supply air temperature is between the zone temperature and zone temperature +10°F:

- and the zone temperature is above the cooling setpoint, the control action will be "Heat"
- and the zone temperature is below the heating setpoint, the control action will be "Cool"
- and the zone temperature is between the heating setpoint and the cooling setpoint, the control action will remain unchanged

UCM Voting for System Heat or Cool

Each UCM attached to the VariTrac II Central Control Panel can vote for heating or cooling. A UCM is determined to be a "Voting UCM" if the following criteria are met:

- presently communicating with the Central Control Panel
- has access to a valid zone temperature reading
- is edited to be a "voter" in the UCM setup menu
- has not been tagged by the Central Control Panel (see UCM tagging section below)

Each UCM gets one vote. Occupied and Unoccupied UCMs have the same voting rights.

UCM Tagging for "No Vote"

A UCM zone will be tagged and excluded from the voting decision if:

- the zone is receiving its desired supply air
- the zone temperature is the farthest away from setpoint of all voting UCMs receiving their desired supply air
- the zone temperature is 3 or more degrees away from setpoint for 60 minutes

A tagged zone continues to operate normally and will continue to communicate. This tagging capability is used to prevent a zone from driving the comfort of all other zones when its setpoints or load is such that it cannot be realistically satisfied.

The zone will become an eligible voter to the changeover decision once it returns to within 1°F of its active setpoint, the system goes unoccupied, or if "UCM Tagging" is edited from enabled to disabled in the Central Control Panel Setup Menu.

The units tagged by the VariTrac II Central Control Panel are displayed in the "Service Summary."

UCM Heat/Cool Mode and Call Strength

Once the heat/cool mode of the UCM has been decided, and it is a voting UCM, the strength of its heating or cooling call will be determined.

Cool Caller-A UCM will become a cool caller if it is a voting UCM and its zone temperature is 1.0 degree or more above the active cooling setpoint. A UCM will lose its cool caller status if it becomes a non-voter or if its zone temperature is less than or equal to the active cooling setpoint +0.5 degrees.

Strong Cool Caller-A UCM will become a strong cool caller if it is a voting UCM and its zone temperature is 2.0 degrees or more above the active cooling setpoint. A UCM will lose its strong cool caller status if it becomes a non-voter or if its zone temperature is less than or equal to the active cooling setpoint +1.0 degree.

Heat Caller on a UCM with no local heat or "Priority Local Heat" edited to OFF becomes a heat caller if it is a voting UCM and its zone temperature is 1.0 degree or more below the active heating setpoint. A UCM will lose its heat caller status if it becomes a non-voter or if its zone temperature is greater than or equal to the active heating setpoint -0.5 degree.

Strong Heat Caller on a UCM with no local heat or "Priority Local Heat" edited to OFF becomes a strong heat caller if it is a voting UCM and its zone temperature is 2.0 degrees or more below the active heating setpoint. A UCM will lose its strong heat caller status if it becomes a non-voter or if its zone temperature is greater than or equal to the active heating setpoint -1.0 degree.

Heat Caller on a UCM with local heat and "Priority Local Heat" is edited to ON -A UCM edited to have Local Heat will become a heat caller if it is a voting UCM, its local heat has not been disabled by the Central Control Panel, and its zone temperature is 2.0 degrees or more below the active heating setpoint. A UCM will lose its heat caller status if it becomes a non-voter or if its zone temperature is greater than or equal to the active heating setpoint -1.5 degrees.

Strong Heat Caller on a UCM with local heat and "Priority Local Heat" is edited to ON -A UCM edited to have Local Heat will become a strong heat caller if it is a voting UCM, its local heat has not been disabled by the Central Control Panel, and its zone temperature is 3.0 degrees or more below the active heating setpoint. A UCM will lose its strong heat caller status if it becomes a non-voter or if its zone temperature is greater than or equal to the active heating setpoint -2.0 degrees.

Heat/Cool Decision for the Central Control Panel

All UCM zones are scanned continuously (but not more than once every 10 seconds) by the Central Control Panel. The quantity and strength of all UCM heating and cooling calls is determined. At power-up and on transition from unoccupied to occupied, the greater number of calls for either heat or cool will determine the mode of the Central Control Panel and the air conditioning system.

Heat/Cool Changeover for the Central Control Panel

Once a heating/cooling decision has been determined, the VariTrac II Central Control Panel will require a minimum number of opposite calls to changeover. This is an editable setup parameter with a range of 1 to 4. The factory default value is 2. All current mode callers must be responded to before the system will be allowed to changeover.

Example: Minimum opposite calls to changeover is set to 2. If the system is in the heating mode and three zones are calling for heat, all three zones must have their heating calls satisfied. Then, two or more zones must be calling for cooling for the system to changeover. The changeover will not occur until all minimum on/off times have been satisfied.

A minimum time between changeovers will also be enforced. This is an editable setup parameter with a range of 10 to 60 minutes. The factory default is 15 minutes. The "minimum time to changeover" counter begins running immediately after a changeover occurs. This timer must be expired before another changeover will be allowed. The time remaining on the counter is displayed in the Service Summary.

NOTE: During the unoccupied mode (all groups unoccupied) the "minimum opposite calls to changeover" functions the same as in the occupied mode.

Heat/Cool Changeover from Opposite Strong Callers

A heat/cool changeover can also occur if enough opposite STRONG callers exist. Zones which are more than 2°F away from their setpoint are considered to be strong callers, as described in the previous section UCM Heat/Cool Mode and Call Strength. The "minimum opposite strong calls to changeover" is an editable setup parameter with a range of 1 to 4. The factory default is 2. This is the number of opposite strong callers required to force the system to changeover to the opposite mode. All current mode callers DO NOT have to be satisfied, but the "minimum time to changeover" must be expired before changeover is allowed.

NOTE: During the unoccupied mode (all groups unoccupied) the "minimum opposite strong calls to changeover" automatically goes to one (1) so any "Strong Caller" zone can change the system over.

Central Control Panel Heat/Cool Staging

All Staging for 2H2C systems and Cooling Stages on a HEAT PUMP occurs as follows:

Stage 1 - comes on when at least one "current mode" caller exists

Stage 2 - comes on when stage one has been on by itself for 15 minutes and at least one "strong current mode" caller exists, or when stage one has been on by itself for 5 minutes and two "strong current mode" callers exist

Stage 2 - goes off when no "strong current mode" callers exist

Stage 1 - goes off when no "current mode" callers exist

Heat Staging for HEAT PUMP systems occurs as follows:

Stage 1 - comes on when at least one "current mode" caller exists and the reversing valve has been off for at least 4 minutes

Stage 2 - comes on when stage one has been on by itself for 15 minutes and at least one "strong current mode" caller exists, or when stage one has been on by itself for 5 minutes and two "strong current mode" callers exist

Aux Ht - comes on when Stages 1 and 2 have been on by themselves for at least 20 minutes

Aux Ht - goes off when no "strong current mode" callers exist

Stage 2 - goes off when no "strong current mode" callers exist

Stage 1 - goes off when no "current mode" callers exist

Table 1
Timing Between Stage for 2 Heat/2 Cool Mode

2 Heat/2 Cool Mode	
Stage	**Timing**
Cool 1 to Cool 2	15 minutes - At least one **Strong** current mode caller must exit; or 5 minutes - If two or more **Strong** current mode callers exist
Heat 1 to Heat 2	15 minutes - At least one **Strong** current mode caller must exit; or 5 minutes - If two or more **Strong** current mode callers exist
Cool 2 to Cool 1	1 minute - after the 3 minute "minimum on" time has been completed
Heat 2 to Heat 1	1 minute - after the 3 minute "minimum on" time has been completed
Cool 1/Heat 1 to Fan Only	1 minute - after the 3 minute "minimum on" time has been completed

Table 2
Timing Between Stage for Heat Pump Mode

2 Heat/2 Cool Mode	
Binary Output	**Timing**
Reversing Valve to Stage 1	4 minutes - (Note: All compressors must be off 4 minutes before changing the position of the reversing valve)
Stage 1 to Stage 2	15 minutes - At least one **Strong** current mode caller must exit; or 5 minutes - If two or more **Strong** current mode callers exist
Stage 2 to Aux. Heat	20 minutes - At least one **Strong** current mode caller must exit; or 5 minutes - If two or more **Strong** current mode callers exist
Aux. Heat to Stage 2	1 minute - after the 2 minute "minimum on" time has been completed
Stage 2 to Stage 1	1 minute - after the 3 minute "minimum on" time has been completed
Stage 1 to Fan Only	1 minute - after the 3 minute "minimum on" time has been completed

Table 3
VariTrac II Minimum On and Off Times

2 Heat/2 Cool		Heat Pump	
Binary Output	**Min. On/Min. Off**	**Binary Output**	**Min. On/Min. Off**
Cool 1	3 min./3 min.	Stage 1	3 min./3 min.
Cool 2	3 min./3 min.	Stage 2	3 min./3 min.
Heat 1	3 min./3 min.	Reversing Valve	4 min./4 min.
Heat 2	3 min./3 min.	Auxiliary Heat	2 min./1 min.

Supply Air Temperature Limiting

The VariTrac II Central Control Panel will enforce supply air temperature limits to avoid mechanical problems with the air handling unit, and to help insure occupant comfort by maintaining reasonable discharge air temperatures. The Central Control Panel uses the following limit schedule:

Table 4
Supply Air Temperature Limits (Cooling Stage Limits - Shown at Default Setpoint of 45°F)

Supply Air Temperature				Cooling Stage
45°F	50°F	55°F	60°F	
Must Turn Stage Off	Can't Turn Stage On	OK to Turn Stage On		Stage One Cooling
Must Turn Stage Off	Can't Turn Stage On		OK to Turn Stage On	Stage Two Cooling

Table 5
Supply Air Temperature Limits (Heating Stage Limits in 2 Heat/2 Cool Mode - Shown at Default Setpoint of 130°F)

Supply Air Temperature				Heating Stage
130°F	120°F	110°F	100°F	
Must Turn Stage Off	Can't Turn Stage On	OK to Turn Stage On		Stage One Heating
Must Turn Stage Off	Can't Turn Stage On		OK to Turn Stage On	Stage Two Heating

Table 6
Supply Air Temperature Limits (Heating Stage Limits in Heat Pump Mode - Shown at Default Setpoint of 110°F))

Supply Air Temperature				Heating Stage
110°F	105°F	100°F	95°F	
Must Turn Stage Off	Can't Turn Stage On	OK to Turn Stage On		Stage One Heating
Must Turn Stage Off	Can't Turn Stage On		OK to Turn Stage On	Stage Two Heating

A stage will not turn off until its minimum ON time has been satisfied. Once a stage is off, it cannot be turned on again until its minimum OFF time has been satisfied. Normal staging control will resume when the supply air temperature returns within normal operating range.

Priority Shutdown

When the VariTrac II Central Control Panel goes into the priority shutdown mode the following control actions will be taken:

- Disable all stages of heating and cooling (minimum ON time not enforced)
- Turn the main supply air fan to OFF (minimum ON time not enforced)
- Disable all VAV local heat, if present
- Disable all VAV parallel fans, if present
- Drive all VAV dampers to MAX
- Drive the bypass damper(s) 50% open

A priority shutdown can be initiated by:

- Shorting the supply air sensor on the Central Control Panel
- Opening the supply air sensor on the Central Control Panel when a Voyager supply air sensor does not exist
- A "High Temp Input" alarm from the Voyager TCI high temp switch input

The VariTrac II Central Control Panel will return to normal operation when the priority shutdown condition is corrected.

Failure Modes

- Velocity/Static Sensor Failure - If a velocity/static sensor failure is determined, the VariTrac II Central Control Panel will drive the bypass damper to the edited minimum (factory default = 25%). A failure message will appear on the AHU Status menu.
- Supply Air Temperature Sensor Failure - If a supply air temperature sensor failure is determined, the VariTrac II Central Control Panel will issue a command for all dampers to drive maximum. All stages of heating, cooling and the fan are de-energized. This is a priority shutdown.

NOTE: If the supply air temperature sensor fails "open" and the VariTrac II Central Control Panel is attached to a Voyager, the Voyager supply air sensor data will be used and the system will continue to operate normally.

