

CEILING MOUNT AIR HANDLERS INSTALLATION INSTRUCTIONS

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Important Safety Instructions

The following symbols and labels are used throughout this manual to indicate immediate or potential safety hazards. It is the owner's and installer's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of personal injury, property damage, and/or product damage.

WARNING

HIGH VOLTAGE!

Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death.



WARNING

Goodman will not be responsible for injury or property damage arising from improper service or service procedures. If you install or perform service on this unit, you assume responsibility for any personal injury or property damage which may result. Many jurisdictions require a license to install or service heating and air conditioning equipment.

WARNING

Installation and repair of this unit should be performed **ONLY** by individuals meeting the requirements of an "entry level technician", at a minimum, as specified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI). Attempting to install or repair this unit without such background may result in product damage, personal injury, or death.

WARNING

Do not connect to or use any device that is not design certified by Goodman for use with this unit. Serious property damage, personal injury, reduced unit performance and/OR hazardous conditions may result from the use of such non-approved devices.


WARNING

To prevent the risk of property damage, personal injury, or death, do not store combustible materials or use gasoline or other flammable liquids or vapors in the vicinity of this appliance.

CAUTION

Have your contractor identify all the various cutoff switches and devices that service this unit. Know where the switch is that will cut off energy to the heating system in the event of overheating.

⚠ DANGER PELIGRO



CARBON MONOXIDE POISONING HAZARD

Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death.

B10259-216

Shipping Inspection

Upon receiving the product, inspect it for damage from shipment. Shipping damage, and subsequent investigation is the responsibility of the carrier. Verify the model number, specifications, electrical characteristics, and accessories are correct prior to installation. The distributor or manufacturer will not accept claims from dealers for transportation damage or installation of incorrectly shipped units.

Codes & Regulations

This product is designed and manufactured to comply with national codes. Installation in accordance with such codes and/or prevailing local codes/regulations is the responsibility of the installer. The manufacturer assumes no responsibility for equipment installed in violation of any codes or regulations.



The United States Environmental Protection Agency (EPA) has issued various regulations regarding the introduction and disposal of refrigerants. Failure to follow these regulations may harm the environment and can lead to the imposition of substantial fines. These regulations may vary by jurisdiction. A certified technician must perform the installation and service of this product. Should you have any questions please contact the local office of the EPA.

Replacement Parts

When reporting shortages or damages, or ordering repair parts, give the complete product model and serial numbers as stamped on the product. Replacement parts for this product are available through your contractor or local distributor. For the location of your nearest distributor consult the white business pages, the yellow page section of the local telephone book or contact:

CONSUMER AFFAIRS
GOODMAN MANUFACTURING COMPANY, L.P.
7401 SECURITY WAY
HOUSTON, TEXAS 77040
(877) 254-4729

Application Information



CAUTION

Heat Pump Premature Failure Notice

Running the unit without HPSK-1 kit installed on heat pump can cause premature unit failure. A HPSK-1 kit must be installed on all heat pump applications.

This ceiling mount air handler is available in cooling capacities of 1.5, 2, and 2.5 nominal tons of cooling. Electric heat models are available in capacities of 0, 5, 6, 8 and 10 kW.

The unit is designed to be installed in a horizontal position above a dropped ceiling. **Do NOT install this unit outside the structure. These models are designed for INDOOR USE ONLY.**

Pre-Installation Instructions

Carefully read all instructions for the installation prior to installing product. Make sure each step or procedure is understood and any special considerations are taken into account before starting installation. Assemble all tools, hardware and supplies needed to complete the installation. Some items may need to be purchased locally. Make sure everything needed to install the product is on hand before starting.

Before attempting any installation, the following points should be considered:

- Structural strength of supporting members
- Clearances and provision for servicing
- Power supply and wiring
- Air duct connections
- Drain facilities and connections

Installation Clearances

Place this unit as close to the space to be air conditioned as possible. These units are U.L. listed for installations with zero clearance to combustible materials. If this unit is installed in a removable ceiling panel, ensure adequate space is available for servicing. Run ducts as direct as possible to supply and return outlets. Use non-flammable weatherproof flexible connectors on both supply and return connections at unit to reduce noise transmission.

