*Model 2075*

# MiniMast™

## MANUAL

ETS·LINDGREN™
An ESCO Technologies Company

 REV D – PN 399235

Note: Model 2075 shown with optional base cover on the front of this manual.

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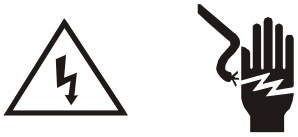
**NOTICE: This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.**

## SAFETY SYMBOL DEFINITIONS

**REFER TO MANUAL** When product is marked with this symbol refer to instruction manual for additional information.



**HIGH VOLTAGE** Indicates presence of hazardous voltage. Unsafe practice could result in severe personal injury or death.

**PROTECTIVE EARTH GROUND (SAFETY GROUND)**
Indicates protective earth terminal. You should provide uninterruptible safety earth ground from the main power source to the product input wiring terminals, power cord, or supplied power cord set.

**CAUTION**

**CAUTION** Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.

**WARNING**

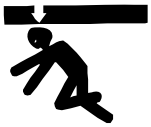
**WARNING** Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

## GENERAL SAFETY CONSIDERATIONS

**BEFORE POWER IS APPLIED TO THIS INSTRUMENT,**
**GROUND IT PROPERLY** through the protective conductor of the AC power cable to a power source provided with protective earth contact. Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal could result in personal injury.


**BEFORE SERVICING: CONTACT ETS-LINDGREN -** servicing (or modifying) the unit by yourself may void your warranty. If you attempt to service the unit by yourself, disconnect all electrical power before starting. There are voltages at many points in the instrument which could, if contacted, cause personal injury. Only trained service personnel should perform adjustments and/or service procedures upon this instrument. *Capacitors inside this instrument may still be CHARGED even when instrument is disconnected from its power source.*


**ONLY QUALIFIED PERSONNEL** should operate (or service) this equipment.



**MOVING BOOM** Keep clear during tower operation. A falling boom can cause serious injury.

# INTRODUCTION

The ETS-Lindgren Model 2075 MiniMast™ is a portable electric powered mast and platform system designed to be used with the Model 2090 Positioning Controller for EMI compliance testing. The MiniMast™ is designed for antenna scanning from 1m to 2m, with a 2 m mast extension included so that 1m to 4 m scans can be performed. The mast, carrier, platform, lifting rope and guying system are non-conductive and non-magnetic. The mast sections of the tower are constructed of square fiberglass tubing for strength, rigidity, and weather-ability.

The MiniMast™ features an offset boom which maintains a constant rotational axis along the centerline, when the antenna is rotated from horizontal to vertical polarization. A cable guide at the back end of the boom feeds the coaxial cable to the antenna while maintaining the appropriate bending radius. The air polarization feature allows for remote polarization of the antenna using the Model 2090 Controller or the optional Hand Control Unit.

The antenna carrier is raised and lowered by a fractional horsepower electric gear motor with an integral fail-safe electric brake. The motor and its associated electronics are contained in a shielded enclosure mounted on the base of the unit. Under control of the Model 2090 the motor typically positions the carrier within one centimeter of the desired location. To prevent over travel of the carrier in either direction of movement, the motor is outfitted with mechanical limits. The mechanical limits are set using dual knobs located outside the motor cover. Soft limits can be set within the travel range provided by the mechanical limits using the Model 2090 Controller.

The motorbase is connected to the Model 2090 Positioning Controller via a twin fiber-optic cable assembly. This fiber-optic cable transmits both directional control and position information. Power to the motorbase is provided locally to the motor through a three conductor power cable.

A safety brake is mounted on the carrier assembly. In the event that the carrier is released from its rope suspension, a spring-loaded lever jams the brake into position against the mast and locks the carrier so that further vertical movement is restricted.

Mylar rope guy lines are provided for outdoor installations and must be firmly anchored to provide vertical stability.