- Communication Failure - If a communication failure is determined (no UCMs communicating), the VariTrac II Central Control Panel will de-energize all stages of heating, cooling and the fan, and drive the bypass damper to 50% open.

2 Heat-2 Cool vs. Heat Pump Operation (DIP Switch Selection)

Dip switches on the VariTrac II Central Control Panel can be set to tell the Central Control Panel if it is operating a 2 HEAT/2 COOL unit or a HEAT PUMP unit. *(see the VariTrac II Central Control Panel Installation Manual VADA-IN-2 for details)* Setting the dip switch establishes the operating parameters for the VariTrac II Central Control Panel, such as staging and supply air limiting. It also configures the binary outputs to control in the appropriate sequence. Proper relay function by mode is identified in the VariTrac II Central Control Panel wiring schematic.

This switch setting is also required for proper Voyager operation. If the VariTrac II Central Control Panel is operating a Voyager Heat Pump, the dip switch must be set for heat pump operation.

Binary Output vs. Voyager Rooftop Operation

The VariTrac II Central Control Panel uses an optional relay board with six binary output relays to control the stages of heating, cooling, and the supply fan on the air conditioning unit. These same relays are used both for heat pump and 2 heat-2 cool operation. *(see the VariTrac II Central Control Panel Installation Manual VADA-IN-2 for details)*

The VariTrac II Central Control Panel can control a Voyager rooftop directly via a TCI-3 communications board mounted in the Voyager unit. This allows the Central Control Panel and the Voyager UCP control board to share data and control modes over a single pair of wires. All staging, limit, and control functions operate the same for Voyager rooftops and air conditioning units controlled by the relay outputs. If the Voyager unit being controlled is a heat pump, the dip switch on the Central Control Panel must be set for heat pump mode for proper operation.

The VariTrac II Central Control Panel will automatically recognize and communicate with the Voyager unit on the communications link. The relay board in the Central Control Panel is not required when communicating directly with a Voyager unit.

Spare Binary Output Control

The sixth binary output on the optional relay board is a spare output. An entry on the VariTrac II Central Control Panel setup menu allows the user to choose how the relay will be controlled. The choices are:

VENT- The spare output will be used for outside air damper control. The output is ENERGIZED when every UCM is unoccupied. When the first UCM goes occupied, the Central Control Panel will enter the "morning warm-up/cool-down mode. During this mode the spare output will remain energized. The mode will terminate when 50% of the occupied voting UCMs are satisfied or are callers for the opposite air from what is being provided. Morning warm-up will also be terminated if it lasts more than two hours, or if the systems heat/cool mode changes over. The spare output is DE-ENERGIZED when morning warm-up is terminated.

H/C- The spare output will be ENERGIZED when the Central Control panel is cooling and DE-ENERGIZED when it is heating.

ICS- The ICS system such as Tracer will have control of the relay.

Compressor Lockout (DIP Switch Selection)

Compressor lockout can be initiated via a dip switch on the VariTrac II Central Control Panel (or by ICS). When the compressors are locked out all compressors will be turned off after minimum ON times have been enforced. No cooling will be allowed. If the unit is a heat pump, the compressors cannot be used for cooling or heating, and Auxiliary Heat will become stage one.

Auxiliary Heat Lockout

Auxiliary heat on heat pump units can be disabled via an entry on the VariTrac II Central Control Panel setup menu. When it is disabled, any stages of auxiliary heat that are on will be turned off after the minimum ON times have been enforced.

Priority Local Heat

"Priority Local Heat" can be controlled via an entry on the VariTrac II Central Control Panel setup menu. If "Priority Local Heat" is edited to YES, UCMs will control their local heat to the heating setpoint for that zone. In this mode the UCM will attempt to heat to setpoint with local heat first. If it cannot achieve this and the space temperature falls 2°F below the zone heating setpoint, it will become a "heat caller" for heat from the main air handler.

If "Priority Local Heat" is edited to NO, UCMs will control their local heat to the heating setpoint minus 2°F for that zone. In this mode the UCM will first become a "heat caller" for heat from the main air handler when the space temperature falls 1°F below the zone heating setpoint. If the space temperature falls to 2°F below the zone heating setpoint, the UCM will then attempt to heat to setpoint with local heat.

Binary Input vs. ICS Control

When the VariTrac II Central Control Panel is being used as a standalone system (non-ICS), the modes are determined by three binary inputs. A simple time clock and system switches can be used to determine the operating modes. The inputs are as follows:

Table 7
Binary Input vs. ICS Control

Input	Contact Open	Contact Closed
1. Occupied/Unoccupied	Occupied	Unoccupied
2. Heat/Cool Mode	Heat	Cool
3. Auto/Manual	Auto	Manual

Binary Input #1 - Occupied/Unoccupied
When a contact *closure* is made across terminals 1 and 2 on terminal strip TB5 of the VariTrac II Central Control Panel, the Unoccupied Mode is initiated for all groups and connected UCMs. Upon initiation of the unoccupied mode the Central Control Panel will:

- Begin intermittent fan operation
- Change the minimum number of strong callers to changeover to one
- Disable the energy saver and ventilation modes
- Disable the local heat capability at ALL UCMs when the fan is off
- Disable the outside air damper of the air conditioning unit with the spare binary output if the VariTrac II Central Control Panel is setup with this capability

When the occupied/unoccupied mode is being determined by the binary input, the individual group scheduling function is not available. All groups will follow the state of the binary occupied/unoccupied input. When the timed override button on a zone sensor is pushed, a group override will be invoked. All UCMs assigned to that group will go into the occupied mode for two hours.

During the unoccupied mode, the fan will only operate if a demand for heating or cooling is determined. This is intended to minimize the operation of the fan to save energy.

During the unoccupied mode the "minimum opposite strong calls to changeover" automatically goes to one (1) so any "Strong Caller" zone can change the system over. All other system setup parameters remain the same during the unoccupied mode.

The energy saver and ventilation modes are disabled in the unoccupied mode because they both require continuous "ON" fan operation. Since the unoccupied mode used intermittent "AUTO" fan operation, these two modes are not applicable.

During the unoccupied mode, the local heat is disabled at all UCMs when the fan in the air handler is off. Whenever the fan is energized, the remote heat is enabled unless it is permanently disabled by a Trane Building Automation System.

Many systems require that the outside air damper remain closed during unoccupied operation. DIP switches can be put in the appropriate position to allow the "spare" binary output on the VariTrac II Central Control Panel to disable the outside air damper on the air conditioning unit during the unoccupied mode.

Binary Input # 2 - Heat/Cool
This input is made by *closing* the connection between terminals 3 and 4 on terminal strip TB5 on the Central Control Panel. The closure would typically come from an auxiliary System Heat/Cool switch. When the connection is closed the system is in the Cool Mode. When the connection is open the system is in the Heat mode. See Binary input #3 below; Manual/Auto Changeover.

Binary Input #3 - Auto/Manual Changeover
This input determines if the Central Control Panel is operating in the Manual or Auto changeover mode. When a connection is *closed* between terminals 5 and 6 on terminal strip TB5 of the Central Control Panel, the system is in the Manual Changeover mode. The Central Control Panel will then operate in the mode set by binary input #2-Heat/Cool. When the connection between terminals 5 and 6 is open, the system will operate in the Auto Changeover mode, ignoring the input status of input #2.

VariTrac II Central Control Panel can also be controlled and monitored from an upper level system such as a Tracer or the Stat 4, 7, and 16. When ICS is present, the ICS system determines the operating modes of the central control panel.

VariTrac II Central Control Panel Group Functions

Groups

The VariTrac II Central Control Panel will allow groups of UCMs to be controlled and monitored independently. UCMs can be divided into four groups, with each group having up to 16 members. Any UCM can be assigned to any group, but a UCM can only be a member of one group at a time. The UCMs are initially assigned to groups as follows:

Group 1	Group 2	Group 3	Group 4
Zones # 1-4	Zones # 5-8	Zones # 9-12	Zones # 13-16

Group Occupied/Unoccupied

The time of day scheduling for the VariTrac II Central Control Panel is done by group. This allows UCMs serving a specific area to be grouped and scheduled together. As a result, each air conditioning unit controlled by a Central Control Panel can have up to four separate time of day schedules, one for each of the four groups. If any one of the four groups is "occupied," the Central Control Panel will operate the supply fan and handle UCM voting according to the "occupied mode" parameters. All four groups must be "unoccupied" for the Central Control Panel to operate using "unoccupied mode" parameters. UCMs that are members of a group in the "occupied mode" will control to their occupied setpoints. UCMs that are members of a group in the "unoccupied mode" will control to their unoccupied setpoints.

If the timed override button on a sensor is pressed to invoke the timed override period, all UCMs that are members of that group will go to the occupied mode. The Central Control Panel will operate the supply fan and handle UCM voting according to the "occupied mode" parameters. UCMs that are members of other groups in the "unoccupied mode" but on the same Central Control Panel will continue to control to their unoccupied setpoints.

Timed Override

The VariTrac II Central Control Panel must collect the UCM TOV signals (both ON and CANCEL) from all members in a group into TOV signals for the group. A cancel signal from any group member will be treated as a cancel for the group. A cancel signal does not have to be generated by every UCM that initiated a TOV before the TOV for the group is canceled.

If the VariTrac II Central Control Panel is under ICS control, it must pass the group TOV signals and TOV cancel signals onto the ICS system without taking any control action on its own. The ICS system will be responsible for initiating any TOV control action, and will determine the TOV period length..

If the VariTrac II Central Control Panel is under local control, a group TOV signal will cause a two hour timer to start and cause the group to be controlled to the OCCUPIED mode. If another group TOV signal should be generated, the timer will be reset to two hours and the group will continue to be controlled to the OCCUPIED mode. If the timer expires or a cancel TOV signal is generated, the group will be released from the control of the timed override function.

Group Overrides

The VariTrac II Central Control Panel has the ability to override several UCM zone functions as a group. The following "Group" commands can be issued from an edit terminal attached to the Central Control Panel or from an ICS system.

NOTE: Group level controls are not available through binary inputs.

- *Occupied/Unoccupied.* The group can be set to "Auto" which will follow the time of day schedule, or it can be overridden to "continuous occupied" or "continuous unoccupied."
- *Flow Control.* The group can be set to "Auto" which will follow temperature vs. setpoint demand, or it can be overridden to continuous open, closed, minimum, or maximum.
- *Fans.* The fans in parallel fan powered boxes can be overridden to enabled or disabled. Series fans cannot be overridden.
- *Local Heat.* Local zone heat can be overridden to enabled or disabled.

- *Enforce Minimum While Unoccupied.* "Yes" will enforce the minimum positions of the UCMs during unoccupied. "No" will allow the dampers (air valve) to go fully closed during unoccupied.
- *Energy Saver Mode.* When "enabled" the energy saver mode allows UCMs to close below their minimums. This will only occur if a UCM is in the cooling mode and it has a zone temperature lower than the active heating setpoint, or if a UCM is in the heating mode and it has a zone temperature greater than the active cooling setpoint. This feature is designed to prevent "counterproductive air" from entering a zone.
- *Ventilation Mode.* When "enabled" this mode allows dampers to open for greater ventilation. This occurs when the group is occupied and the air conditioning system is in a zero energy state (no stages of heating or cooling are energized) for more that four minutes. When the ventilation mode is active, the vent flow multiplier is not allowed to drop below 4.0 For example, if the "cooling minimum position" is set to 10%, the damper goes to 40% (10% x 4.0 = 40%) minimum open during the ventilation mode.

NOTE: The fans in "Series Fan Powered VAV Boxes" can not be overridden, and are not controlled by the occupancy schedule. Series fans only go off when the air valve is fully CLOSED.

VariTrac II Central Control Panel System Interface

The VariTrac II Central Control Panel offers several user friendly menus which can be edited or simply used for diagnostics. It is not necessary to interface with the VariTrac II Central Control Panel for the system to operate properly. The VariTrac II Central Control Panel offers a "no setup" capability if desired. If interfacing is desired, the VariTrac II Central Control Panel can be interfaced through an RS-232 port, located on the Central Control Panel. See the Terminal Operation section in this manual for more details.

