

# SPECulations

A Periodic Newsletter for Design Professionals  
About Innovative Products and Ideas Worthy of Specification Consideration

June  
2000  
(E1)

This  
Issue



## Digital Diffuser Systems by **Titus**

### Overview

Surveys of building managers and tenants show that comfortable temperatures are the biggest concern for tenants. Building managers know that tenants registering three or more complaints in a year will find another location.

Also, in this tight labor market, employees can demand a more comfortable work environment including better air distribution and individual temperature control.

Adding additional VAV terminals is one solution, making the zones as small as one VAV box per office, but the cost is very high. Another option is a pressure dependent zoning system utilizing modulating duct dampers. In either case, a wall thermostat for every box must be provided. Also, diffuser performance is highly variable. Select or install the wrong diffuser and the air will dump at low airflow creating a situation as bad as the one you are trying to fix.



Now individually responsive comfort control is finally here! Titus' **Zcom** Digital Diffuser Systems electronically control the volume of air from each diffuser in response to individually programmed temperature settings.

Because **Zcom** diffusers have a high air diffusion performance index (ADPI) throughout their entire turndown range, dumping and drafting is virtually eliminated.

### Zcom Components

Multiple border types available to complement various ceiling designs.

A tight horizontal air pattern is achieved by the intelligent curvature design of the Backpan.

A conduit chase is provided to conceal power (24 VAC) and communication wiring.

Damper plate design produces uniform air distribution in all positions.

Duct sensors accurately sense supply air temperature and verify airflow.

Electronic pulse motor has fast ultra quiet operation and strength.

Low-mass induction sensors create the most accurate and quickest responding means of measuring room temperature.

Face panel's curved edge reduces diffuser sound and creates a smooth appearance.

On the technical side, Titus **Zcom** provides true DDC (P+I) control algorithms for control accuracy and exceptional comfort. The diffuser has separate temperature, override and minimum volume setpoints for cooling and heating modes that are stored in non-volatile memory so batteries are not required. The temperature sensor is located in the diffuser so it responds to room temperature changes instantly.

The supply air temperature and flow detection sensors in the neck of the diffuser provide automatic cooling/heating changeover and fail-safe operation. The standard infrared communication port for the Zapper hand-held remote control allows adjustment of temperature setpoints, damper limits and unit addressing. Once the **Zcom** is set for the individual's comfort, there is seldom a need to change setpoints since the temperature sensor on the diffuser reacts instantly to a change in the room load.

## Zapper Infrared Setup Tool



Pictured above is the Zapper hand-held infrared remote used in the initial setup of the **Zcom** system. It is used to input the individual **Zcom** addresses, temperature setpoints and to set the minimum damper position. You'll need one per project for the initial setup. Projects with multiple floors may elect to purchase one per floor. When the tenant first gets the **Zcom**, there may be some need to use the Zapper to change the temperature setpoints to suit the individual's need. You'll find that after a month or so, the Zapper isn't used because the **Zcom** continuously modulates to maintain the desired room temperature, reacting to changes in occupancy and equipment load.

Below is the Wall Mount Adjuster, whose single function is to allow the room occupant to vary the **Zcom** temperature setpoint +/- 3° without using the Zapper. When used in conjunction with the Zone Manager, the Wall Mount Adjuster has an Override Push-Button that alerts the Zone Manager to start the air conditioning for after hours operation.

## ZWMA Wall Mount Adjuster



## Zone Manager



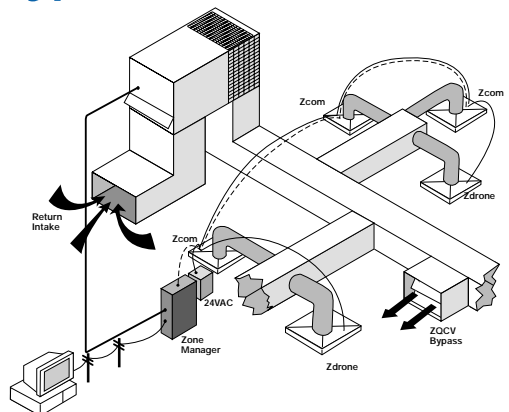
Titus' Zone Manager is designed to provide a VAV comfort solution for smaller buildings using unitary HVAC equipment. It is ideal for 5 to 30 ton unitary systems.

Zone Manager replaces the standard thermostat using the same 24VAC connections. Zone Manager can control a conventional 1 or 2 stage cooling only unit, a 1 or 2 stage heating/cooling package unit or a heat pump system. Changing from a conventional system setup to a heat pump requires only a simple jumper at the Zone Manager panel.

Simple installation is one of the key features of the Titus Zone Manager system. Other zoning systems require complex "home run" wiring schemes, separate thermostats and dampers, and additional components for interface to unitary equipment.