Ducting

Duct work should be fabricated by the installing contractor in accordance with local codes. Use industry manuals such as NESCA (National Environmental Systems Contractors Association, 1501 Wilson Blvd., Arlington, Virginia 22209) as a guide when sizing and designing the duct system.

To ensure correct system performance, the ductwork is to be sized to accommodate 375-425 CFM per ton of cooling with the static pressure not to exceed 0.5" W.C. Inadequate ductwork that restricts airflow can result in improper performance and compressor or heater failure



WARNING

To prevent the risk of property damage, fire, carbon monoxide poisoning, explosion, personal injury, or death, do not connect ductwork to any heat producing device such as a fireplace insert or stove.

Filters

Filters are not provided with unit, and must be supplied and installed in the return air system by the installer. A field installed filter grille is recommended for easy and convenient access to the filters for periodic inspection and cleaning. Filters must have adequate face area for the rated air quantity of the unit. The minimum filter size is 20" x 20" x 1".

Condensate Drain Piping

The coil drain pan has a primary and a secondary drain with 3/4" NPT female connections. The connectors required are 3/4" NPT male, either PVC or metal pipe, and should be hand tightened to a torque of approximately 37 in-lbs. to prevent damage to the drain pan connection. An insertion depth between .355 to .485 inches (3-5 turns) should be expected at this torque. Use the female (3/4 NPT) threaded fitting that protrudes outside of the enclosure for external connections.

1. Ensure drain pan hole is NOT obstructed.
2. To prevent potential sweating and dripping on to finished space, it may be necessary to insulate the condensate drain line located inside the building. Use Armaflex® or similar material.

A Secondary Condensate Drain Connection has been provided for areas where the building codes require it. Pitch the drain line 1/4" per foot to provide free drainage. Insulate drain lines located inside the building to prevent sweating. Install a condensate trap to ensure proper drainage. If the secondary drain line is required, run the line separately from the primary drain and end it where it can be easily seen.

NOTE: Water coming from this line means the coil primary drain is plugged and needs clearing.

CAUTION
If secondary drain is not installed, the secondary access must be plugged.

The installation must include a "P" style trap that is located as close as is practical to the evaporator coil. See **Figure 1** for details of a typical condensate line "P" trap.

NOTE: Trapped lines are required by many local codes. In the absence of any prevailing local codes, please refer to the requirements listed in the Uniform Mechanical Building Code.

A drain trap in a **draw-through** application prevents air from being drawn back through the drain line during fan operation thus preventing condensate from draining, and if connected to a sewer line to prevent sewer gases from being drawn into the airstream during blower operation. In a **blow-through** application the drain trap prevents conditioned air from escaping. It is permissible in this application to use a shallow trap design sometimes referred to as a running trap.

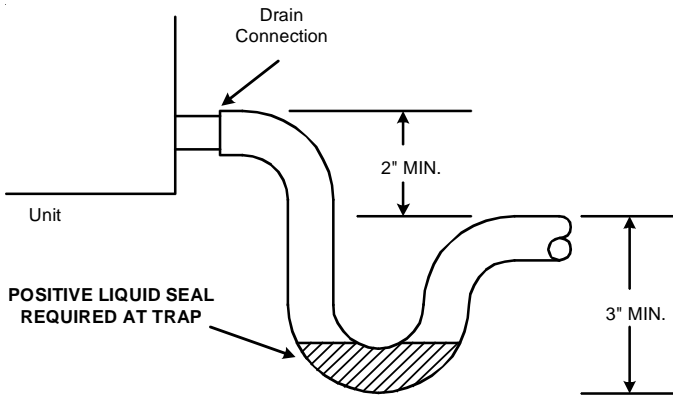


Figure 1

The depth of a running trap (Figure 2) should be either 1" or a depth that permits unrestricted condensate drainage without excessive air discharge.