Unit Control Module (UCM)

UCM Start-Up

Upon power-up, The UCM executes a RESET with the following sequence:

1. Recalls its configuration data from nonvolatile memory to determine its identity and setup.
2. Recalibrate the damper blade (air valve) position, and if present, recalibrate its own pressure transducer, and water valve position.
3. Begin normal operation

A reset will occur in the UCM after every power failure. The UCM will also have a RESET initiated by the VariTrac II Central Control Panel automatically every seven days, or manually whenever air valve timing, water valve timing, or unit size is edited.

The calibration process can take as much as 11 minutes, depending on the edited Drive Time. All UCMs are divided into four groups based on their address. UCMs will begin their RESET based on the following schedule:

- 4,8,12, and 16 will begin reset immediately after a RESET command has been issued.

- 1,5, 9, and 13 will begin RESET 7 minutes after a command has been issued.
- 2,6,10, and 14 will begin RESET 14 minutes after a command has been issued.
- 3,7,11, and 15 will begin RESET 21 minutes after a command has been issued.

After a power failure, the reset starts are delayed by 20 minutes. This is to prevent reset calibration of the UCM from interfering with the calibration of the bypass dampers and velocity/static pressure sensor.

RESET should not be confused with the process executed by the VariTrac II Central Control Panel when it transitions from occupied to unoccupied. When the Central Control Panel goes into the occupied mode it calibrates the position of the UCM damper blade by driving it to its "open" position and then back to the "max position.

Setpoints

Each UCM has the following eleven setpoints:

1. Occupied Cooling Setpoint - This is the active cooling setpoint when the UCM is in its occupied mode and the zone sensor setpoint is disabled at the UCM.
2. Occupied Heating Setpoint - This is the active heating setpoint when the UCM is in the occupied mode and the zone sensor setpoint is disabled at the UCM.
3. Unoccupied Cooling Setpoint - This is the active cooling setpoint when the UCM is in its unoccupied mode.
4. Unoccupied Heating Setpoint - This is the active heating setpoint when the UCM is in the unoccupied mode.
5. Maximum Position Setpoint - This is the maximum position that the damper (air valve) will open to, unless overridden by a drive open command.
6. Minimum Position Setpoint - This is the minimum position the damper (air valve) will close to unless overridden by a drive closed command or by initiation of the energy saver mode.
7. Minimum Heating Position Setpoint - The minimum heating position applies to both local heat and when the unit is operating in the HEAT mode. This is the minimum position that the damper (air valve) will close to when in the HEAT mode or reheat is energized. This minimum can be overridden by a drive closed command.
8. Cooling Setpoint Low Limit - The cooling setpoint low limit is a limit applied to the "active cooling setpoint," but will not affect operator entry of setpoints from the edit terminal or at the sensor thumbwheel. When the setpoint, regardless of the source, is set below the cooling setpoint low limit, the UCM will use the cooling low limit as the "active cooling setpoint." The UCM will continue to control normally using this setpoint.
9. Heating Setpoint High Limit - The heating setpoint high limit is a limit applied to the "active heating setpoint," but will not affect operator entry of setpoints from the edit terminal or at the sensor thumbwheel. When the setpoint, regardless of the source, is set above the heating setpoint high limit, the UCM will use the heating high limit as the "active heating setpoint." The UCM will continue to control normally using this setpoint.
10. Heat Setpoint Offset - This setpoint has a range of 2° to 10°F. When a zone sensor thumbwheel setpoint is being used, the cooling setpoint will equal the zone sensor setpoint and the heating setpoint will equal the zone sensor setpoint minus the Zone Sensor Heating Setpoint Offset. The offset will always be displayed and will always be editable even if a zone sensor setpoint is not being used.

11. Control Offset - The control Offset has a range of 0° to 5°F. When Control Offset is active, this value will be added to the edited occupied cooling setpoint and subtracted from the edited occupied heating setpoint to determine the active setpoints.

NOTE: If the zone sensor setpoint thumbwheel is enabled, the control offset value is only effective if the UCM is Version 3.0 or greater. On UCM versions prior to 3.0, control offset only functions with programmed setpoints.

NOTE: Control Offset is a Tracer level ICS command only.

Parameters

There are three (3) parameters which control the operation of the UCM per the following:

1. Control Mode - This parameter tells the UCM to operate in the occupied or the unoccupied mode, as dictated by the VariTrac II Central Control Panel binary input or ICS Group command.
2. Control Action - This parameter is automatically determined by the Central Control Panel for each UCM and defines whether the control action will be heating or cooling (i.e., if there is warm or cold air in the supply duct).
3. Position Control - This parameter is an air damper (air valve) override parameter per one of the following:
   - Auto (The UCM operates to satisfy zone temperature).
   - Drive to Minimum Position.
   - Drive to Maximum Position
   - Drive to Open Position
   - Drive to Closed Position

Damper Control

The UCM continuously monitors the zone temperature, the damper position, and the zone setpoints. With this information, it uses a PI control loop to maintain the heating and cooling setpoints.

Heat/Cool Mode Decision for UCMs

The heat/cool "control action" for the individual UCMs is determined by the VariTrac II Central Control Panel, and then sent to the UCM to be executed. The Central Control Panel compares the supply air temperature of the system to the individual UCM zone temperature and zone setpoint.

If the supply air temperature is:

<=(less than or equal to) the zone temperature the control action will be "Cool"

>=(greater than or equal to) the zone temperature +10°F or more, the control action will be "Heat"

If the supply air temperature is between the zone temperature and zone temperature +10°F:

- and the zone temperature is above the cooling setpoint, the control action will be "Heat"
- and the zone temperature is below the heating setpoint, the control action will be "Cool"
- and the zone temperature is between the heating setpoint and the cooling setpoint, the control action will remain unchanged.

Heat Control

The UCM has three local heat outputs available to control duct or perimeter heat. The UCM outputs are 12 VA maximum at 24 VAC "wet contacts," meaning voltage is being provided by the UCM transformer. The "local" heat type has six selections. This selection determines the heating control algorithm used by the UCM. These tables and descriptions are with "priority local heat enabled." If "priority local heat" is disabled, all values are lowered by 2°F below the heating setpoint. The choices are:

0 = "NONE" - No local heat is being controlled.

NOTE: VariTrac dampers factory configured as CHGR use this type of local heat control.

1 = "1-3 stages electric" - Three stages of local electric heat are staged on by space demand. The stages are controlled on/off by the following differentials:

Output #1 (J9)	Output #2 (J10)	Output #3 (J11)
ON: Heating Setpoint	ON: 1.0°F below Ht. Setpoint	ON: 2.0°F below Ht. Setpoint
OFF: 0.5°F above Ht. Setpoint	OFF: 0.5°F below Ht. Setpoint	OFF: 1.5°F below Ht. Setpoint

NOTE: If the local heat is configured to "1-3 stages electric" and the VariTrac II Central Control Panel goes into the heating mode, the "local heat" will be disabled. VariTrac dampers factory configured as ELEC use this type of local heat control.

2 = "fast pulse width modulation" - Pulse width modulation energizes an electric heat output for some portion of a time window. The time window for fast pulse width modulation is 2 seconds. The "on time" is based on the percentage of heat required as calculated by the control algorithm of the UCM. The outputs of the UCM are controlled as follows:

Output #1(J9)	Output #2(J10)	Output #3(J11)
Pulsing Output	On during a call for Heat	On when pulse width = 100%
		Off when pulse width < 50%

NOTE: "fast pulse width modulation" requires the use of mercury contactors in the electric heater. Contact the heater supplier for specifications.

3 = "slow pulse width modulation" - Pulse width modulation energizes an electric heat output for some portion of a time window. The time window for slow pulse width modulation is 3 minutes. The "on time" is based on the percentage of heat required as calculated by the control algorithm of the UCM. The outputs of the UCM are controlled as follows:

Output #1(J9)	Output #2(J10)	Output #3(J11)
Pulsing Output*	Pulsing Output*	On when pulse width = 100%
		Off when pulse width < 50%

* *When heating demand is between 0-50% of heating capacity, Output #1 is pulsing, and Output #2 is off. When heating demand is between 50-100% of heating capacity, Output #1 is on continuously, and Output #2 is pulsing.*

4 = "prop hot water and aux output" - The local heat is controlled by a proportional hot water valve. An auxiliary 24 volt AC output is also available during a call for local heat. The outputs are controlled as follows:

Output #1(J9)	Output #2(J10)	Output #3(J11)
Drives the valve closed	Drives the valve open	On when pulse width = 100%
		Off when pulse width < 50%

5 = "1-3 stages hot water/perimeter" - Three stages are available to control local hot water heat. The outputs are staged on by space demand. The stages are controlled on/off by the following differentials:

Output #1 (J9)	Output #2 (J10)	Output #3 (J11)
ON: Heating Setpoint	ON: 1.0°F below Ht. Setpoint	ON: 2.0°F below Ht. Setpoint
OFF: 0.5°F above Ht. Setpoint	OFF: 0.5°F below Ht. Setpoint	OFF: 1.5°F below Ht. Setpoint

NOTE: If the local heat is configured to "1-3 stages hot water/perimeter" and the VariTrac II Central Control Panel goes into the heating mode, the "local heat" will remain enabled. VariTrac dampers factory configured as NCHW use this type of local heat control.

When the local heat is enabled to run, the damper will go to the "heating minimum position" as edited in the UCM setpoint menu (factory default =10%).

Priority Local Heat

"Priority Local Heat" can be controlled via an entry on the VariTrac II Central Control Panel setup menu. If "Priority Local Heat" is edited to YES, UCMs will control their local heat to the heating setpoint for that zone. If "Priority Local Heat" is edited to NO, UCMs will control their local heat to the heating setpoint minus 2°F for that zone.

Standalone Control

The VariTrac damper can be used on a standalone basis. It is not required for the UCM to communicate with the VariTrac II Central Control Panel. Under this condition, the UCM uses the duct temperature analog input (auxiliary temperature) to determine the heating or cooling control action.

If the UCM determines that a communication failure exists or it is being used as a standalone device, it will use the auxiliary temperature and the space temperature to determine its control action. If the duct temperature is greater than or equal to the zone temperature plus 10°F, the control action will be heating. If the duct temperature is less than or equal to the zone temperature, the control action will be cooling.

If the duct temperature is between the zone temperature and the zone temperature plus 10°F, the UCM will drive to the minimum position of the last control action that was used.

If the UCM has a communication failure and has a duct temperature sensor failure, it will control to the last control action determined.

Occupied/Unoccupied Mode

During occupied operation the UCM will control to the zone sensor setpoint knob. The setpoint at the sensor is the cooling setpoint; the heating setpoint is 2°F below the cooling setpoint. This heating setpoint offset can be edited in the UCM setpoint menu.(range 2-10°F) If the zone sensor setpoint knob is disabled or has failed, the UCM will control to the programmed "occupied cooling" setpoints. The factory defaults are 74°F cooling and 71°F heating. These setpoints can be edited in the UCM setpoint menu.

During unoccupied operation, the UCM will control to the programmed unoccupied setpoints. These setpoints have factory defaults of 85°F cooling and 60°F heating. The setpoints can be edited in the UCM setpoint menu. Zone sensor mounted setpoints are not applicable in the unoccupied mode.

Drive to Max

A UCM can be manually override from the zone sensor to drive the "maximum" position. When the zone sensor setpoint thumbwheel is rotated to the "*" position (fully clockwise) and the TOV ON button is pushed, the UCM goes to the MAX override position. It remains in MAX override until the zone sensor thumbwheel is moved from the "*" position into the setpoint range.

Override to Unoccupied

A UCM can be manually overridden from the zone sensor to go into the "continuous unoccupied" mode. When the zone sensor setpoint thumbwheel is rotated to the "**" position (fully counter-clockwise) and the TOV ON button is pushed, the UCM goes into the continuous unoccupied mode. It remains in the Unoccupied override until the zone sensor thumbwheel is moved form the "**" position into the setpoint range.

Zone Sensor Operations

The zone sensor module utilizes a thermistor element to measure zone temperature. The zone sensor module has the following options:

Zone Temperature
Each zone sensor module includes a zone temperature sensor.

Zone Setpoint Control
A UCM will only use the zone sensor thumbwheel setpoint (during occupied times) if "Zone sensor thumbwheel functions" is edited to ENABLE on the UCM setup screen.

