Chapter 4
Installation and Setup Procedures

There are special considerations that need to be taken into account before the 425A can be installed. For example, if the installation is completed during cool weather, a heat-related problem may not surface for many months, suddenly appearing during the heat of summer. This section provides planning information for the installation and set up of the transmitter.

4.1 Site Considerations

The transmitter requires an AC input line of 220 VAC with a rating of 20 amps for the exciter cabinet and 100 amps for each amplifier cabinet. Make sure that the proposed site for the transmitter has the necessary voltage requirements.

The 425A is designed and built to provide long life with a minimum of maintenance. The environment in which it is placed is important and certain precautions must be taken. The three greatest dangers to the transmitter are heat, dirt, and moisture. Heat is usually the greatest problem, followed by dirt, and then moisture. Over-temperature can cause heat-related problems such as thermal runaway and component failure. Each amplifier tray in the transmitter contains a thermal interlock protection circuit that will shut down that tray until the temperature drops to an acceptable level.

A suitable environment for the transmitter can enhance the overall performance and reliability of the transmitter and maximize revenues by minimizing down time. A properly designed facility will have an adequate supply of cool, clean air, free of airborne particulates of any kind, and no excessive humidity. An ideal environment will require temperature in the range of 40° F to 70° F throughout the year, reasonably low humidity, and a dust-free room. It should be noted that this is rarely if ever attainable in the real world. However, the closer the environment is to this design, the greater the operating capacity of the transmitter.

The fans and blowers designed and built into the transmitter will remove the heat from within the trays, but additional means are required for removing this heat from the building. To achieve this, a few issues need to be resolved. The first step is to determine the amount of heat to be removed from the transmitter room. There are generally three sources of heat that must be considered. The first and most obvious is the heat from the transmitter itself. This can be determined by subtracting the average power to the antenna (350 watts) from the AC input power (3500 watts). This number in watts (3150) is then multiplied by 3.41, which gives 10,741, the BTUs to be removed every hour. 12,000 BTUs per hour equals one ton, so a 1-ton air conditioner will cool a 500-watt transmitter.

The second source of heat is other equipment in the same room. This number is calculated in the same way as the equation for BTUs. The third source of heat is equally obvious but not as simple to calculate. This is the heat coming through the walls, roof, and windows on a hot summer day. Unless the underside is exposed, the floor is usually not a problem. Determining this number is usually best left up to a qualified HVAC technician. There are far too many variables to even estimate this number without reviewing the detailed drawings of the site that show all of the construction details. The sum of these three sources is the bulk of the heat that must be removed. There may be other sources of heat, such as personnel, and all should be taken into account.

Now that the amount of heat that must be removed is known, the next step is to determine how to accomplish this. The options are air conditioning, ventilation, or a combination of the two. Air conditioning is always the preferred method and is the only way to create anything close to an ideal environment.

Ventilation will work quite well if the ambient air temperature is below 100° F, or about 38° C, and the humidity is kept at a reasonable level. In addition, the air stream must be adequately filtered to ensure that no airborne particulates of any kind will be carried into the transmitter. The combination of air conditioning for summer and ventilation during the cooler months is acceptable when the proper cooling cannot be obtained through the use of ventilation alone and using air conditioning throughout the year is not feasible.

Caution: The use of air conditioning and ventilation simultaneously is not recommended. This can cause condensation in transmitters. For tube type transmitters, this can be especially serious if the condensation forms in the tube cavity and creates damaging arcs.