# STANDARD CONFIGURATION

- Dual-Voltage Motor: 100/115 VAC or 220/240 VAC switch-selectable
- Input frequency 50 Hz or 60 Hz
- Castered platform for portability
- Sectional mast
- Air polarization antenna mount
- Ten meter fiber-optic control cable for inside chamber
- Three meter fiber-optic control cable for connection to Model 2090 outside chamber
- Two ST to ST bulkhead feedthroughs
- Maximum loading 10.0 kg (22.0 lb)
- Overall height 4.61 m (15.1 ft) with all sections of mast installed, sections can be removed for lower heights
- Base dimensions 0.90 m by 0.90 m (2.95 ft by 2.95 ft)
- Weight 81.2kg (179.0 lb)

# MODEL 2075 OPTIONS

**Model 2090 Positioning Controller:** This controller provides control for two separate devices (i.e. towers and turntables) in any combination, plus the control of four auxiliary devices via a fiber optic interface. The unit includes a GPIB connection and is compatible with most popular EMI measurement software.

**Hand Control Unit:** This sturdy, hand-held controller will allow the user to manually operate the tower remotely and independently from the Model 2090 Positioning Controller. This controller attaches conveniently to the electrical enclosure located on the base of the tower. Functions include: up (UP), down (DN), polarization and Hand/Main control selection.

**Universal Antenna Mount:** This option is a versatile and sturdy mount for most common antennas.

**Shield Room Feed-Through:** This option allows the customer to take the fiber-optic control cable from the control room to the shield room while maintaining shielding attenuation. The unit is made of brass for conductivity and provides attenuation of greater than 100 dB at 10 GHz. A single 22.25 mm (.875 in) hole is required to mount this option.

**Additional Fiber Optic Cable:** Various lengths of fiber optic cable are available by custom order. The standard length provided is 10 m (32.8 ft).

**Motor Base Shielded Enclosure:** A black shielded enclosure as shown on the cover of this manual is available to go over the motor base assembly.

# PRECAUTIONS


Read this manual completely before starting installation. This equipment should be installed and operated only by qualified personnel.

The electrical installation of this product should be accomplished by an individual who is authorized to do so by the appropriate local authority. The installation should be in compliance with local electrical safety codes.

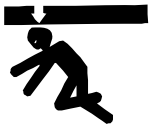
Do not attempt to service the unit unless qualified to do so. As with any electrical equipment, ensure unit electrical power has been disconnected and secured when performing scheduled maintenance or adjustments.


Do not make any modifications to this unit without consulting the factory directly.

Stay clear of all moving components on this equipment.

Regularly inspect all equipment and conduct scheduled maintenance in accordance with the factory recommendations provided.

Only use replacement part and fasteners ordered directly from the factory.



Do not, at any time, stand underneath the carrier assembly whether moving or stationary.

Disconnect all air supply lines when servicing pneumatic components.

Always use guy ropes provided for outdoor installations and periodically check them for wear.

Do not exceed the load rating of the carrier. Refer to the product specifications for the maximum weight limit.

The fiber optic cable must be looped through the “P” clip installed on the front panel. Failure to do so will increase the chance of cable being accidentally pulled, thus breaking the fiber optic connectors.

# ASSEMBLY INSTRUCTIONS

The Model 2075 is shipped partially assembled. It is anticipated that the assembly process will take no longer than one hour. Ensure that a clear area is available to unpack and assemble the MiniMast™. Prior to starting the assembly process, open the shipping container and check all parts for any shipping damage. NOTE: Do not discard any packing material until the tower is fully installed and operational. During this assembly procedure, refer to the assembly drawings at the back of this manual.

**Tools needed for assembly:**
Adjustable open-end wrench
Phillips head screw driver (#2)
Allen wrench

1. In an open workspace, lay the mast sections out end-to-end.
2. There are two sections that make up the four meter mast (only the pulley section is required for 2 meter scans). The base section which enables scanning up to 4 meters is fitted with a pin that slides into the joining mast section. The two sections are supplied with an indexing mark (circle) to indicate the best alignment of the mast sections.
3. The carrier should be installed so that the end with the spring loaded brake is toward the top pulley on the mast assembly. When you are standing at the rear of the platform after the mast is installed the carrier should be oriented so the boom receptacle is to the left of the mast. The air lines for polarization should already be connected to the carrier, take care not to tangle them during this process. To attach the carrier slide it onto the bottom section of the mast assembly. If 2 meter scan height is desired, slide the carrier onto the pulley mast section. If the full 4 meter scan height is desired, join the mast sections together by sliding the pin into the bottom of the pulley section and the top of the mast section.
4. Once the carrier is on the mast assembly, unwind the rope from the rope drum. Feed about half of the rope over the top pulley.