Field experience has shown condensate drain traps with an open vertical Tee between the air handler and the condensate drain trap can improve condensate drainage in some applications, but may cause excessive air discharge out of the open Tee. Goodman® does not prohibit this type of drain but we also do not recommend it due to the resulting air leakage. Regardless of the condensate drain design used, it is the installer's responsibility to ensure the condensate drain system is of sufficient design to ensure proper condensate removal from the coil drain pan.

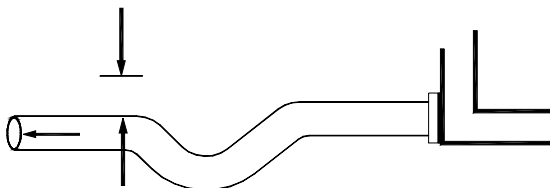


Figure 2

When coils are installed above ceilings, or in other locations where damage from condensate overflow may occur, it is **MANDATORY** to install a field fabricated auxiliary drain pan under the coil cabinet enclosure. Drain lines from the auxiliary pan must be installed and terminated so that the homeowner can see water discharges. A primary condensate drain connection is located in the drain pan on the bottom of the coil / enclosure assembly. The female (3/4 fpt) threaded fitting that protrudes outside of the enclosure is used for external connections.

NOTE: Wire size based on 60°C rated wire insulation and 30°C Ambient Temp. (86°F).

For branch circuit wiring (main power supply to unit disconnect), determine the minimum wire size for the length of run from Table 1 using the circuit ampacity found on the unit rating plate. From the unit disconnect to unit, the smallest wire size allowable in Table 1 may be used, **as long as the disconnect is in sight of the unit.**

BRANCH CIRCUIT COPPER WIRE SIZE (Base on 1% Voltage Drop)									
SUPPLY WIRE TW (60C) LENGTH - FEET	200	6	4	4	4	3	3	2	2
	150	8	6	6	4	4	4	3	3
	100	10	8	8	6	6	6	4	4
	75	12	10	8	8	6	6	4	4
	50	14	12	18	10	8	8	6	6
BRANCH CIRCUIT AMPACITY									
	15	20	25	30	35	40	45	50	

Note: Wiring for unit only, no heat kit installed.

Table 1

For more than three conductors in a raceway or cable, see the N.E.C. for derating the ampacity of each conductor.

Layout For Ceiling Mount Air Handlers

NOTE: The location of the unit is based on thorough consideration of the PRE-INSTALLATION CHECK POINTS.

1. Before locating the unit on the dropped ceiling, ensure the strength of the ceiling and beams is adequate to support the weight involved. This is an important step and the installers responsibility. See the table below for approximate weight of unit.

MODEL	WEIGHT (lb.)
1.5 TON	57
2 TON	64
2.5 TON	68

Table 2

2. Mount the unit in a horizontal position above a dropped ceiling of adequate strength. Refer to Figure 3.

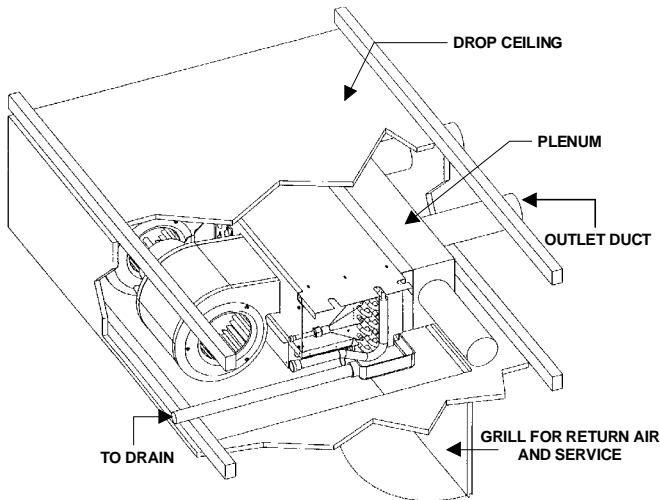
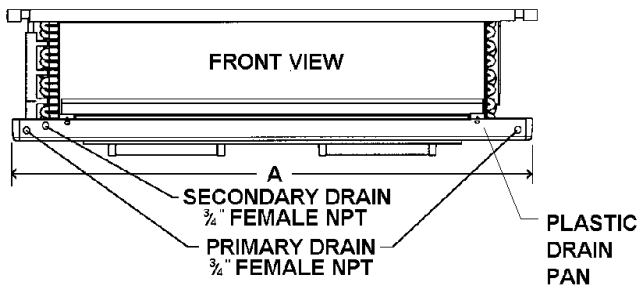
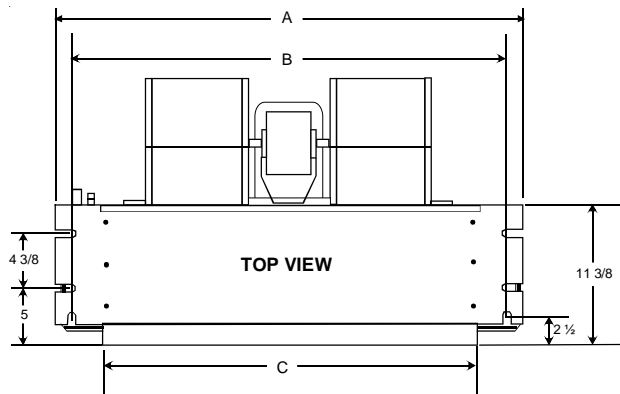