The following precautions should be observed regarding air conditioning systems:

1. Air conditioners have an ARI nominal cooling capacity rating. In selecting an air conditioner, do not assume that this number can be equated to the requirements of the site. Make certain that the contractor uses the actual conditions that are to be maintained at the site in determining the size of the air conditioning unit. With the desired conditioned room temperature under 80° F, the unit must be derated, possibly by a substantial amount.
2. Do not have the air conditioner blowing directly onto the transmitter. Condensation may occur on, or worse in, the transmitter under certain conditions.
3. Do not isolate the front of the transmitter from the back with the thought of air conditioning only the front of the unit. Cooling air is drawn in at the front of all transmitters and in the front and back of others. Any attempt to isolate the front from the rear will adversely affect the flow of cooling air.
4. Interlocking the transmitter with the air conditioner is recommended to keep the transmitter from operating without the necessary cooling.
5. The periodic cleaning of all filters is a must.

When using ventilation alone, the following general statements apply:

1. The blower, with attendant filters, should be on the inlet, thereby pressurizing the room and preventing dirt from entering the transmitter.
2. The inlet and outlet vents should be on the same side of the building, preferably the leeward side. As a result, the pressure differential created by wind will be minimized. Only the outlet vent may be released through the roof.
3. The inlet and outlet vents should be screened with 1/8-inch hardware cloth (preferred) or galvanized hardware cloth (acceptable).
4. Cooling air should enter the room as low as practical but in no case higher than four feet above the

floor. The inlet must be located where dirt, leaves, snow, etc., will not be carried in with the cooling air.

5. The exhaust should be located as high as possible. Some ducting is usually required to insure the complete flushing of heated air with no stagnant areas.

6. The filter area must be large enough to insure a maximum air velocity of 300 feet per minute through the filter. This is not a conservative number but a never-exceed number. In a dusty or remote location, this number should be reduced to 150 CFM.

7. The inlet and outlet(s) must have automatic dampers that close any time the ventilation blower is off.

8. In those cases in which transmitters are regularly off for a portion of each day, a temperature-differential sensor that controls a small heater must be installed. This sensor will monitor inside and outside temperatures simultaneously. If the inside temperature falls to within 5° F of the outside temperature, the heater will come on. This will prevent condensation when the ventilation blower comes on and should be used even in the summer.

9. A controlled-air bypass system must be installed to prevent the temperature in the room from falling below 40° F during transmitter operation.

10. The blower should have two speeds, which are thermostatically controlled, and be interlocked with the transmitter.

11. The blower on high speed must be capable of moving the required volume of air into a half inch of water pressure at the required elevation. The free air delivery method must not be used.

12. Regular maintenance of the filters, if used, can not be overemphasized.

13. Tube transmitters should not rely on the internal blower to vent the cooling air at elevations above 4000 feet. For external venting, the air vent on the cabinet top must be increased to an 8-inch diameter for a 1-kW transmitter and to a 10-inch diameter for 5-kW and 10-kW transmitters. An equivalent rectangular duct may be used but, in all cases, the outlet must be increased by 50% through the outlet screen.

14. It is recommended that a site plan be submitted to ADC for comments before installation begins.

In calculating the blower requirements, filter size, and exhaust size, if the total load is known in watts, 2000 CFM into ½ inch of water will be required for each 5000 watts. If the load is known in BTUs, 2000 CFM into ½ inch of water will be required for each 17,000 BTUs. The inlet filter must be a minimum of seven square feet, larger for dusty and remote locations, for each 5000 watts or 17,000 BTUs. The exhaust must be at least four square feet at the exhaust screen for each 5000 watts or 17,000 BTUs.

The information presented in this section is intended to serve only as a general guide and may need to be modified for unusually severe conditions. A combination of air conditioning and ventilation should not be difficult to design (see Figure 4-1). System interlocking and thermostat settings should be reviewed with ADC. As with any equipment installation, it is always good practice to consult the

manufacturer when questions arise. ADC can be contacted at (724) 941-1500.