Timed Override and Cancel
The ON (TOV) and TOV CANCEL commands can be issued by pressing the ON or CANCEL buttons on any of the UCM zone sensor modules.

- When an ON button on a zone sensor is pressed (shorting the zone temperature sensor circuit), the UCM will start the two hour timed override timer at the VariTrac II Central Control Panel. This will effect all group members as described below.
- When a CANCEL button on a zone sensor module is pressed for at least one second, the UCM sends a TOV cancel signal setting the timed override timer to zero.
- Pressing any zone sensor module's ON or CANCEL button will not affect the zone temperature reported from the UCM.

NOTE: TOV push buttons should be pressed for at least 2 seconds and not more than 15 seconds.

Drive to Max
A UCM can be manually override from the zone sensor to drive the "maximum" position. When the zone sensor setpoint thumbwheel is rotated to the "*" position (fully clockwise) and the TOV ON button is pushed, the UCM goes to the MAX override position. It remains in MAX override until the zone sensor thumbwheel is moved from the "*" position into the setpoint range.

Override to Unoccupied
A UCM can be manually overridden from the zone sensor to go into the "continuous unoccupied" mode. When the zone sensor setpoint thumbwheel is rotated to the "**" position (fully counter-clockwise) and the TOV ON button is pushed, the UCM goes into the continuous unoccupied mode. It remains in the Unoccupied override until the zone sensor thumbwheel is moved form the "**" position into the setpoint range.

Failure Modes

Three failure modes exist for the VariTrac UCM as follows:

1. Zone sensor failure
2. Zone sensor setpoint failure
3. Communications failure

For a detailed explanation of these failures see the System Start-Up and Checkout section in VADA-IN-2.

UCM Interface

The UCM can be interfaced at the VariTrac II Central Control Panel with an edit terminal or PC with terminal emulation software.

The VariTrac II Central Control Panel has an RS-232 port. A terminal with an RS-232 port can be connected to the VariTrac II Central Control Panel and all zones and system information can be retrieved. For specific information, see the Programming section for more details.

STAT 4

A Stat 4 Operators Panel is available to provide monitoring and control of VariTrac systems and UCM zones from one central location. Up to two VariTrac II Central Control Panels can be connected to the Stat 4.

The Stat 4 provides a 2 line by 40 character screen to display operator information, and an easy to use 16 button keypad for system control. The Stat 4 will add the following capabilities to the VariTrac system:

Setpoint Control

Stat 4 allows an operator to control setpoints for each UCM connected to the system. Setpoints are maintained during a power outage without the use of batteries. Available setpoints for all VariTrac zones are as follows:

- Occupied Heat Setpoint
- Unoccupied Heat Setpoint
- Occupied Cool Setpoint
- Unoccupied Cool Setpoint

VariTrac II Group Scheduling

The UCM zones on a VariTrac II system can be scheduled in groups. The zones are assigned to their "Groups" by their communications dip switch address setting done during installation and commissioning of the VariTrac II Central Control Panel. A total of four groups are available.

Daylight Saving Time

Stat 4 automatically implements daylight saving time and leap year changes.

Holiday Dates- Up to 24 holiday dates can be defined for the Stat 4 system.

Timed Override

A group can be placed into occupied setpoints for two hours using the Stat 4 keypad.

Optimal Start

VariTrac groups will be optimally started based on a degrees per hour ramp.

Alarms

Temperature and system failure alarms are indicated on the Stat 4 display screen. Voyager Rooftop unit alarms will also be displayed.

Alarm Log

The Stat 4 maintains an Alarm Log of the last 32 alarms.

Password Security

The Stat 4 front panel is guarded by a password.

Auto-logoff

If there are no key hits on the front panel for five minutes Stat 4 will be logged off.

Terminal Operation

An ANSI edit terminal device or PC with terminal emulation software must be connected to the VariTrac II Central Control Panel in order to communicate with the internal software. Communication between the VariTrac II Central Control Panel and edit terminal device is accomplished via an RS-232 cable.

Using the Edit Terminal (RS-232) Interface

An ANSI edit terminal device can be connected to the VariTrac II Central Control Panel for initial system setup. It will be required for future setup, or modifications to edited setpoint data.

NOTE: If the VariTrac II Central Control Panel is connected to an ICS system, all communication with the VariTrac II Central Control Panel may also be performed at the edit terminal attached to the ICS system.

The RS-232 connection at the VariTrac II Central Control Panel is a RJ-12 style socket which requires a Trane-supplied cable and a Trane-supplied modular adapter. It attaches to port J2 on the VariTrac II Central Control Panel board.

Settings for Edit Devices

When an edit terminal or PC with terminal emulation software is used with the Central Control Panel, the baud rate must be the same on both devices. The baud rate is the rate of data exchange between the VariTrac II Central Control Panel and the edit terminal. The default baud rate of the Central Control Panel edit terminal port is 1200. Available (editable) baud rates for the Central Control Panel are 300, 600, 1200, 2400, 4800, and 9600. Use the highest baud rate that is common to both the VariTrac II Central Control Panel and edit device. Refer to the operator's manual supplied with the edit device to determine the baud rates that are available.

The baud rate of the VariTrac II Central Control Panel can be overridden to 1200 baud by DIP switch SW2, switch number 7. Other communications interface functions may also have to be set on the edit device. Some of these functions and settings are listed in Table 8 shown on the next page.

NOTE: See VariTrac II Central Control Panel Installation Guide for edit terminal cabling and connections.

Table 8
Edit Terminal Device Settings

Function	Setting
Baud Rate	Same as VariTrac II Central Control Panel
Half or Full Duplex	Full Duplex
Parity	0, Space, None
Upper/Lower Case	Upper Case Only
Auto Line Feed	OFF
Number of Data Bits	8
Number of Stop Bits	1

Modem Interface for Edit Devices

A modem may be connected to the VariTrac II Central Control Panel RS-232 port (RJ-12 style socket) for remote site communications.

Setup Requirements for Modem at VariTrac II Central Control Panel

It is recommended that a Trane-supplied 14,400 baud US Robotics Sportster fax/data external modem be used for VariTrac II Central Control Panel applications. The 14,400 baud modems require hardware and software configuration for VariTrac II Central Control Panel applications.

The following configuration steps must be followed for 14,400 baud US Robotics fax/data external modem communications:

1. Connect the modem to a PC running terminal emulation software. Use a pin-to-pin serial cable (straight through modem cable) or use the following Trane adapters and cables from the "Central Control Panel Edit Terminal Cable Kit." Use the 35914264 edit adapter plugged into the modem, the 35914260 cable, and either the 35914262 (9 pin) or 35914263 (25 pin) adapter plugged into your computer.
2. Check the dip switch settings on the back of the modem. Make sure that switch #1 and switch #8 are DOWN, and that all other switches are UP.
3. Power up the modem and the edit device. The baud rate on the edit device must be set to 9600 baud, and the caps lock should be ON.
4. At the edit device, type the following command: AT&F
   This may not appear on the screen as you type.
   Press ENTER. The message "OK" or "0" appears.
5. At the edit device, type this command string:
   ATE0Q1S0=1&C1M1V0&D0&NO&B1&M0&R1&W (Enter)

NOTE: 0=Zero. There are no letter "O"s in this string.

6. Power the modem OFF, then turn it back ON. Type the command ATI4 (ENTER). The modem will display it's current settings. Verify these settings with the command string you entered in step 5. The following command codes are the ones you should confirm. More codes and tables than this may appear on the screen.

M1	Q1	
&B1	&C1	&D0
&M0	&N0	&R1
S0=1		

   The modem is now ready for use with the VariTrac II Central Control Panel.

7. Make sure the VariTrac II Central Control Panel baud rate is set to 9600 baud. (see "Central Control Panel Setup" section of this manual for instructions)

8. Power the modem down and connect it to the VariTrac II Central Control Panel using use the Trane adapter and cable from the "Central Control Panel Edit Terminal Cable Kit." Use part numbers 35914260 cable and 35914269 modem adapter. This is a different adapter from the one used to configure the modem in step 1.

NOTE: See VariTrac II Central Control Panel Installation Guide for additional edit terminal and modem cabling and connection information.

VariTrac II Central Control Panel Menu System

Keyboard Commands

The VariTrac II Central Control Panel menu system uses a series of "Quick Keys" to allow the operator to move quickly through the menu system using relatively few keyboard commands. Table 9 shows a list of the key used, and a description of their function.

The "H" help key is also available at the VariTrac II Central Control Panel Main Menu. This key produces a display similar to Table 9 , providing the operator with a quick reference to keyboard functions when actually working in the menu system.

NOTE: All letter keys must be in capital form. The CAPS LOCK key must be locked on when a terminal is being used to communicate with a VariTrac II Central Control Panel.

Table 9
Edit Device Keys Used for Programming VariTrac II Central Control Panel

CRT Terminal Key *(Note 1)*	Key Function	Description of Key Function
H	Help	Press ***H*** at any time to display a 1-page ***HELP*** screen. The last line displayed before ***H*** was pressed appears at the bottom of the screen so the operator can continue from where he left off.
M *(Note 3)*	Menu	Press ***M*** to restore the top of the previous menu or list to the display. Press ***M*** repeatedly to return to the ***Main Menu***.
L	List	Press ***L*** to display all items in the current menu or list.
S	Select	Press ***S*** to select an item on a menu or list. If the cursor is on a *menu line*, press the corresponding number and ***S*** to select that item from the list. If the cursor is on a *menu item line*, simply pressing ***S*** will select that item.
N *(Note 3)*	Next	Press ***N*** to sequentially advance from one menu item or line to the next. When the last item is displayed, pressing ***N*** simply redisplays that item.
P *(Note 3)*	Previous	Press ***P*** to sequentially back up from one menu item or line to the previous one. When the first item is displayed, pressing ***P*** simply redisplays that item.
RETURN or **↵ ENTER**	Enter	Press **RETURN** or **↵ ENTER** to enter typed data into the system. Pressing either key without first typing data has the same effect as pressing ***N***.
C *(Note 2)*	Clear	Press ***C*** to clear typed data *not yet entered*, and to return the current display line to the screen. To clear *alphanumeric* entries, hold down **CONTROL** and press ***C***.
DELETE or **BACKSPACE**	Correct Errors	Press **DELETE** or **BACKSPACE** to correct typing errors by removing characters before data is entered–*that is*, ***before*** pressing any of the *preceding* keys.
R	Repeat	Press ***R*** to redisplay the current screen every 16 seconds.
ESC	Main Menu	Pressing the **ESC** key returns the operator to the **Main Menu**.

Notes:
1. All letter keys must be entered as capitals! Whenever using the edit device to communicate with Tracer, ensure that the ***CAPS LOCK*** function is ***ON***.
2. To delete alphanumeric data *not yet entered*, hold down the ***CONTROL*** key (Ctrl) and press ***C***.
3. Preceding ***M***, ***N*** or ***P*** with a number is equivalent to pressing ***M***, ***N*** or ***P*** that number of times; for example, pressing ***5N*** is the same as pressing ***N*** five times.
   Pressing ***9M*** at any time restores the ***Main Menu*** to the display.

Menu System

The VariTrac II Central Control Panel menu begins with a "Main Menu" or list of items available within the VariTrac II Central Control Panel. Each of these selections represents another sub-menu or summary display. A sample of the Main Menu is shown below.

Figure 1
Main Menu

```
000000000000000000 VariTrac II Central Control Panel V1.0: H-
help, L-list
   1) UCM data
   2) Group Data
   3) AHU status
   4) Central Control Panel setup
   5) Central Control Panel control inputs
   6) Service summary
```

Summary and Status Displays

Three of the selections in the VariTrac II Central Control Panel Main Menu provide summary or status displays. These displays are for viewing data only, and cannot be edited. The selections are:

- 6) Service summary - The service summary provides an overview of the current state of the VariTrac system. The current air conditioning unit status and the conditions of all the UCM zones are brought together in one quick reference screen.
- 3) AHU status - The AHU status provides a detailed look at the current state of the air conditioning system. Information on the bypass system is also included in this screen. If a Voyager rooftop is attached to the VariTrac system, the Voyager status screen is displayed.
- 5) Central Control Panel control inputs - The control inputs display provides information on the current state of the Central Control Panel binary inputs. If an ICS system is attached, a detailed display of its current control parameters is also shown.