Figure 3

3. The location of the unit should provide proper access for inspection and servicing.

MODEL	A	B	C	D
1.5 TON	37 1/4	37 11/16	30	6 1/2
2 TON	43 1/4	40 11/16	36	6 1/2
2.5 TON	49 1/4	46 11/16	42	6 1/2

Table 3



NOTE: SPECIFICATIONS AND PERFORMANCE DATA LISTED HEREIN ARE SUBJECT TO CHANGE WITHOUT NOTICE

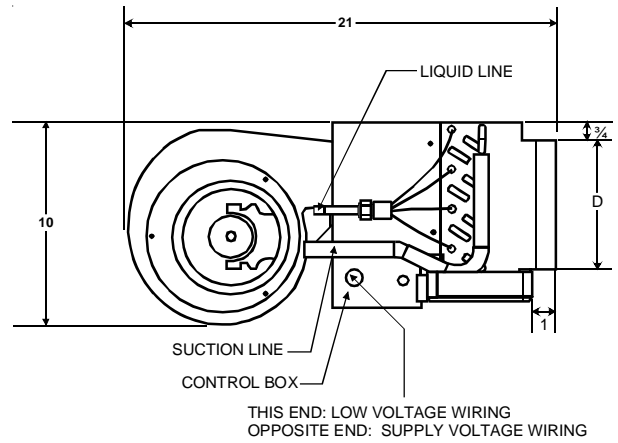


Figure 4

Special Instructions

This airhandler comes equipped with an evaporator coil with a check style flowrator assembly, an indoor blower and all necessary internal electrical wiring. For most installations with matching applications, no change to the flowrator orifice is required. However, in mix-matched applications, a flowrator change may be required. See the Goodman piston kit chart or consult your local distributor for details regarding mix-matched orifice sizing. If the mix-match application requires a different piston size, change the piston in the distributor on the indoor coil before installing the coil and follow the procedure shown below.

WARNING

The evaporator coil is shipped from the factory with approximately 200 PSI tracer gas charge. Use caution when relieving pressure.

IMPORTANT NOTE: Torch heat required to braze tubes of various sizes is proportional to the size of the tube. Tubes of smaller size require less heat to bring the tube to brazing temperature before adding brazing alloy. Applying too much heat to any tube can melt the tube. Service personnel must use the appropriate heat level for the size of the tube being brazed.

NOTE: The use of a heat shield when brazing is recommended to avoid burning the serial plate or the finish on the unit. Heat trap or wet rags should be used to protect heat sensitive components such as service valves and TXV valves.

CAUTION

To prevent feeder tube damage, hold the distributor body with a 3/4" open end wrench when removing or replacing the 13/16" flare nut.

1. Remove the valve core to allow high pressure tracer gas to escape. No gas indicates a possible leak.
2. Remove the 13/16" flare nut and tailpiece.