5. Should guying of the mast be required, attach the guy ropes to the mast pulley section now. Guying is recommended when the mast is used for the full 4 meter scan height and for outdoor applications.
6. There are two bolts that when inserted and tightened will secure the mast into the support structure. Making sure the holes on the mast and the support structure are aligned, lift and place the mast into the support. Alternately, the base section can be placed on its side and the mast inserted at an angle. Make sure that the mast fully seats into the lower portion of the mast support. While supporting the mast, install the two mast bolts and tighten them in place. With the mast erect, the carrier assembly will be at the bottom of the mast. It should be oriented so the boom receptacle is to the left of the mast when you are standing at the rear of the platform.
7. Attached to one end of the boom unit is a cable guide which reduces stress on the antenna feed cable. The cable guide must be removed to install the boom. Remove the bolts that hold the cable guide in place, and set the unit to the side. Slide the end of the boom that the cable guide was attached to through the receptacle hole on the carrier so that the cable guide will hang over the back of the tower when reinstalled. When the center block reaches the carrier, tighten the two set screws located in the boom collar on the carrier. These set screws secure the boom in place. Reinstall the cable guide.
8. If guying is required, attach the free end of the guy ropes at this time.
9. Check the pneumatic polarization tubes from the motor base to the double-acting cylinder to insure that all connections are complete and no air lines are wrapped around the mast.
10. Install the fiber optic cable from the controller. Refer to the section on “Connecting the Model 2090 Positioning Controller” for proper connection.
11. Block the carrier boom so that the reference point on the largest antenna you use will be set at 1 meter. Use a piece of wood under the carrier to support it at this height.

12. Connect the free end of the lifting rope to the carrier brake using the phenolic rope clamp. When connecting the rope to the carrier, lift the carrier slightly and connect the rope so that it is taut.
13. To set the antenna's vertical position, measure the distance from the antenna (i.e. antenna centerline) to the ground plane. With this distance established, refer to the Model 2090 controller manual's instruction for setting Current Position.
14. To connect the pneumatic polarization to an air supply, a barbed air fitting is provided on the side of the motor base enclosure. Tubing is provided to make this connection. The air supplied to the system should be dry and free of foreign matter. Supplied air pressure should be between 60-80 psi (410-550 kPa). The volume required to operate the polarization cylinder is dependent upon the frequency of polarization changes. Air consumption should be less than 2 cfm at 60 psi during normal operation.
15. When the tower is in the position where testing will occur the platform brake should be set to secure the base in place. To set the platform brake, locate the hand knob on the base platform and turn it until the brake is secure against the ground.
16. Proceed to the electrical installation section to complete the installation of the tower.

# ELECTRICAL INSTALLATION

The Model 2075 is configured to operate using either 115 or 230 VAC, single phase, 50/60 Hz service. The voltage setting is accomplished by switching two voltage select switches which are accessible from the outside of the motor base assembly. The switches are located adjacent to one another on the side of the motor base enclosure immediately below the lid of the enclosure. The motor base is shipped from the factory set in the 230 VAC position. Prior to connecting the motor base to the power mains, check the positions of the voltage select switches for their proper setting.

The tower motor base is provided with a three conductor AC power cord that is approximately 2.45 M (8 feet) long. The power cord is to be terminated into an outlet near the motor base. This power cord is suitable for portable or indoor applications without modification. Ideally the power cord would come out of the motor base and terminate into an outlet with as short a cord as possible. The start and stop actions of the motor base create a small amount of RF noise through the power cord.


If this equipment is to be installed outdoors, a qualified, licensed electrician should perform the installation. In the event that modifications are required, the installation should be compliant with all local and national electrical safety codes.

**WARNING** As with all electrical devices, power should be disconnected prior to servicing the equipment.

A fuse is mounted on the side of the motor enclosure. This fuse provides protection for the motor and its associated electronics. An additional fuse provides protection for the DC power supply inside the motor base.

The branch circuit supplying power to the motor base should be protected from excess current according to local electrical codes. Whenever possible the motor should be powered from a separate

branch circuit of adequate current capacity to keep voltage drop to a minimum during startup and running.