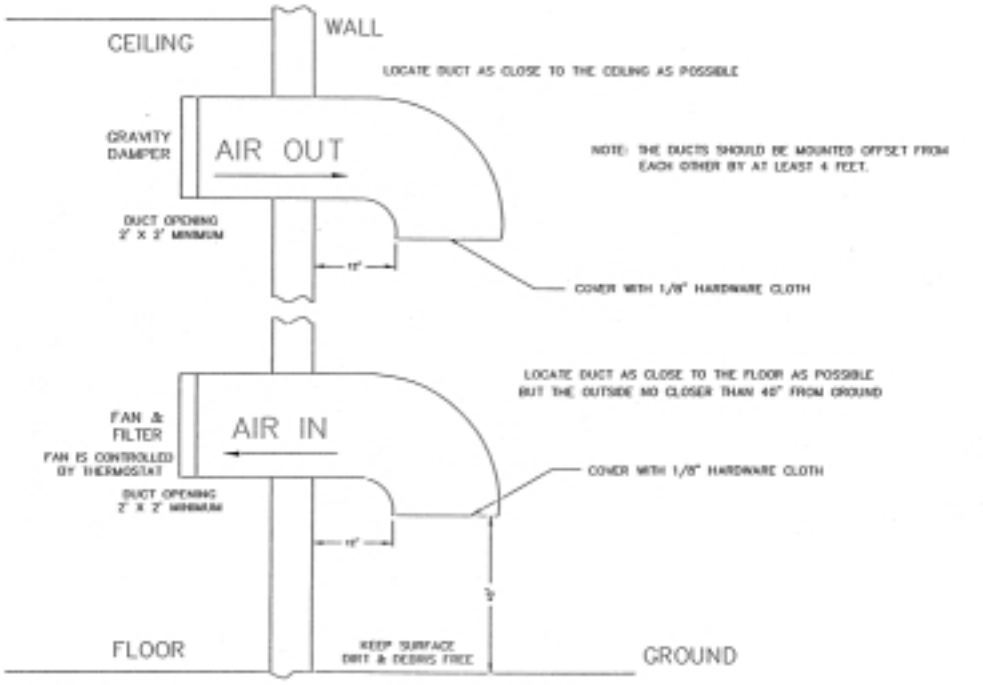

Figure 4-1. 1 kW Minimum Ventilation Configuration

4.2 Unpacking the Cabinets and Trays

Note: Air conditioning and any related heat exhaust ducts should be in place before continuing with the installation of the transmitter.

Thoroughly inspect the cabinets and all other materials upon their arrival. ADC certifies that upon leaving our facility the equipment was undamaged and in proper working order. The shipping containers should be inspected for obvious damage that indicates rough handling. Check for dents and scratches or broken switches, meters, or connectors. Any claims against in-transit damage should be directed to the carrier. Inform ADC as to the extent of any damage as soon as possible.

Remove the cabinet and the trays from the crates and boxes. Remove the straps that hold the cabinet to the shipping skid and slide the cabinet from the skid. Remove the plastic wrap and foam protection from around the cabinet. Do not remove any labeling or tags from any cables or connectors; these are identification markers that make assembly of the transmitter much easier.

Remove the two L-brackets, mounted on the front panel rails, which held the trays in place during shipment. The trays are mounted in the cabinet using Chassis Trak cabinet slides as shown in Figure 4-2. The tray slides are on the top and the bottom of the VHF amplifier trays and on the sides of the VHF exciter tray. Inspect the trays for any loose hardware or connectors, tightening as needed.