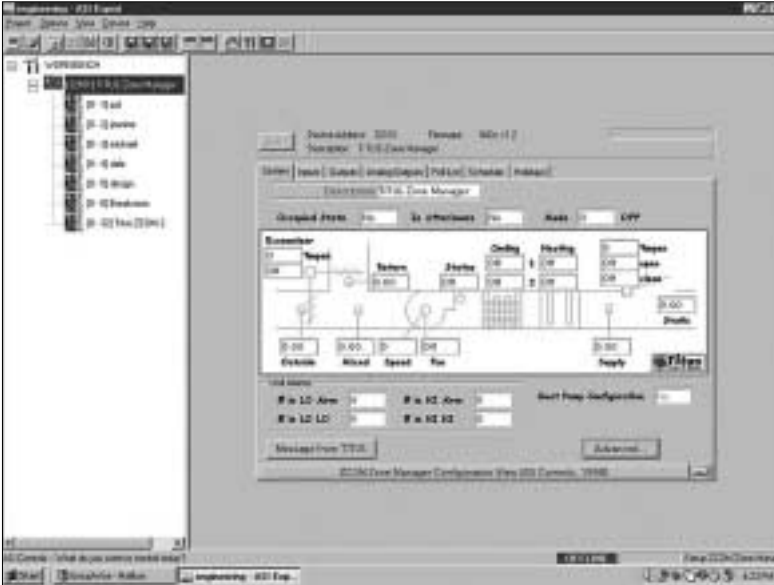
By contrast, **Zcom** requires only four wires — two for 24 VAC power and two for the "daisy chain" communications loop. The Zone Manager panel requires power wiring (120 VAC), termination of the communications loop, and standard thermostat wiring from the unitary equipment. Without any further configuration, the Zone Manager and Zcoms are ready. Below is a typical **Zcom** /Zone Manager system for an open plenum return design.

## Typical Zcom Installation



You don't need a computer to set up a **Zcom** system, however the Zone Manager has a lot of additional power for those who want to take advantage of it. Economizers, bypass terminals and scheduling functions may be set and controlled for each Zone Manager using the Titus Expert Software, which is included.

## Titus Expert Software



## Bypass Application Guidelines

Most unitary equipment designs utilize constant volume supply fans. Since the **Zcom** is a variable volume device, constant fan systems will see changes in system static pressures as the **Zcom** diffusers modulate to meet comfort requirements. If more than 30% of the total system air will be under VAV control by the **Zcom** diffusers, then a bypass terminal is required. Bypass terminals should be sized to handle 80% of the total system airflow minus the airflow of the smallest zone. The Titus ZECV and ZQCV bypass terminals are ideal for this application.

As the **Zcom** diffusers modulate closed, duct static pressure will increase. The duct static pressure transmitter will sense this increase and the Zone Manager will open the bypass damper to relieve excess air from the system. This will maintain proper airflow through the unitary equipment and maintain low sound levels in the comfort zones.

Typical bypass applications will direct excess air into the ceiling plenum (open plenum return), or into the return air duct (ducted return). When bypassing air into the plenum, it is recommended to locate the bypass terminal near the end of a duct run. This allows time for plenum and bypass air to mix, protecting the unitary equipment from high or low temperature limit conditions. Location of the static pressure tap should be approximately two-thirds down the length of the longest duct run.

## Another perSPECTive...



By Dave McIntyre

HVAC milestones. Those of us who have been around awhile have seen a few. We've seen multi-zone systems give way to single zone systems, bypass systems defer to double duct systems, constant volume systems succumb to variable volume systems, and pneumatics slowly surrender to electronics. The march of progress inexorably defines our times.

I think we're about to witness another milestone, the end of an era, if you will – the end of the zone.

Individual temperature control has been the holy grail of HVAC design from the time the first air conditioning engineer put pencil to paper. Now it is here. And I think the venerable single zone VAV box may have seen its day.

Digital Diffusers. You knew they had to happen. Instead of the comfort of every occupant in the zone being dictated by a single remote thermostat, temperatures can now be controlled at every diffuser. No zones, no dumping and no drafts. Buildings full of happy, comfortable people.

The future is here...

### BENEFITS TO THE OWNER/CONTRACTOR

- Accurate personal comfort control
- Improved productivity
- Lower cost per zone than VAV terminals
- Renovate existing offices or add zones easily
- Responds more quickly than a wall thermostat
- No drafts, no dumping and no zones

### BENEFITS TO THE ENGINEER

- State-of-the-art comfort control
- No zoning headaches or trade-offs
- Provides retrofit opportunities
- Convert constant volume systems into VAV
- Easy to install and configure with the Zapper remote
- Stand-alone or complete system with Zone Manager

**SPECulations** is published by: Toro-Aire, 1708 Mahalo Place, Dominguez Hills, CA 90220 • Phone (310) 632-6000 • Fax: (310) 632-8919

Email: [publisher@toroaire.com](mailto:publisher@toroaire.com)

Web Page: [www.toroaire.com](http://www.toroaire.com)

**Do you have a customer or colleague who would enjoy SPECulations? Send us their name and address and we will add them to our mailing list.**

Editor-In-Chief  
Dave McIntyre

Managing Editor  
Monica Froeber

Technical Editor  
Victor Petring

Web Consultant  
Karin West

Copy Chief  
Michael Green