Check that the conductor size is adequate for the motor load and the distance from the mains source. Improperly sized conductors will lead to a high voltage drop in the power conductors and cause reduced starting torque and premature motor failure. For longer runs, increase the wire size in accordance with the wire selection guide shown below. Never use smaller than 14 AWG for any installation.

| **Length of wire @ 115V** | 0-15.24 m (0-50 ft) | 15.24-30.48m (50-100 ft) | 30.48-60.96 m (100-200 ft) |
|---|---|---|---|
| **Wire gauge required** | 14 AWG | 10 AWG | 8 AWG |

| **Length of wire @ 220V** | 0-15.24 m (0-50 ft) | 15.24-30.48m (50-100 ft) | 30.48-60.96 m (100-200 ft) |
|---|---|---|---|
| **Wire gauge required** | 14 AWG | 14 AWG | 14 AWG |

If the power cord needs to be replaced, it is recommended that this alteration be performed at the factory. However, if it is necessary to modify the electrical cord on site, a qualified, licensed electrician should perform this operation.

**To remove the power input cord:**

1. Disconnect the power cord from the supply mains.
2. Remove the clamps that secure the enclosure cover plate in place and lift the lid.
3. Loosen the plastic strain relief that is around the power cord on the exterior of the unit.
4. Using a Phillips head screwdriver locate and remove the ten screws around the edge of the motor base face plate. Gently remove the face plate and set it down in front of the opening. **IMPORTANT** Do not pull the faceplate away quickly as there are wires that connect to the faceplate that should remain intact during this procedure.

5. The control relay PCB assembly inside the enclosure is connected to the enclosure via an L-shaped bracket. It will be necessary to remove the mounting screws which hold the bracket to the bottom of the housing in order to gain access to the wires connected to the base of the filter. Do not disconnect wires from the relay assembly. Locate the two screws that secure the L-shaped bracket in place, loosen and remove them. Then **CAREFULLY** slide the circuit board assembly and the bracket upwards so the unit rests on top of the encoder assembly. Do not yank or force the circuit board while pulling it upward as rough handling will likely loosen or damage the internal wiring of the motor base.
6. Remove the two screws that secure the protective earth wires to the enclosure, so you can gain access to the bottom terminals on the power filter. Note the toothed washer between each terminal ring and the enclosure body as these will need to be replaced in the same location when it is time to reassemble the unit.
7. Using a Phillips head screwdriver locate and remove the four screws on the side of the enclosure by the belt tension idler, this will release the power filter from the side of the enclosure. Do not attempt to pull the power filter out of the enclosure as it is connected to several wires in the unit. Without disconnecting the wires from the top of the filter tilt the filter so you can access the terminals on the base.

The electrical wiring color code used by ETS-Lindgren for this unit is:

| | |
|---|---|
| Brown | AC Hot |
| Blue | AC Neutral |
| Green with Yellow Stripe | Protective Earth/Safety Ground |

8. Note which terminal is hot and which one is neutral. Remove the heat shrink tubing and unsolder the hot and neutral terminals. Remove the power cord from the enclosure.
9. The strain relief is properly sized for a standard ½ inch electrical conduit fitting. If the unit will be exposed to moist environmental conditions an appropriate metal (with rubber

coating) conduit fitting should be attached in the strain relief hole. Moisture should not be allowed to penetrate the motor base enclosure as it could damage the components inside.

10. Keep the lead length inside the enclosure to no longer than 4 inches to maintain good EMC performance. The distance from the opening in the conduit fitting to the filter should remain less than 10 cm (4 inches). Excessive wire length can render the power filter useless.

11. Insert the end of the new cord into the enclosure through the conduit fitting. Solder the new hot and neutral wires to the corresponding terminals. Insulate the connections either with heat shrink tubing as they were before or with electrical tape.

12. Reconnect both protective earthings, with one terminal ring per grounding point. Remember to include the external tooth lock washers between the terminal ring and the enclosure body when inserting and tightening the screws.

**CAUTION** Properly terminate the safety ground wires in the positions provide for connection of the protective earth conductor.

13. Tilt the power filter back into place, align the holes on the enclosure with the holes on the filter plate, insert and tighten the four screws that hold the filter in place.

14. Carefully slide the circuit board back into the enclosure, taking care not to pull any wires loose, or leave any wires under the L-shaped bracket. Secure the board and bracket on the base of the enclosure using the two screws you removed earlier.