A more detailed description of each item along with sample displays begins on page 28.

Configuration Selections

Three of the selections in the VariTrac II Central Control Panel Main Menu provide access to setup or configuration displays. These displays allow the operator to configure the operating parameters for the Central Control Panel and all other components of the VariTrac system. The selections are:

- 4) Central Control Panel setup - This selection allows the operator to configure the control parameters and setpoints for the VariTrac II Central Control Panel.
- 1) UCM data - The UCM data selection allows the operator to select a specific UCM from up to 16 that may be attached to the system. For each UCM, a submenu provides access to the UCM status, the UCM setpoints, and the UCM configuration parameters

- 2) Group data - Selecting group data provides the operator with a list of the four groups in the Central Control Panel. For each group, a submenu provides access to group status, the group UCM member list, the group setup and control parameters, and a review of control being done by the ICS system, if one exists.

A more detailed description of each item along with sample displays begins below.

Service Summary

The Service Summary provides a status summary of UCM data and other information. This status display is for viewing only; no editing is available. To access the Service Summary:

1. Select Service Summary (6S) from the VariTrac II Central Control Panel Menu.

Figure 2
Service Summary Report

Service Summary

Supply air temp	73.0 F
Operating status	HEAT
Bypass position	0 %
Number of cool requests	1
Number of heat requests	0
Present mode worst deviation	.0 F
Duration of deviation	0 MIN
Changeover allowed in	0 MIN

UCM Name	GRP	POS	MIN	MAX	TEMP	DEV		
1 UCM 01	1	100%	10%	100%	80.3	6.3	CLOSED	No Vote
2 UCM 02	1	41%	41%	66%	78.6	8.6	MIN	
3 UCM 03	1	100%	43%	46%	74.0	.0	OPEN	
4 UCM 04	1	100%	95%	100%	——	——	OPEN	No Vote

Each of the entries is described in order in the following text.

Supply Air Temp
The temperature being read by the supply air temperature sensor. If the sensor has failed, "Failed" displays instead of the temperature.

Operating Status
The current heat/cool state of the system.

Bypass Position
The percent of valve/damper open.

Number of Cool Requests
This displays the number of cooling callers in the system.

Number of Heat Requests
This displays the number of heating callers in the system.

Present Mode Worst Deviation
This displays information used in the voting and tagging process. The UCM with the worst deviation is the UCM farthest from its setpoint. Only UCMs that are in the same mode (operating status) as the system is in are considered.

Duration of Deviation
This displays information used in the tagging process. The duration of deviation indicates how long the UCM has been the UCM with the worst deviation.

Changeover Allowed In
This displays the time left before an automatic changeover can occur.

UCM
This column displays the UCM number.

Name
This is the name assigned to the UCM.

Group
This displays the number of the group of which the UCM is a member.

POS
This displays the position of the unit's damper as a percentage.

MIN
This is the current minimum damper position being used by the UCM.

MAX
This displays the edited maximum damper position for the unit.

TEMP
This displays the zone temperature for the unit. If a UCM is not supplied with a valid zone temperature, "---" displays on this line.

DEV
This displays the UCM's deviation from setpoint. If the zone temperature is below the active heating setpoint, the deviation is a negative value. If the zone temperature is between the heating and cooling setpoints, the deviation is zero. If the zone temperature is above the active cooling setpoint, the deviation is a positive value. If a UCM is not being supplied a valid zone temperature, a "---" displays.

The following messages may also display on this screen:

- No Vote - The UCM has been edited to have no heat/cool vote.
- Tag - The UCM has been tagged by the Central Control Panel.
- Open, Close, MIN, or MAX - The UCM is being flow overridden.

AHU Status

AHU Status provides a status summary of VariTrac II Control Panel-specific data. This status display is for viewing purposes only; no editing is available.

To access the AHU Status Display,:

1. Select AHU Status (3S) from the VariTrac II Central Control Panel Menu.

Figure 3 displays an example of an AHU Status Display.

Figure 3
AHU Status (without Voyager)

AHU Status	
Operating mode	OCCUPY
Operating status	COOL
CCP supply air temp	58.4 F
AHU air flow	71 %
Bypass position	23 %
AHU fan	ON
Cool 1	ON
Cool 2	OFF
Heat 1	OFF
Heat 2	OFF
Spare output (VENT)	OFF

Figure 4 displays an example for a VariTrac II Central Control Panel that is communicating directly to a Voyager Rooftop.

Figure 4
AHU Status (with Voyager)

AHU Status				
Operating mode				OCCUPY
Operating status				COOL
CCP supply air temp				58.4 F
AHU air flow				71 %
Bypass position				23 %
Unit Type: Gas Heat, economizer				
Diagnostics: Normal				
Active modes: COOL 1				
Voyager supply air temp				56.1 F
Supply fan status				ON
Compressors	1	ON,	2	OFF
Heat outputs	1	OFF,	2	OFF
Exhaust fan				OFF
OK to economize				NO
Reference enthalpy				22 BTU/LBM
Minimum damper position				10 PCT
Current damper position				10 PCT
Outside air temperature				78.3 F
OA Relative humidity				81PCT
RA Relative humidity				56 PCT
Condenser fans: A		ON,	B	ON

Control Inputs

VariTrac II Central Control Panel Control Inputs can be displayed as follows. This screen is for viewing purposes only; fields can not be edited. To access the Central Control Panel Control Inputs display:

1. Select *VariTrac II Central Control Panel Control Inputs (5S)* from the VariTrac II Central Control Panel Menu.

The VariTrac II Central Control Panel Control Inputs screen displays (Figure 5).

Figure 5
VariTrac II Central Control Panel Control Inputs

```
Central Control Panel Control Inputs
Binary Inputs:
     1) OCCUPY
     2) HEAT
     3) AUTO

DIP switch inputs:
Unit type                          2H2C
Compressor lockout?                NO
ICS address                        1
Bypass control                     VELOCITY
Test mode?                         NO

ICS communications                 UP
ICS control?                       YES
Auto/manual input                  AUTO
Heat/cool input                    HEAT
Aux heat                           ENABLE
Compressor lockout?                NO
Priority shutdown?                 NO
Heat stages enabled                2
Cool stages enabled                2
OA multiplier                      1.0
Spare binary output                OFF
```

The Binary Inputs portion of the Control Inputs menu display the current states of the VariTrac II Central Control Panel's three binary inputs.

The DIP Switch Inputs portion of the Control Inputs menu displays the inputs that are determined by the DIP switches. The DIP switches are located on the VariTrac II Central Control Panel board.

The ICS Control Parameters portion of the Control Inputs menu indicates whether the VariTrac II Central Control Panel is communicating with a higher level ICS system such as Tracer. If it is, information pertaining to the state of the ICS is displayed. These parameters are set by the ICS System and cannot be edited.

Central Control Panel Setup

VariTrac II Central Control Panels can be set up through the interface as follows:

1. Select *VariTrac II Central Control Panel Setup (4S)* from the VariTrac II Central Control Panel Menu.

The VariTrac II Central Control Panel Control Setup screen displays (Figure 6).

Figure 6
VariTrac II Central Control Panel Control Setup

```
Central Control Panel Setup: S-select, L-list, P-previous, N-next
 1) System name                    [VARITRAC 2 CCP1   ]
 2) Supply temp high limit                      130 F
 3) Supply temp low limit                        45 F
 4) Supply temp/calib offset                73.6/ 0.0 F
 5) Minimum supply flow                          70 %
 6) Static pressure setpoint                    140 %
 7) Static pressure control band                 20 %
 8) Min opposite calls to changeover              2
 9) Min opp strong calls to changeover            2
10) Min time to changeover                       15 m
11) Occupied fan mode                            ON
12) Fan turn off delay                           90 s
13) Number of compressors                         2
14) Auxiliary heat                           ENABLE
15) Priority local heat?                        YES
16) Spare output control                    VENT 0
17) Is Voyager cooling only?                    NO
18) Voyager OA damper pos pot?                  YES
19) Voyager min damper pos                      10 %
20) Bypass actuator drive time                  58 s
21) Fail-safe bypass damper min pos             25 %
22) UCM tagging                              DISABL
23) Temp display units                FAHRENHEIT 0
24) Flow display units                      CFM 0
25) Pressure display units                   IN 0
26) Page length                                  24
27) Baud rate                                  9600
```

1) System Name
Enter a descriptive name for the VariTrac II Central Control Panel UCM. The name can contain a maximum of 18 characters, including spaces. The valid characters are the numbers 0 through 9, the letters A through Z, "space," "#," single quote ('), and dash (-).

NOTE: When entering a name into the Central Control Panel, be sure to enter a single quote (') before entering the characters of the name. If the single quote (') key is not pressed first, the Central Control Panel does not allow the name to be entered. To clear a name from the Central Control Panel, type a single quote, then press Enter.

2) Supply Temp High Limit **(default 130°F)**
Used to enforce supply air temperature limits to avoid such things as equipment damage and space discomfort. This limit is enforced by disabling heating stages based on the relationship between the supply air temperature and the heating limit. Values can range from 90-200°F (32.3 - 93.3°C) degrees.

3) Supply Temp Low Limit **(default 45°F)**
Used to enforce supply air temperature limits to avoid such things as equipment damage and space discomfort. This limit is enforced by disabling cooling stages based on the relationship between the supply air temperature and the cooling limit. Values can range from 40-70°F (4.4 - 21.1°C) degrees.

4) Supply Temp/Calib Offset **(default 0)**
This value calibrates the temperature read by the Supply Air Temperature sensor connected to the VariTrac II Central Control Panel. It does not affect the Supply Air Temperature that is reported by a Voyager.

The supply air temperature, with the offset applied, is also displayed on this line. If the temperature sensor has failed, "---" displays instead of a temperature value. Values for the offset range from -10 to 10 degrees.

5) Minimum Supply Flow **(default 70%)**
This value is a bypass setpoint that defines minimum desired system air flow based on the air flow measurement taken with all VAV dampers driven to maximum. The VariTrac II Central Control Panel regulates bypass dampers to maintain system airflow at or above the edited minimum supply flow. This setpoint value is used if the "Velocity" method of Bypass Control is selected. The input range is from 10% to 95%.

6) Static Pressure Setpoint **(default 140%)**
7) Static Pressure Control Band **(default 20%)**
These parameters are used to define static pressure bypass control. Values range from 90 to 250% for the Static Pressure Setpoint and 5 - 100% for the Static Pressure Control Band. Bypass Control determines the amount the bypass damper may be open to protect air handler components from excessively low air flow and high duct static pressure. The Static Pressure Setpoint value is used if static pressure method of Bypass Control is selected. The setpoint represents the percentage of reference static allowed in the duct before the bypass damper begins to open to relieve the pressure. Reference static is established during calibration and represents system pressure with all VAV dampers at max.

8) Min Opposite Calls to Changeover **(default 2)**
Enter the number of opposite mode callers (1 to 4) required to change the system over from Heat to Cool or Cool to Heat. All current mode callers must be satisfied before the system will be allowed to changeover.

Example: Minimum opposite calls to changeover is set to 2. If the system is in the heating mode and three zones are calling for heat, all three zones must have their heating calls satisfied. Then, two or more zones must be calling for cooling for the system to changeover. The changeover will not occur until all minimum on/off times have been satisfied. The "minimum time to changeover" timer must also be expired.

NOTE: During the unoccupied mode (all groups unoccupied) the "minimum opposite calls to changeover" functions the same as in the occupied mode.

9) Min Opposite Strong Calls to Changeover **(default 2)**
Enter the number of opposite STRONG callers (1 to 4) required to force the system to changeover to the opposite mode. Zones which are more than 2°F away from their setpoint are considered to be strong callers. All current mode callers DO

NOT have to be satisfied, but the "minimum time to changeover" must be expired before changeover is allowed.

NOTE: During the unoccupied mode (all groups unoccupied) the "minimum opposite strong calls to changeover" automatically goes to one (1) so any "Strong Caller" zone can change the system over.

10) Min Time to Changeover **(default 15 min)**
Enter the minimum time (10 to 60 minutes) the system must remain in the current mode before changeover to the opposite mode will be allowed. The "minimum time to changeover" counter begins running immediately after a changeover occurs. This timer must be expired before another changeover will be allowed. The time remaining on the counter is displayed in the Service Summary.