3. Unsweat the access fitting on the tailpiece
4. Remove the check piston to verify it is correct and then replace the piston. See piston kit chart in instructions.
5. Unsweat the cap on the suction line.
6. Slide the 13/16" flare nut over the tailpiece.
7. Braze tailpiece to the lineset liquid tube.
8. Insert the suction line into the connection, slide the insulation at least 18" away from the braze joint. Braze suction line.
9. **AFTER THE TAILPIECE HAS COOLED**, confirm position of the white Teflon® seal and hand tighten the 13/16" flare nut.
10. Torque the 13/16" flare nut to 7-25 ft-lbs. or tighten 1/6 of a turn. Do not overtighten.



CAUTION

Excessive torque can cause orifices to stick. Use the proper torque settings when tightening orifices.

11. Replace suction line insulation.
12. After installation, evacuation and charging of the low side is complete, check fittings for leaks.

NOTE: With the piston in the distributor, the seal end should point inside the distributor body and should not be seen when looking into the end of distributor. Make sure the piston is free to rotate, and move up and down in the distributor body.

Electrical Connections



WARNING

HIGH VOLTAGE!

Disconnect ALL power before servicing. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death due to electric shock. Wiring must conform with NEC or CEC and all local codes. Undersized wires could cause poor equipment performance, equipment damage or fire.



Determine the availability of sufficient power to operate the unit. The voltage at the power supply must correspond to the unit RATED VOLTAGE REQUIREMENT.

Determine wire sizes from the unit nameplate ampacity and in accordance with the National Electrical Code. Wiring should never be sized smaller than is recommended by either of these two sources.

The unit must be permanently grounded in accordance with local codes, or in the absence of local codes, with the N.E.C. ANSI/NFPA NO. 70-1987 or latest edition in the U.S.A.

Internal Wiring

A diagram of the internal wiring of this unit is located under the electrical box cover. If any of the original wire as supplied with the appliance must be replaced, the wire gauge and insulation must be same as original wiring.

Transformer is factory wired for 230 volts on 208/ 230 volt models. See wiring diagram for 208 volt wiring. For 208V operation, move the red wire lead from 240V to 208V tap.

MODEL	THERMOSTAT HEAT ANTICIPATOR SETTING
ALL MODELS	0.2

Table 4

Make the following high and low voltage connections at either location to wire units.

High Voltage Wiring

This unit is designed for Single phase 208/230 Volt only. Connect the two leads to terminals L1 and L2 on the disconnect in the electrical control section, using wire sizes specified in Table 1.

Low Voltage Wiring

Refer to Figure 5 for cooling unit with electric heat and refer to Figure 6 for heat pump with electric heat.

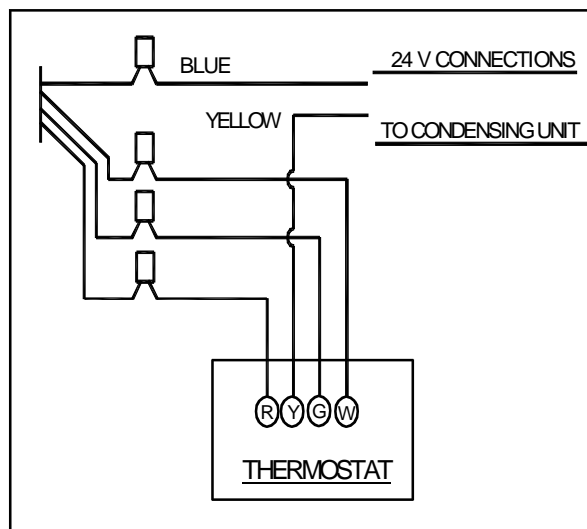
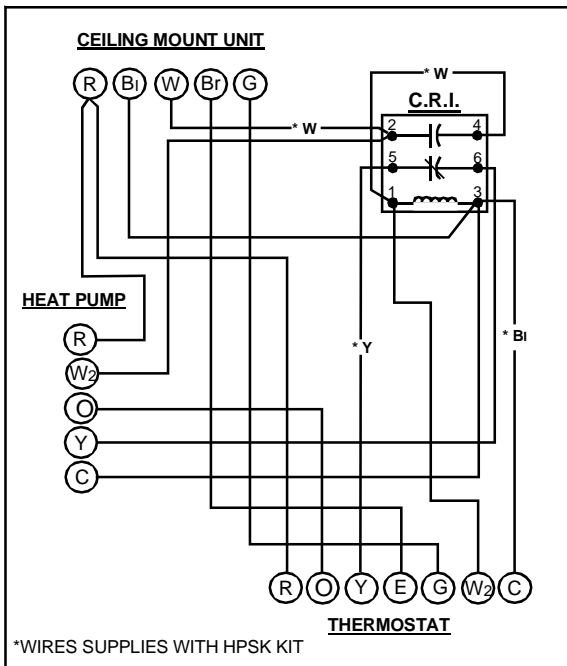