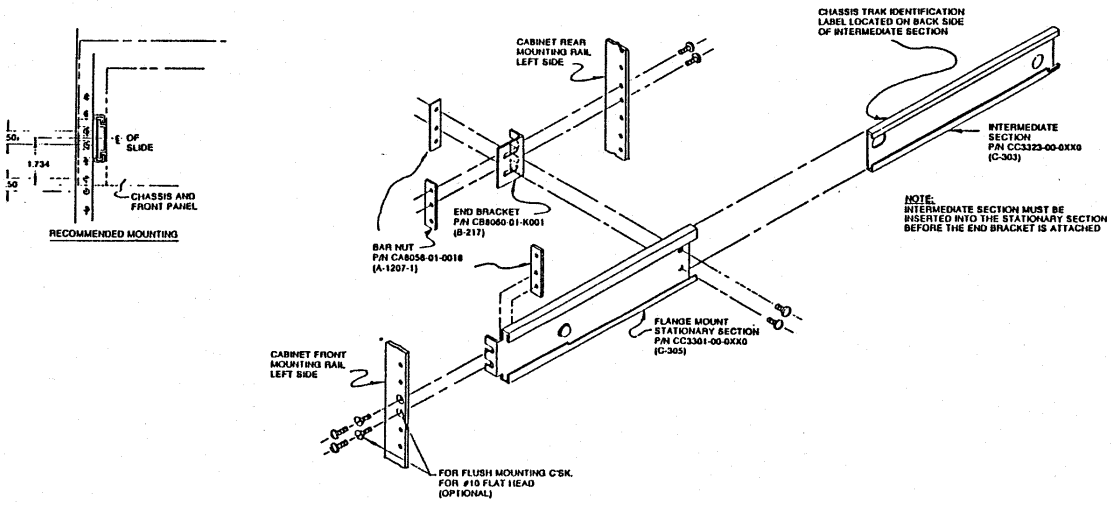

Figure 4-2. Chassis Trak Cabinet Slides

Open the rear door. Inspect the interior of the cabinet for packing materials and carefully remove any packing materials that are found. Slowly slide each tray in and out to verify that they do not rub against each other and have no restrictions to free movement.

4.3 Installing the Cabinets and Trays

It may be necessary to adjust the position of the trays to keep them from rubbing. This is accomplished by loosening the cabinet slide mounting bolts that hold the front of the slide to the mounting frame of the cabinet and moving the tray up or down, as needed, to correct for the rubbing.

The air intake to the 500-watt transmitter is only intended for room air. The cabinet should be positioned for adequate air intake and exhaust; the opening of the rear door, if present; access to the trays, including sliding them out for testing; the main AC hookup; and the installation of the output transmission line. The cabinet should be grounded using copper strapping material and should be permanently mounted to the floor of the site using the holes in the bottom of the cabinet.

Once the cabinet is in place, and the trays are checked for damage, the main AC hookup can be made.

Caution: Before connecting the 220 VAC, make certain that all of the circuit breakers associated with the transmitter have been switched off.

The main AC input circuit to the 500-watt transmitter should be a 40-amp, 230-VAC line, using AWG 6 wire, inside of a 1-1/4-inch conduit.

The 220 VAC input connections are made to terminal block TB1, which is part of the AC distribution panel, near the upper right-hand, rear portion of the transmitter: terminals 1 and 4 (220 VAC) and terminal 3 (chassis ground).

The output of the bandpass filter assembly, which is an “N” connector, should connect to the transmission line for the antenna system.

This completes the unpacking and installation of the 425A 500-watt VHF television transmitter. Refer to the setup and operation procedures that follow before applying power to the transmitter.

4.4 Setup and Operation

Initially, the transmitter should be turned on with the RF output at (A9-A5-J2) the coupler assembly terminated into a dummy load of at least 500 watts. If a load is not available, check that the output of the coupler assembly is connected to the antenna.

Connect the baseband balanced audio input to the terminal block TB1 or the composite audio input to BNC jack J3 or J13 on the rear of the UHF exciter. The baseband audio input can remain connected when using the 4.5-MHz composite input without affecting the operation of the tray. Connect the baseband video input to BNC jack J2 or J1 also on the rear of the UHF exciter or, if the (optional) 4.5-MHz composite input kit is purchased, connect the 4.5-MHz composite input to BNC jack J2 or J1. To use the 4.5-MHz composite input, the 4.5-MHz composite input must be connected to J2 or J1 and the baseband select must be removed from J7-6 and J7-7 on the rear of the tray. To use the baseband video and audio inputs, the baseband video input must be connected to J2 or J1, the baseband audio must be connected to the proper jack, and the baseband select must be connected from J7-6 and J7-7.