15. Next, slide the front panel back into place and reinsert the ten screws that secure it in place. Do not forget to reattach the P-clip that is held in place by one of the screws.

16. Finally close the lid, move the clamps that secure it into place, and tighten the screw in each clip to firmly seal the lid in place.

**CAUTION** Prior to applying power, check the position of the voltage select switches on the front of the enclosure.

# CONNECTING THE MODEL 2090 POSITIONING CONTROLLER

Any combination of primary devices (towers, turntables, reverberation paddles, MAPS, etc.) can be connected to the two Device Interface ports located on the rear panel of the controller. For easy set up of an EMC facility, it is recommended that the tower be connected to the Device 1 interface port. The controllers default settings are for a tower connected to the Device 1 interface port and a turntable connected to the Device 2 port.

Primary device connection is accomplished by way of a dual fiber optic cable included with the device. This cable terminates into two ST connectors that are identical at both ends. The cable is symmetrical; either end can be connected to the controller. A fiber optic cable that is connect to the IN port of a controller should, at the other end, be connected to the primary OUT port of the motor base. A fiber connected to the OUT port of the controller should, at the other end, be connected to the primary IN port of the motor base. Older motor base designs have only one fiber optic connector pair, while the newest motor base interface provides a secondary interface reserved for future expansion.

NOTE: Fiber optic cabling for each device should not be allowed to hang unsupported from the rear panel of the controller. The fibers and connectors are easily broken if twisted or bent too much. Keep the fiber optic cables as straight as possible from the connector to the protective sheath.

**CAUTION** The mechanical limits must be set whether or not the soft limits in the 2090 controller are used. Failure to do so may cause damage due to overrun of the tower. Ensure the travel limit settings will not cause damage to user installed cables and equipment mounted on the tower.

Using the Model 2090 Position Controller (or hand controller), rotate the motor base shaft to verify proper operation. Find the travel (mechanical) limit adjustment knobs on the side of the motor base enclosure. To increase the amount of travel in either direction,

turn the knob in the direction indicated by the positive (+) sign. To decrease the amount of travel in either direction, turn the knob in direction indicated by the minus (-) sign.

Run the motor base down to the lower limit CCW and then back it off from the lower limit just a bit.

# SETTING TRAVEL LIMITS

The mechanical limits of the Model 2075 MiniMast™ are located in the motor base on the mast platform.

**CAUTION** Keep all body parts away from the drive components when the tower is energized. Never be directly beneath the carrier at any time.

The mechanical limit adjustment knobs are labeled to indicate function. To increase the amount of travel in either direction turn the knob in the direction indicated by the positive **(+)** sign. To decrease the amount of travel in either direction you must turn the knob in the minus **(-)** direction as indicated.

**WARNING** Ensure the current travel limit settings will not cause damage to the mast or any mounted antennas prior to operation.

With the carrier at the lowest point of desired travel, attach the lifting rope to the carrier assembly. The attachment point on the carrier is the lever arm of the carrier brake. Turn the lower limit adjustment knob in the (-) direction unit the limit switch engages the actuator. Then, running the carrier up and down, adjust the lower limit knob until the proper position is found. Run the carrier assembly up until the carrier assembly is near its desired position. Adjust the upper limit adjustment knob in the (-) direction until the limit switch engages the actuator. Then, running the carrier up and down, adjust the upper limit knob until the proper upper limit position is established. Run the tower through its entire scan range several times to ensure that the limit positions are properly set. Whether or not the soft limits in the controller are used, the mechanical limits must be set for proper and safe operation.

# ABOUT THE BRAKES

## CARRIER SAFETY BRAKE

A safety brake is mounted on the carrier assembly. In the event that the carrier is released from its rope suspension, a spring-loaded lever jams the brake into position against the mast and locks the carrier so that further vertical movement is restricted.

**CAUTION** If the carrier is at a position on the tower where it cannot be accessed when the safety brake actuates the tower may need to be leaned over to release the brake. Make sure there is a clear area in which to tilt the tower. Take care not to damage the tower or antenna during this process. The tower should be fully supported as it is leaned over so as not to damage the mast.

To release the carrier safety brake, lift upward on the carrier and move the brake lever. Slide the carrier down to the base of the mast. Replace the carrier rope if necessary. Reset the current position using the Model 2090 before resuming use of the mast.