Figure 5



Note: in case of heat pump failure, switch to "E" on Thermostat for emergency heat.

Figure 6

Connect low voltage wires from the thermostat to the corresponding wires in the Ceiling Mount unit and outdoor unit using No. 18 AWG wires as follows:

LEAD	THERMOSTAT	NOTES
RED	R (24V)	-
GREEN	G (FAN)	-
-	Y	TO CONDENSING UNIT 24V CONNECTIONS
WHITE	W	-
BLUE	-	TO CONDENSING UNIT 24V CONNECTIONS
BROWN	E	TO BE USED FOR EMERGENCY HEAT ONLY

Table 5

MAINTENANCE

Room Thermostat

The room thermostat controls the operation of your heating and/or cooling unit. It senses the indoor temperature and signals the equipment to start or stop maintaining the temperature you have selected for your comfort. The room thermostat should be in a central, draft free inside wall location for best operation. Do not place any heat producing apparatus such as lights, radio, etc., near the thermostat as this will cause erratic operation of the comfort system.

Air Filter(s)

All central air moving comfort systems must include air filter(s). Locate these filters in either the equipment or return air duct system upstream of the equipment. The filter(s) removes dust and debris from the air thus helping to keep your conditioned space clean. More important, the filter keeps dust and debris from collecting on heat transfer surfaces thus maintaining optimum equipment efficiency and performance. Inspect and clean or replace filters every month. This routine maintenance procedure will pay big dividends in reduced operating cost and reduced service expense. Never operate comfort equipment without filter(s).

Fuses and/or Circuit breakers

This comfort equipment should be connected to the building electric service in accordance with local and National Electric codes. This electrical connection will include over current protection in the form of fuses or circuit breakers. Have your contractor identify the circuits and the location of over current protection so that you may be in a position to make inspections or replacements in the event the equipment fails to operate. Keep replacement fuses of the proper size on hand.

Periodic Checkup and Service

This unit is designed to provide many years of dependable, trouble-free comfort when properly maintained. Proper maintenance will consist of annual checkups and cleaning of the internal electrical and heat transfer components by a qualified service technician. Failure to provide periodic checkup and cleaning can result in excessive operating cost and/or equipment malfunction.

BLOWER CHART FOR ACNF

Model	Motor Speed	Airflow rate delivered against External Static Pressure, (CFM)				
		0.1"	0.2"	0.3"	0.4"	0.5"
ACNF180XXX	High	710	660	590	515	435
	Low	650	595	540	480	390
ACNF240XXX	High	955	880	820	740	675
	Low	885	840	775	725	620
ACNF300XXX	High	1,075	1,005	920	820	730
	Low	945	890	835	760	650

Note: Airflow data for 240 Vac with dry coil and no filter in place.

Quality Makes the Difference!

All of our systems are designed and manufactured with the same high quality standards regardless of size or efficiency. We have designed these units to significantly reduce the most frequent causes of product failure. They are simple to service and forgiving to operate. We use quality materials and components. Finally, every unit is run tested before it leaves the factory. That's why we know. . . **There's No Better Quality.**

Visit our websites at www.goodmanmfg.com or amana-hac.com for information on:

- Products
- Warranties
- Customer Services
- Parts
- Contractor Programs and Training
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