If the optional (A12) A/V input and remote interface assembly is present in the system, the baseband balanced audio input connects to the terminal block TB1 or the composite audio input to BNC jack J6. The baseband audio input can remain connected when the 4.5-MHz composite input is in use without affecting the operation of the tray. Connect the baseband video input to BNC jack J2 on the A/V input and the remote interface assembly or, if the (optional) 4.5-MHz composite input kit is purchased, connect the 4.5-MHz composite input to BNC jack J2. To use the 4.5-MHz composite input, the 4.5-MHz composite input must be connected to J2 and the baseband select must be removed from J7-6 and J7-7 on the rear of the UHF exciter tray. To use the baseband video and audio inputs, the baseband video input must be connected to J2, the baseband audio must be connected to the proper jack, and the baseband select must be connected from J7-6 and J7-7 on the rear of the UHF exciter tray.

Switch on the main AC, VHF exciter, and the amplifier #1 and amplifier #2 circuit breakers on the AC distribution panel facing the rear of the cabinet and mounted behind the rear door. On the VHF exciter tray, switch the Operate/Standby switch to Standby and the Auto/Manual switch to Manual. Normal operation of the transmitter is in Automatic. Automatic operation uses the video input to the UHF exciter as an Operate/Standby switch. In Auto, if the input video is lost for approximately 7 seconds, the transmitter will automatically revert to Standby and, when the video signal is restored, the transmitter will quickly return to Operate.

Move the Operate/Standby switch on the UHF exciter tray to Operate. Observe the power supply reading, +48 V, on the front panel of the VHF amplifier trays.

Note: If the transmitter does not switch to Operate when the Operate/Standby switch is placed in Operate, check that an external interlock plug, with a jumper wired from pins 23 to 24, is connected to jack J11 on the rear of the VHF exciter. If (A12) the (optional) A/V input and remote interface assembly are present in the system, the external interlock plug, with a jumper wired from pins 21 to 22, is connected to jack J9 on the assembly.

On the VHF exciter tray, look at the front panel meter reading in the % Visual Power position; it should read 100%. If necessary, readjust the screwdriver adjust power pot on the front panel of the VHF exciter for 100%. As the power

level is being checked, observe the meter reading in the % Reflected Power position. If the % Reflected Power is very high, above 10%, a problem exists with the output coaxial lines and they will need to be checked. A center bullet missing from the coax lines or loose bolts on the connections can cause this problem. Return the Operate/Standby switch to Standby.

The gain and phase controls on the front panels of the individual VHF amplifier trays were adjusted at the factory to obtain an output of 100% for the transmitter and should not need to be readjusted.

The front panel readings on the individual VHF amplifier trays may not be the same. Refer to the Test Data Sheet for the transmitter to compare the final readings from the factory with the readings on each of the trays after the setup. They should be very similar. If a reading is off by a significant amount, refer to the phasing and power adjustment procedures for the VHF amplifier trays in Chapter 5, Detailed Alignment Procedures, of this manual before trying to make any adjustments.

If a dummy load is connected to the transmitter, switch the unit to Standby and switch off the main AC circuit breaker. Remove the dummy load and make all of the connections that are needed to connect the transmitter to the antenna. Switch the main AC circuit breaker on and the Operate/Standby switch to Operate. Adjust the output power screwdriver pot to achieve an output of 100%.

If the transmitter is already connected to the antenna, check that the output is 100%. If necessary, adjust the power screwdriver pot.

This completes the transmitter setup and operation procedures for the 425A VHF solid-state transmitter. The transmitter can now be operated normally.

If a problem occurred during the setup and operation procedures, refer to Chapter 5, Detailed Alignment Procedures, of this manual for more information.