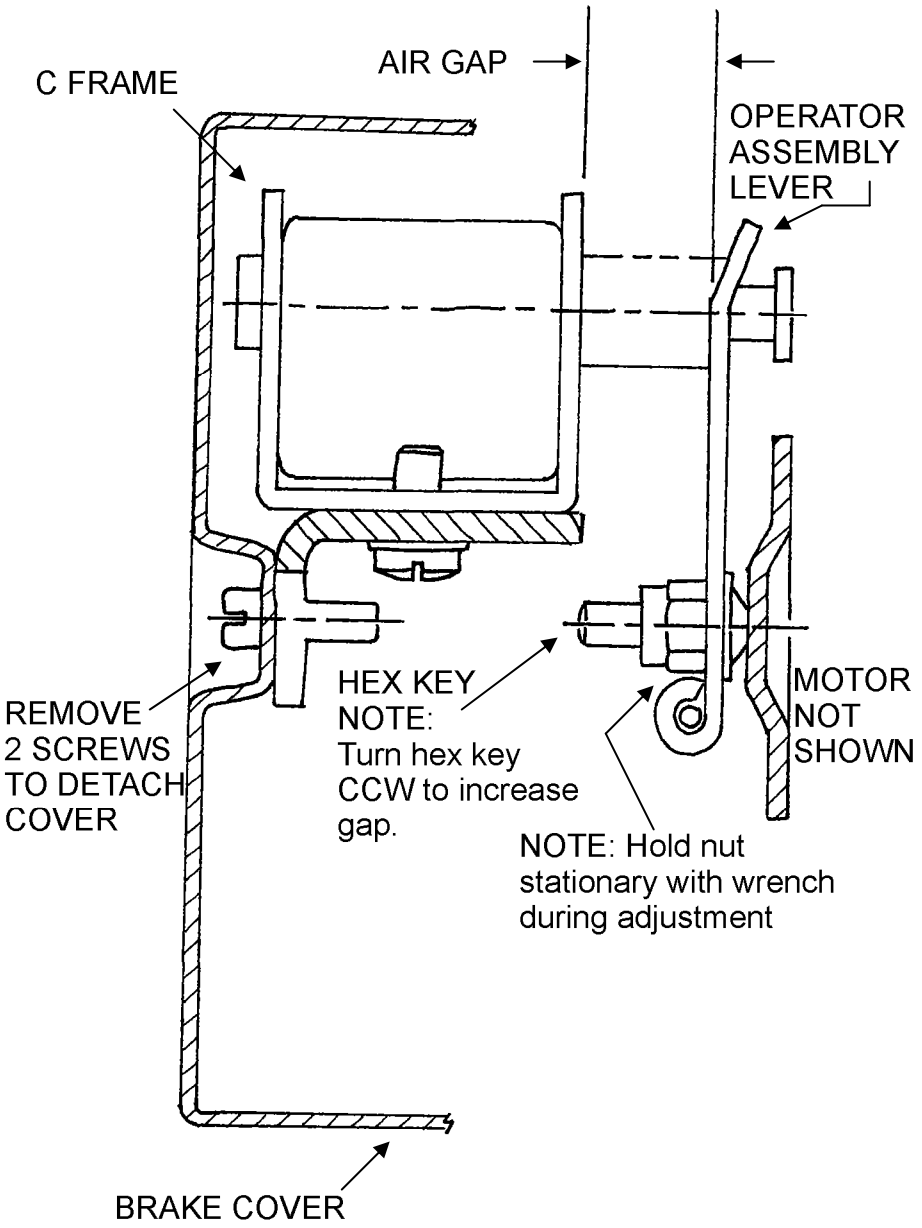
## ELECTRIC BRAKE

**CAUTION** Before making any adjustments, disconnect power from the unit.

The tower uses a fractional horsepower motor with gear reduction. This motor is supplied with a safety brake which holds the carrier at the right position until another command is received. To adjust the brake, remove the brake access cover and open the top of the motor enclosure. Disconnect the air hoses from the solenoid valve which is routed in back of the brake. Remove the brake cover (attached by the two slotted screws). Insert an Allen wrench into the adjusting screw and turn clockwise until the air gap is approximately 8.7 mm (11/32 in). This gap is measured between the operator assembly lever and the “C” frame at the center line of the plunger.