11) Occupied Fan Mode **(default ON)**
Enter + to turn ON or - to turn OFF. This parameter determines the system fan mode if any UCM is occupied. If this parameter is edited to AUTO, the fan is cycled on and off with stages of heat and cool. If it is edited to ON, the fan stays on.

12) Fan Turn Off Delay **(default 90s)**
Enter the amount of time (2 to 240 seconds) the fan must wait to turn off after the last stage of heating or cooling has been de-energized. This is applied to intermittent fan operation in the unoccupied mode, and to intermittent (auto) fan operation in the occupied mode.

13) Number of Compressors **(default 2)**
Enter the number of compressors in the unit.

NOTE: If the number of compressors is edited to "1" when connected to a two compressor system or Voyager, only the first compressor will be used. The second compressor will never be energized.

14) Auxiliary Heat **(default ENABLE)**
Enter + to ENABLE or – to DISABLE auxiliary heat. If this field is edited to DISABLE, auxiliary heat in heat pump configurations is not used.

15) Priority Local Heat? **(default YES)**
Enter + to enable (YES) or - to disable (NO). If priority local heat is edited to NO, the UCMs control local heat to two degrees below the heat setpoint. If priority local heat is set to YES, the UCMs control their local heat to the heat setpoint.

16) Spare Output Control **(Default Vent 0)**
This controls the manner in which the spare binary output is to be controlled, if it is installed. The control scheme is selected by entering one of the index numbers below:

Index	Spare Output Control
0	Vent - outside air damper control with morning warmup
1	H/C - controlled based on the heat/cool state of the panel
2	ICS - The ICS system determines the state output. (Tracer only)

17) Is Voyager Cooling Only? **(default NO)**
This line is used only if a Voyager is directly connected to a VariTrac II Central Control Panel. Enter YES if the Voyager Rooftop is a cooling-only unit. Enter NO if the Voyager Rooftop is a cooling/heating unit.

18) Voyager OA Damper Pos Pot **(default YES)**
This line is used only if a Voyager is directly connected to a VariTrac II Central Control Panel via twisted pair wiring. YES allows the Voyager to use its local minimum position potentiometer to determine OA damper minimum position. NO allows the Voyager to use the value edited in line 19, Voyager Min Damper Pos, to determine OA damper minimum position.

19) Voyager Min Damper Pos **(default 10%)**
This line is used only if a Voyager is directly connected to a VariTrac II Central Control Panel via twisted pair wiring. Enter the percentage (0 to 50%) that is the minimum damper setting of the outdoor air damper that is needed to provide the required ventilation for the building. This item applies only to units equipped with economizers.

20) Bypass Actuator Drive Time **(default 58s)**
This value is determined by the type of air valve being used and whether the unit is running in a 50 or 60 Hz mode. This drive time is not automatically changed based on the power line frequency. The default matches the standard VariTrac bypass damper. The range for valid entries is 30 seconds to 200 seconds.

21) Fail-safe Bypass Damper Min Pos **(default 25%)**
The percentage at which the bypass damper is not allowed to go below if the velocity/static pressure sensor fails. The entry value range is from 10% to 100%.

22) UCM Tagging **(default DISABL)**
Enter + to ENABLE or – to DISABLE UCM tagging. This feature allows for enabling the tagging feature, which is a way of preventing problem zones from influencing heat/cool changeover and staging decisions. A UCM is tagged if it is currently 3.0 or more degrees from setpoint and for an hour any of the following conditions exist:

- The UCM is receiving its desired air
- The UCM is the farthest from setpoint of all the UCMs that are calling and receiving their desired air

When this line is edited to DISABLE, all existing UCM tags are cleared.

23) Temp Display Units **(default °F)**
This entry determines the units used for all temperature readings displayed on the edit terminal. Enter "0" for Fahrenheit units and "1" for Celsius units. All temperature readings from all connected devices are display in the units chosen here.

24) Flow Display Units **(default CFM)**
This entry determines the units used for all air flow readings displayed on the edit terminal. Enter "0" for CFM (cubic feet per minute), "1" for L/s (liters per second), and "2" for CMS (cubic meters per second). All air flow readings from all connected devices are display in the units chosen here.

25) Pressure Display Units **(default IN)**
This entry determines the units used for all pressure readings displayed on the edit terminal. Enter "0" for IN (inches water column), and "1" for kPa (kilopascals). All pressure readings from all connected devices are display in the units chosen here.

26) Page Length **(default 24)**
Enter the number of lines to be displayed on an edit terminal or PC screen before pausing the display. A CRT typically has 24 lines of display.

27) Baud Rate **(default 9600)**
Specify the baud rate of the RS-232 port on the VariTrac II Central Control Panel. Valid entries are 300, 1200, 2400, 4800, and 9600 baud. The baud rate of the edit terminal or PC connected to the Central Control Panel must match the baud rate entered here for communications to function.

UCM Data

Each UCM is monitored and controlled by the Central Control Panel. Status, setup and setpoint information is available on the appropriate Central Control Panel menu. The following sections discuss these menus.

UCM Status

The VariTrac II Central Control Panel UCM Status display provides a status summary of a selected UCM. This status display is for viewing only; no editing is available.

To access a VariTrac UCM Status display, follow these steps:

1. From the VariTrac II Central Control Panel Menu, select *UCM data* (1S).
2. Select the desired UCM from the UCM Menu.
3. Select *UCM Status* (1S).

The current operating parameters are then displayed for the selected UCM. Figure 7 shows an example of a VariTrac II Central Control Panel UCM status display.

Figure 7
VariTrac II UCM Status Display

	Operator Entry
VariTrac II Central Control Panel	1S
S-Select UCM (1-16)	1S
UCM 1 CONFERENCE ROOM Menu	1S
UCM 1 CONFERENCE ROOM	Status:
Zone temperature	74.3 F
Active cooling setpoint	74.0 F
Active heating setpoint	68.0 F
Zone sensor setpoint	FAIL
Control mode	OCCUPY
Control action	COOL
Flow control	AUTO
Position	66 %
Present minimum	10 %
Ventilation ratio	0.00
Unit type:	VARITRAC
Heat type:	1-3 stages electric
Fan type:	NONE
Software revision	3.1
Member of group	1 MARKETING DEPT

NOTE: If certain conditions exist, "UCM Memory Failure" and "Calibrating" may be displayed under the Active Heating Setpoint line. UCM Memory Failure indicates that the UCM's EEPROM has failed. Calibrating indicates that the UCM is calibrating.

NOTE: "Auxiliary Temp" may be displayed under the Present Minimum line. Auxiliary Temp displays the temperature read from an auxiliary temperature sensor, if one is installed.

UCM Setup

UCMs connected to the VariTrac II Central Control Panel can be set up through the edit terminal as follows:

1. Select *UCM Data* from the VariTrac II Central Control Panel Main Menu (1S).
2. Select the desired UCM from the UCM Menu.
3. Select *UCM Setup* (3S).

Figure 8 shows the VariTrac II UCM Setup Menu.

Figure 8
VariTrac II UCM Setup Menu

```
                                                    Operator Entry
VariTrac II Central Control Panel 1                          1S
S - Select UCM (1-16)
UCM 1 CONFERENCE ROOM Menu                                   3S

UCM 1 CONFERENCE ROOM Setup Menu:
 1) Name                                  [ CONFERENCE ROOM ]
 2) Unit type                                      VariTrac  3
 3) Heat type                                         NONE  0
 4) Fan type                                          NONE  0
 5) Unit size                                   300  CFM  0
 6) Zone sensor thumbwheel functions                 ENABLE
 7) Heat/cool vote?                                     YES
 8) Parallel fan control                                  —
 9) Include in group/system calculations?               YES
10) Output 1 normally                                  OPEN
11) Output 2 normally                                  OPEN
12) Output 3 normally                                  OPEN
13) Max hot water override?                              —
14) Flow override                                     AUTO  0
15) Current flow:      0 CFM,  Calib factor: 1.00   Measured flow:
16) Aux temp/calibration offset                        —/  .0 F
17) Wired temp/calibration offset                    72.1/ 1.3 F
18) Wired setpoint/calibration offset                74.7/  .0 F
```

1) Name
Enter a descriptive name for the VariTrac II Central Control Panel UCM. The name can contain a maximum of 18 characters, including spaces. The valid characters are the numbers 0 through 9, the letters A through Z, "space," "#," single quote ('), and dash (-). If an unnamed UCM starts to communicate with the Central Control Panel, the UCM is given the name "UCM XX," where XX is the number of the UCM.

NOTE: When entering a name into the VariTrac II Central Control Panel, be sure to enter a single quote (') before entering the characters of the name. If the single quote (') key is not pressed first, the Central Control Panel does not allow the name to be entered. To clear a name from the Central Control Panel, type a single quote, then press Enter.

2) Unit type
The possible types and their indexes are:

Index	Unit Type
0	VariTrane C
1	VariTrane D
2	VariTrane E
3	VariTrac
4	Generic

3) Heat Type
The heat type assignment identifies what kind of heat control algorithm is used by the UCM. Entries 0-5 designate the following:

0 = None - No Heat Available
1 = 1-3 stages electric
2 = Fast pulse width modulation - Electric (2 sec. time base) One stage only
3 = Slow pulse width modulation - Electric (3 min. time base) 1 -3 stages
4 = Prop hot water and aux output
5 = 1-3 stages hot water/perimeter

4) Fan Type
Fan type identifies the fan control algorithm to be used by the UCM. Entries 0-2 designate one of the following:

0 = None
1 = Series
2 = Parallel

5) Unit Size
The unit's size is selected by entering an index number. The size associated with the index number is determined by Table 10, Unit Size Data for VariTrac.

Table 10
Unit Size Data for VariTrac

	Size Index	Unit Size (inches)	Size (CFM)	Drive Time (Seconds) 60 Hz	Drive Time (Seconds) 50 Hz
VariTrac	0	6	300	57	68
	1	8	500	57	68
	2	10	800	57	68
	3	12	1200	57	68
	4	14	1600	57	68
	5	16	2000	57	68

The unit size index is stored in the UCM's EEPROM as an information reference value, and is used to calculate actual CFM values from the percentages used by the UCM.

NOTE: See the Appendix for VariTrane and Generic Information.

6) Zone Sensor Thumbwheel Functions **(default ENABLE)**
Enter + to ENABLE or – to DISABLE zone sensor thumbwheel functions. When this entry is disabled, the following features of the UCM zone sensor modules are disabled:

- Setpoint (adjustment at sensor)
- Ability to generate a "drive to max" command
- Ability to generate a "go unoccupied" command

7) Heat/Cool Vote **(default YES)**
Enter + to enable (YES) or – to disable (NO). When this entry is edited to NO, the UCM has no influence on staging or changeover decisions made by the VariTrac II Central Control Panel.

8) Parallel Fan Control
The data field on this line displays "---" if the unit does not have a parallel fan.

9) Include in Group/System Calculations? **(default YES)**
Enter + to enable (YES) or – to disable (NO). If NO is entered on this line, the UCM's values are not included in the minimum, maximum, average and other calculations that the VariTrac II Central Control Panel does on a group and system basis.

10-12) Output 1-3 Normally **(default OPEN)**
These lines can only be edited for the following heat types:

Proportional hot water and aux output - Only output 3 is editable.
1-3 stages hot water/perimeter - Outputs 1-3 are editable.

If the unit has a fan, Output 3 is not editable. Also, if the unit's heat type is changed, all outputs are set to Normally Open. If the unit's fan type is edited, Output 3 is set to Normally Open.

13) Max Hot Water Override?
A YES answer forces the UCM to turn on all of its hot water outputs or drive open its proportional hot water valve, which may be handy for water balancing. Only units with the following heat types are affected:

1-3 stages hot water/perimeter - All three heat outputs are energized, even if they control electric heat devices. If the unit has a fan, Output 3 is not affected.

Proportional hot water and aux output - The hot water valves connected to outputs 1 and 2 are driven open. Output 3 is turned on, even if it controls an electric heat device. If the unit has a fan, Output 3 is not affected.

The UCM maintains the maximum hot water override condition over power failures. The only way to cancel maximum hot water overrides is by editing this line to NO. If the unit does not have "1-3 stages hot water/perimeter" or "proportional hot water and aux output," this field displays "---."