NOTE: The dimension for the air gap is a nominal position. Observe the motor starting characteristics after adjusting the gap. The motor should start quickly. If not, increase the air gap by turning the adjusting screw counter-clockwise increments.

After the adjustment is complete, replace the brake cover, reconnect the air lines, close and clamp the top of the motor enclosure and replace the brake access cover.



# OPERATION

Please refer to the Model 2090 Positioning Controller manual if you are unfamiliar with the operation of the unit. A Model 2090 manual is included with each 2090 shipment and it also available for download from our website.

## EDITING MODEL 2090 POSITIONING CONTROLLER CONFIGURATION PARAMETERS

To edit a configuration parameter, press the PARAM key to display the current parameter. Pressing the PARAM key repeatedly will scroll down through the parameter list, showing each parameter in turn. While viewing a parameter, the STEP keys (INC/DEC) may be used to scroll up or down the parameter list. This reduces the effort necessary to scan through a long parameter list using the PARAM key. Pressing any of the LIMIT/POSITION selection keys will return the display to that selection. Pressing any of the remaining motion keys will return the display to the current position and execute that motion. Pressing the PARAM key again will return to the last displayed parameter in the list, allowing easy transition between parameter adjustment and device operation.

Once the desired limit, position or parameter is visible in the display window, pressing INCRM, DECRM, or ENTER will toggle into edit mode. The lowest adjustable digit will flash on and off. Pressing the LOCAL key for that device will switch the flashing digit to the next higher digit. In this way, it is possible to rapidly adjust any digit of a multi-digit parameter or limit.

## TOWER ENCODER CALIBRATION

The display symbol C refers to the encoder calibration parameter. This setting is used to convert the encoder count values returned from a motor base into the corresponding centimeter or degree position reading. For towers, the number represents the number of

encoder counts per meter. Using this parameter, a variety of standard, retrofit, and custom devices can be used. The setting for the Model 2075 series towers is : 1620

If the given value does not appear to work correctly, the encoder calibration value can be determined using the following procedure:

1. Set the encoder calibration value to 1000.
2. Insure that the tower is positioned to allow at least a meter of travel in the upward direction at an easily measurable height, and then set the current position reading to 000.0. *NOTE: It will be necessary to adjust the lower limit setting to allow this.*
3. Using the STEP keys, adjust the height of the carrier until it is one meter above the start point.
4. Record the reading of the display, ignoring the decimal point (i.e. 200.0 would be 2000). This is the encoder calibration value. *NOTE: If the value is below 1000, the resolution of the encoder is low and thus the 2090 will not provide 0.1 cm resolution, even though the display shows that digit. If the value has gone past 9999, the encoder has too many counts per meter and the 2090 can not correct for it. In this case, contact ETS-Lindgren for assistance.*
5. Enter this value for the encoder calibration value and reset the limits and position information.
6. Test the tower by moving it a known distance and comparing the display to the measured distance traveled. It may be necessary to adjust the encoder calibration value up or down slightly depending on the result.

# ANTENNA MOUNTING INSTRUCTIONS

Antennas can be mounted to the assembly using either the 7/8-14 thread which is common on EMCO brand antennas, or the ¼-20 thread which is another common size. The antenna should be mounted on the boom as close to the carrier as possible. Insert the mounting knobs through the holes on the boom and align the mounting holes on the antenna with the threaded end of the mounting knobs. Secure the antenna in place by tightening the threaded knobs into the receptacle mounting holes on the antenna.

# PRE-OPERATIONAL CHECKS

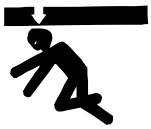
Ensure that the voltage select switches on the motor base are set to the correct voltage.

Check to ensure that the power lines are connected for both the tower, controller and any other equipment you will be using to test.

Check the fiber optic cables, to ensure they are connected.

Ensure the antenna connected to the boom is securely mounted in place.

Connect the feed cable to the antenna.



**CAUTION** Before moving the carrier on the mast up or down using the Model 2090 Controller or the Hand Control Unit ensure that there are no people standing near the boom.

# START-UP AND SAFE SHUTDOWN

After completing the pre-operational checks, the Model 2090 can be turned on by pressing the power button. Please refer to the Model 2090 Positioning Controller operational manual for instructions on operating the unit.