NOTE: Unit heat must be enabled in order for the maximum hot water override to work.

14) Flow Override (default AUTO)
The valued entered on this line has the highest priority of all the flow overrides. Enter a value of 0 to 4 to reflect the following:

0 = Auto - UCM functioning normally
1 = Open - Damper open 100%
2 = Closed - Damper closed 0%
3 = Min - Damper at edited minimum position
4 = Max - Damper at edited maximum position

Any flow override (1-4) will remain in effect until the value is manually edited back to "auto" (0).

15) Current Flow 0 CFM, Calib factor: 1.00, Measured Flow:
This field displays the calibration factor being used and the current flow being reported by the UCM with the calibration factor applied. This field does not affect VariTrac units.

16) Aux Temp/Calibration Offset (default 0.0 F)
Enter a value that the VariTrac II Central Control Panel will use as a calibration offset for the auxiliary temperature sensor. The calibration offsets are stored at the UCM. The UCM adds the offset to the value being read by the UCM's temp sensors. For example, if the auxiliary sensor is indicating that the temperature is 74.0°F and the calibration offset is -1.5°F, the actual temperature used by the UCM and reported to the Central Control Panel is 72.5°F.

The current temperature, with the offset applied, is displayed on the line with the offset. If a temperature sensor has failed or it is not installed, "---" displays instead of the temperature. It may take 20 seconds after a new offset is entered before it is factored into the temperature.

17) Wired Temp/Calibration Offset (default 0.0 F)
Enter a value that allows a temperature calibration offset to be displayed for the wired zone sensor temperature. The calibration offsets are stored at the UCM. The UCM adds the offset to the value being read by the UCM's temp sensors. For example, if the zone sensor is indicating that the temperature is 74.0°F and the calibration offset is -1.5°F, the actual temperature used by the UCM and reported to the VariTrac II Central Control Panel is 72.5°F.

The current temperature, with the offset applied, is displayed on the line with the offset. If a temperature sensor has failed or is not installed, "---" displays instead of the temperature. It may take 20 seconds after a new offset is entered before it is factored into the temperature.

18) Wired Setpoint/Calibration Offset (default 0.0 F)
Enter the calibration offset to be applied to the wired zone sensor's setpoint. It may take 20 seconds for the entered offset to be factored into the setpoint. This line also displays the setpoint being supplied by the wired zone sensor, with the offset applied. The following may display instead of a setpoint:

"---" is displayed if the setpoint has failed.

MAX is displayed if the zone sensor has been overridden to maximum.

UNOCC is displayed if the zone sensor has been overridden to unoccupied.

UCM Setpoints

Setpoints for UCMs connected to the VariTrac II Central Control Panel can be edited through the remote interface as follows:

1. Select *UCM Data* from the VariTrac II Control Panel Main Menu (1S).
2. Select the desired UCM from the UCM Data Menu.
3. Select *UCM Setpoints* (2S).

Figure 9 shows the UCM Setpoints Menu.

Figure 9
VariTrac II UCM Setpoints Menu

	Operator Entry
VariTrac II Central Control Panel 1	1S
S - Select UCM (1-16)	1S
UCM 1 CONFERENCE ROOM Menu	2S
UCM 1 CONFERENCE ROOM Setpoints Menu:	
1) Active cooling setpoint	74.0 F
2) Active heating setpoint	68.0 F
3) Occupied cooling setpoint	74.0 F
4) Occupied heating setpoint	68.0 F
5) Unoccupied cooling setpoint	85.0 F
6) Unoccupied heating setpoint	60.0 F
7) Cooling setpoint low limit	45 F
8) Heating setpoint high limit	100 F
9) Zone sensor heating setpoint offset	2 F
10) Control offset	0 F
11) Parallel fan control offset	—
12) Maximum position	100 %
13) Cooling minimum position	10 %
14) Heating minimum position	10 %
15) Occupied outside air requirement	0 %
16) Unoccupied outside air requirement	0 %

1) Active cooling setpoint
This is the current cooling setpoint being used by the UCM. The active cool setpoint is display only and cannot be changed through the Central Control Panel. It represents the actual setpoint being used by the UCM.

If Zone Sensor Thumbwheel Functions in the UCM Setup Menu has been edited to ENABLE and the system is in the Occupied mode, this is the zone sensor setpoint. If Zone Sensor Thumbwheel Functions has been edited to DISABLE and the system is in the Occupied mode, this is the Occupied Cooling Setpoint. If the system is in the Unoccupied mode, this value reflects the Unoccupied Cooling Setpoint. Zone sensor setpoints are ignored in the Unoccupied mode.

2) Active heating setpoint
This is the current heating setpoint being used by the UCM. The active heat setpoint is display only and cannot be changed through the Central Control Panel. It represents the actual setpoint being used by the UCM.

If the Zone Sensor Thumbwheel Functions in the UCM Setup Menu has been edited to ENABLE and the system is in the Occupied mode, this is the Zone Sensor Setpoint. It is two degrees below the Active Cooling Setpoint when the Zone Sensor Thumbwheel Functions is set to ENABLE.

If Zone Sensor Thumbwheel Functions has been edited to DISABLE and the system is in the Occupied mode, this is the Occupied Heating Setpoint. If the system is in the Unoccupied mode, this value reflects the Unoccupied Heating Setpoint. Zone Sensor Setpoints are ignored in the Unoccupied mode.

3) Occupied cooling setpoint **(default 74°F)**
If the zone sensor thumbwheel functions is disabled, enter the cooling setpoint (40 to 95°F, or 4.4 to 35.0°C) to be used by the UCM in the occupied mode.

4) Occupied heating setpoint **(default 71°F)**
If the zone sensor thumbwheel functions is disabled, enter the heating setpoint (40 to 95°F, or 4.4 to 35.0°C) to be used by the UCM in the occupied mode.

5) Unoccupied cooling setpoint **(default 85°F)**
Enter the cooling setpoint (40 to 95°F, 4.4 to 35.0°C) to be used by the UCM in the unoccupied mode.

6) Unoccupied heating setpoint **(default 60°F)**
Enter the heating setpoint (40 to 95°F, 4.4 to 35.0°C) to be used by the UCM in the unoccupied mode.

7) Cooling setpoint low limit **(default 45°F)**
Enter a temperature between 45°F and 100°F (7.2–37.8°C). The UCM will use the "cooling setpoint low limit" as its cooling setpoint any time the actual setpoint is set lower than the limit. This limit applies to the local setpoint adjustment, as well as the UCM setpoint during occupied times only.

8) Heating setpoint high limit **(default 100°F)**
Enter a temperature between 45°F and 100°F (7.2–37.8°C). The UCM will use the "heating setpoint high limit" as its heating setpoint any time the actual setpoint is set higher than the limit. This limit applies to the local setpoint adjustment, as well as the UCM setpoint during occupied times only.

9) Zone Sensor Heating Setpoint Offset **(default 2°F)**
When a zone sensor setpoint is used, the cooling setpoint equals the zone sensor setpoint and the heating setpoint number equals the zone sensor setpoint minus the zone sensor heating setpoint offset. The offset is always displayed and is always editable even if a zone sensor setpoint is not being used. The range is from 2 to 10°F (-16.7 to -12.2°C).

Example: The zone sensor thumbwheel has been enabled. The setpoint arrow on the zone sensor is pointing at 74°F. This is the cooling setpoint for the zone. If the "zone sensor heating setpoint offset" is edited to 3°F, the heating setpoint for the zone is 74°F-3°F = 71°F. If the zone sensor thumbwheel were moved to 72°F, the cooling setpoint would be 72°F and the heating setpoint would be 72°F-3°F = 69°F.

10) Control Offset **(default 0°F)**
When Control Offset is active, the UCM adds this value to its cooling setpoint and subtracts this value from its heating setpoint.

NOTE: Control Offset can only be activated from an upper level ICS system such as Tracer.

NOTE: If the zone sensor setpoint thumbwheel is enabled, the control offset value is only effective if the UCM is Version 3.0 or greater. On UCM versions prior to 3.0, control offset only functions with programmed setpoints.

11) Parallel Fan Control Offset
Enter a value to determine when a parallel fan is turned on and off. This feature is not used with VariTrac dampers.

12) Maximum Position **(default 100%)**
The UCM will not drive its damper position above this value under normal operating conditions. The maximum must be greater than or equal to the minimum cooling and minimum heating values. Values range from 10 to 100%.

13) Cooling Minimum Position **(default 10%)**
The UCM will not drive its damper position below this value under normal operating conditions while in the Cool mode. The minimum cool value must be less than or equal to the maximum value. Values range from 0 to 100%.

14) Heating Minimum Position **(default 10%)**
The UCM will not drive its damper position below this value under normal operating conditions while in the Heat mode and while it is using local duct heat. The minimum heat value must be less than or equal to the maximum value. Values range from 0 to 100%.

15) Occupied Outside Air Requirement **(default 10%)**
This feature does not effect the functional performance of a UCM. It provides information only on ventilation requirements to a higher level ICS system such as Tracer for use in custom ventilation control algorithms. The UCM takes the "Occupied Outside Air Requirement" and divides it by the current flow or damper position. This information then displays on the UCM status screen as the "Ventilation Ratio." The ventilation ratio is also provided to Tracer for custom use.

16) Unoccupied Outside Air Requirement **(default 0%)**
This feature does not effect the functional performance of a UCM. If provides information only on ventilation requirements to a higher level ICS system such as Tracer for use in custom ventilation control algorithms. The UCM takes the "Unoccupied Outside Air Requirement" and divides it by the current flow or damper position. This information then displays on the UCM status screen as the "Ventilation Ratio." The ventilation ratio is also provided to Tracer for custom use.

Group Data

The VariTrac II Central Control Panel allows groups of UCMs to be controlled and monitored independently. UCMs can be defined into four groups. A group can have up to 16 members, or UCMs. UCMs 1-4 are automatically assigned to Group 1, UCMs 5-8 are assigned to Group 2, UCMs 9-12 are assigned to Group 3 and UCMs 13-16 are assigned to Group 4. All UCMs must be assigned to a group for proper operation.

Group Status

The VariTrac II Central Control Panel Group Status display provides a status summary of group data. This status display is for viewing only; no editing is available.

To access a VariTrac II Central Control Panel Group Status display, follow these steps:

1. From the VariTrac II Central Control Panel Main Menu, select *Group data* (2S).
2. Select the desired group from the Group Menu.
3. Select *Group Status (1S).*

The current operating parameters are then displayed for the selected group. Figure 10 shows an example of a VariTrac II Central Control Panel Group Status display.

Figure 10
VariTrac II Group Status Display

	Operator Entry
VariTrac II Central Control Panel 1	2S
S - Select Group (1-4)	1S
Group 1 MARKETING DEPT	1S
Group 1 MARKETING DEPT	Status
Control mode	OCCUPY
Flow control	AUTO
Unit fan	ENABLE
Unit heat	ENABLE
Total flow	.0 CFM
Average temp	74.1 F
Minimum temp	72.6 F UCM 2 OFFICE 1
Maximum temp	77.9 F UCM 1 CONFERENCE ROOM
Max deviation	- 3.2 F UCM 1 CONFERENCE ROOM
Max position	100 % UCM 1 CONFERENCE ROOM
Critical vent ratio	0.00
Max position exists	

NOTE: If certain conditions exist, "Vent Mode Active," "Max Flow Exists," "Max Position Exists," and/or "Zone Temperature Sensor Failure Exists" may display. Vent Mode Active indicates that at least one member of the group is currently in vent mode. Max Flow Exists indicates that at least one member of the group has a flow sensor that is at or above its maximum flow setpoint. Max Position Exists indicates that at least one member of the group is at or above the set max position setpoint. Zone Temperature Sensor Failure Exists indicates that at least one member of the group has a failed zone temp sensor.

Group Member List

The Group Member List provides a brief summary of each group member (Figure 11).

To access a VariTrac II Central Control Panel Group Member List display, follow these steps:

1. From the VariTrac II Central Control Panel Main Menu, select *Group data* (2S).
2. Select the desired Group from the Group Menu.
3. Select *Group Member List (2S).*

Figure 11
Group Member List Display

```
                                        Operator Entry
VariTrac II Central Control Panel 1              2S
S - Select Group (1-4)                           1S
Group 1 MARKETING DEPT Menu                      2S

Group 1 MARKETING DEPARTMENT Menu   Member List:
1) # 1 CONFERENCE ROOM          Cl/Ht 74.7/72.7 Temp 77.9 COOL Pos 100% F
2) # 2 OFFICE 1                 Cl/Ht 73.2/71.2 Temp 72.9 COOL Pos  10% F
3) # 3 OFFICE 2                 Cl/Ht 72.4/70.4 Temp 73.9 COOL Pos  69% F
4) # 4 MARKETING ASSIST          Cl/Ht 74.0/71.0 Temp 73.1 COOL Pos  47% F
```

NOTE: If a group has no members, the system displays "This group has no members."

NOTE: Access to the member's status, setpoint and setup menus are available by selecting that member from the member list, and typing "S."

The following is displayed for each member:

- UCM Number
- UCM Name
- Active Cooling and Heating Setpoints
- Current Zone Temperature - This value is displayed as "---" if the UCM is not being supplied with a valid zone temperature from its zone sensor module.
- Control Action (Heat/Cool)
- Damper Position
- Diagnostic letters, if certain conditions exist

The diagnostic characters in the Member List represent the following:

T - The UCM is not being supplied with a valid zone temperature from its zone sensor module.

F - The UCM's flow sensor has failed or doesn't exist.

S - The UCM is not being supplied with a valid setpoint from its zone sensor.

Group Setup

Groups can be set up through the VariTrac II Central Control Panel as follows:

1. From the VariTrac II Central Control Panel Main Menu, select *Group data* (2S).
2. Select the desired Group from the Group Menu.
3. Select *Group Setup (3S).*

Figure 12 shows a VariTrac II Central Control Panel Group Setup menu.

Figure 12
VariTrac II Group Setup Menu

```
                                                Operator Entry
VariTrac II Central Control Panel Menu                      2S
S - Select Group (1-4)                                      1S
Group 1 MARKETING DEPT Menu                                 3S

Group 1 MARKETING DEPT                              Setup Menu:
1) Name                                  [MARKETING DEPT    ]
2) Control mode                                      AUTO  0
3) Flow override                                     AUTO  0
4) Energy saver mode                                 ENABLE
5) Ventilation mode                                  DISABL
6) Unit fan                                          ENABLE
7) Unit heat                                         ENABLE
8) Enforce min while unoccupied                         YES
9) S - select for member definition

Group 1  MARKETING DEPT                    Member Definition:
1)  Group 1 member  1  CONFERENCE ROOM                     1
 2) Group 1 member  2  OFFICE 1                            2
 3) Group 1 member  3  OFFICE 2                            3
 4) Group 1 member  4  MARKETING ASSIST                    4

⇩   ⇩                                                     ⇩

15) Group 1 member 15                                      0
16) Group 1 member 16                                      0
```

1) Name
Enter a descriptive name for the VariTrac II Central Control Panel UCM. The name can contain a maximum of 18 characters, including spaces. The valid characters are the numbers 0 through 9, the letters A through Z, "space," "#," single quote ('), and dash (-).

NOTE: When entering a name into the Central Control Panel, be sure to enter a single quote (') before entering the characters of the name. If the single quote (') key is not pressed first, the Central Control Panel does not allow the name to be entered. To clear a name from the Central Control Panel, type a single quote, then press Enter.

2) Control Mode **(default 0)**
Enter an index number to select a group control mode. If either index number 1 or 2 is selected, the group control mode overrides the control of the ICS (the system is no longer controlled based upon its schedules). For example, if the group control mode is occupy (1), the system is always in the occupied mode. If index number 0 (Auto) is selected, the system is controlled via the ICS based upon its schedules. The following lists the control modes that may be selected:

Index	Control Mode
0	Auto
1	Occupy
2	Unoccupy

3) Flow Override **(default 0)**
Enter the group flow override as an index number. Entries 0-4 reflect the following:

Index	Control Mode
0	Auto - UCM functioning normally
1	Open - Damper open 100%
2	Closed - Damper closed 0%
3	Min - Damper at edited minimum position
4	Max - Damper at edited maximum position

4) Energy Saver Mode **(default ENABLE)**
Enter + to ENABLE or – to DISABLE Energy Saver Mode. When Energy Saver Mode is enabled, the VariTrac II Central Control Panel sends a command to certain group members that allow them to close below their minimum positions. This command is sent only to occupied members of the group that are either in the cooling mode and have a zone temperature that is less than the active heating setpoint, or are in the heating mode and have a zone temperature that is greater than the active cooling setpoint.

5) Ventilation Mode **(default DISABL)**
Enter + to ENABLE or – to DISABLE ventilation mode. When Ventilation Mode is enabled, the group is occupied, and the system has been in a zero energy state for more than 4 minutes, the VariTrac II Central Control Panel does not allow the group's minimum flow/position multiplier to fall below 4.0. A zero energy state shall be any period when the system fan is on and no stages of heat or cool are on.

6) Unit Fan **(default ENABLE)**
Enter + to ENABLE or – to DISABLE the unit fan. This command allows operators to disable the parallel fans of the group members.

7) Unit Heat **(default ENABLE)**
Enter + to ENABLE or – to DISABLE unit heat. When this is disabled, the UCM heating outputs and the auxiliary outputs of the group members are disabled.

8) Enforce Min While Unoccupied? **(default YES)**
Enter + to enable (YES) or - to disable (NO). If NO is entered on this line, the unoccupied members of the group are allowed to close below their minimum positions.

9) S - select for Member Definition
This menu allows for definition of the group members. Members are defined by entering the UCM number on the desired member line. If the entered UCM is already in another group, the following message is generated:

UCM XX already in group Y; "+ enter" to reassign

If a "+" is entered on this line, the UCM is reassigned to this group.

Group ICS Control Summary

The VariTrac II Group ICS Control Summary provides a summary of the ICS Control. Information such as whether the ICS is currently communicating with the VariTrac II Central Control Panel, whether the ICS is in control of the Central Control Panel, what control mode the ICS is in, and whether the unit fan and heat are enabled displays. This status is for display purposes only; no editing is available. Figure 13 displays the ICS Control Summary Screen.

1. From the VariTrac II Central Control Panel Main Menu, select *Group data* (2S).
2. Select the desired Group from the Group Menu.
3. Select *ICS Control Summary (4S).*

Figure 13
ICS Control Summary Screen

VariTrac II Central Control Panel 1	2S
S - Select Group (1-4)	1S
Group 1 MARKETING DEPT Menu	4S
Group 1 MARKETING DEPT	ICS Control Summary
ICS control?	YES
Control mode	OCCUPY
Flow override	AUTO
Unit heat	ENABLE
Unit fan	ENABLE
Unit reset?	NO
Control offset	DISABL
Minimum flow multiplier	1.0

NOTE: Lines below and including Control Mode are displayed only if an ICS is in control of the VariTrac II Central Control Panel; they are not displayed if the "ICS Control?" is No.

Appendix

Additional UCM Setup Information

The following UCM setup parameters and setpoints apply to Trane VAV boxes and Generic VAV boxes. You should also consult the VAV box documentation such as VAV-IN-24 for further setup information.

UCM Setup

2) Unit type
The possible types and their indexes are:

Index	Unit Type
0	VariTrane C
1	VariTrane D
2	VariTrane E
3	VariTrac
4	Generic

4) Fan Type
Fan type identifies the fan control algorithm to be used by the UCM. Entries 0-2 designate one of the following:

0 = None
1 = Series
2 = Parallel

5) Unit Size

The unit's size is selected by entering an index number. The size associated with the index number is determined by Table 11, Unit Size Data for VariTrane and Generic units.

Table 11
VariTrane and Generic Unit Size Data

VariTrane E	
Size Index	**Size (CFM)**
0	300
1	600
2	1100
3	1700
4	2400
5	3200
6	4200
VariTrane D	
Size Index	**Size (CFM)**
0	300
1	600
2	1100
3	1700
4	2400
5	3200
6	4200
VariTrane C	
Size Index	**Size (CFM)**
0	200
1	400
2	800
3	1200
4	1600
5	2000
6	2400
7	4000
Generic	
Size Index	**Size (CFM)**
0	200
1	400
2	800
3	1200
4	1600
5	2000
6	2400
7	4000

8) Parallel Fan Control

The parallel fan control entry determines if the on/off control of a parallel fan is determined by the zone temperature or flow conditions. If parallel fan control is edited to DEG, the fan is controlled based on temperature. If this entry is edited to FLOW, the fan is controlled based on flow. Enter "-" for DEG and "+" for FLOW. The data field on this line displays "---" if the unit does not have a parallel fan. The degrees or CFM of offset control for the parallel fan can be edited in the Setpoint Menu.

15) Current Flow
This field displays the calibration factor being used and the current flow being reported by the UCM with the calibration factor applied. Upon calibration of the VAV flow sensor, a CFM reading displays, along with a calibration factor of 1. By entering the actual measured flow, the UCM changes the calibration factor from .6 to 1.5, to adjust the reported CFM to match the actual measured CFM. See VAV-IN-24 for more information.

UCM Setpoints

11) Parallel Fan Control Offset **(default 2°F or 15% of flow)**
Enter a value to determine when a parallel fan is turned on and off. If FLOW is being used, the input range is 0 - 100% of flow in CFM. If DEG is used, the input range is 0°F to 10°F.

Control Constants

The Control Constants Menu is a hidden menu designed to give the operator access to key setup factors normally operated at the factory defaults. These constants may require change when a Trane UCM is used to control a non-Trane water valve, or when a non-Trane air control device requires generic setup.

When configuring a UCM as GENERIC, the defaults carry over from the configuration designated immediately prior to selecting "generic" from the Setup Menu. For example, if a UCM is configured as a VariTrac damper, and then reconfigured as a generic device, the VariTrac damper drive time of 57 seconds becomes the default of the generic configuration.

To specify control constants, type "+" at the UCM Setup Menu line and press the Enter key. The Control Constants Menu displays (Figure 14).

Figure 14
Control Constants Menu

	Operator Entry
VariTrac II Central Control Panel 1	1S
S - Select UCM (1-16)	1S
UCM 1 CONFERENCE ROOM Menu	3S
UCM 1 CONFERENCE ROOM Setup Menu	+ [Enter]
UCM 1 CONFERENCE ROOM Control Constants Menu:	
1) Water valve drive time	125 s
2) Air valve drive time	57 s
3) Sensor flow constant	83
4) Air flow Kp	20 1
5) Air flow reset time	500 1
6) PWM heat Kp	20 1
7) PWM heat reset time	500 1
8) Air valve gain	.07 1

1) Water Valve Drive Time **(default 125s)**
Enter the drive time as determined by the type/manufacturer of the hot water valve and the power frequency supplied to the unit. The drive time is always displayed and is editable even though it applies to units with proportional hot water heat. Values range from 25 to 255 seconds.

NOTE: Whenever the water valve drive time is edited, a Reset command is sent to the UCM.

2) Air Valve Drive Time
This value is automatically generated based on the Trane unit's type, size and by the power line frequency that were selected. This is not an editable field for Trane UCMs. For UCMs configured as generic, the entry range is from 30 seconds to 666 seconds.

NOTE: Whenever the air valve drive time is edited, a Reset command is sent to the UCM.

3) Sensor Flow Constant
This constant is automatically determined for the Trane unit type or size. This field is not editable for Trane UCMs. Please refer to VAV-IN-24 for more information.

4) Air Flow Kp
Air Flow Kp should be left at the factory default. This field is not editable for Trane UCMs. Leave this value at the default. Please refer to VAV-IN-24 for more information.

5) Air Flow Reset Time
This field is not editable for Trane UCMs. Leave this value at the default. Please refer to VAV-IN-24 for more information.

6) PWM Heat Kp
PWM Heat Kp should be left at the factory default. This field is not editable for Trane UCMs. Please refer to VAV-IN-24 for more information.

7) PWM Heat Reset Time
PWM Heat Reset Time should be left at the factory default. This field is not editable for Trane UCMs. Please refer to VAV-IN-24 for more information.

8) Air Valve Gain
Air Valve Gain should be left at the factory default. This field is not editable for Trane UCMs. Please refer to VAV-IN-24 for more information.

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