To shut the tower down, move the carrier to an accessible height for the removal of the antenna. Make sure the unit has come to a

complete stop. Press the power button on the Model 2090 Positioning Controller to turn it off.

# HAND CONTROL UNIT

To connect the Hand Control Unit (HCU), remove the connector cap on the motor base. Plug the cable receptacle from the hand control unit into the electrical enclosure and screw connectors completely together. The HCU is now ready to operate. Be sure to coordinate use of the unit with the operator of the Model 2090 Positioning Controller.

To allow the HCU to operate, push the control switch from MAIN to HAND. When the HCU is selected, the Model 2090 Positioning Controller is overridden until control is returned from the HCU. If the Model 2090 Positioning Controller is left on while the HCU is used, all changes in position are recorded by the Model 2090 Device Controller.

**CAUTION** Do not plug the Hand Control Unit into the motor base while that device is operational. Coordinate with the operator of the Model 2090 Positioning Controller before plugging in, using or unplugging.

**IMPORTANT** Do not push the UP and DN buttons at the same time. Be sure that the motor is completely stopped before reversing direction with the Hand Control Unit.

When you are ready to change to automated testing, toggle the control switch from HAND to MAIN.

# RECOMMENDED MAINTENANCE

Regular maintenance will prolong the service of your mast assembly. Follow this recommended schedule.

**CAUTION** Do not perform maintenance while the tower is operating or energized.

Prior to beginning normal operation of the mast, check the mast and lift system for any signs of damage or excessive wear. If guyed, insure that all guy ropes are securely fastened. Also, verify the height readout of the controller with the physical position of the mast.

During routing operation, periodically verify the travel limit setting and the accuracy of the position readout of the controller.

## EVERY SIX MONTHS

Check the lifting rope and guy rope for signs of wear. A well maintained rope and guying system will prolong the use of the mast system.

Check to ensure that the rollers on the carrier assembly are operating properly.

Inspect the components and tubing of the pneumatic polarization mechanism for signs of corrosion, excessive moisture and wear. Pneumatic tubing which appears to be brittle and worn from the effects of UV radiation and inclement weather should be replaced.

Lubricate the air cylinder o-rings. The air cylinder uses a special o-ring lubricant that can be purchased from any seal or bearing store. It can also be purchased from ETS-Lindgren, please contact our Sales Department and request item number 890437. This lubricant should be used to prevent excessive wear of the o-rings.

Check the gearbox for fluid leakage. A slight film that collects is normal. You should not have puddles of fluid. The gearbox is

lubricated and sealed at the factory. Under normal conditions, it should not require servicing during its life.

Check the electrical cabling to the motor base for frayed and worn insulation.

## EVERY 12 MONTHS

Check the mast parts for signs of wear and fatigue.

Check the pads on the electrical brake assembly in the motor base for signs of wear or potential failure. Always remove power from the motor base prior to opening the motor base enclosure.

# SPECIFICATIONS

## ELECTRICAL

| | |
|---|---|
| Nominal AC Voltage | 115/230 VAC |
| Input Frequency | 50/60 Hz |
| Current Rating | 20 amp service |
| Phase | Single (1) |

## MECHANICAL

| | |
|---|---|
| Scan Range | 2 meters or 4 meters |
| Mast Height | 2.5 meters or 4.5 meters |
| Carrier load rating | 10.0 kg (22.0 lb) |
| Required air pressure | 60-80 psi (410-550 kPa) |

# WARRANTY STATEMENT

**EMC Test Systems, L.P.,** hereinafter referred to as the Seller, warrants that standard EMCO products are free from defect in materials and workmanship for a period of two (2) years from date of shipment. Standard EMCO Products include the following:

- Antennas, Loops, Horns
- GTEM cells, TEM cells, Helmholtz Coils
- LISNs, PLISNs, Rejection cavities & Networks
- Towers, Turntables, Tripods & Controllers
- Field Probes, Current Probes, Injection Probes

If the Buyer notifies the Seller of a defect within the warranty period, the Seller will, at the Seller's option, either repair and/or replace those products that prove to be defective.

There will be no charge for warranty services performed at the location the Seller designates. The Buyer must, however, prepay inbound shipping costs and any duties or taxes. The Seller will pay outbound shipping cost for a carrier of the Seller's choice, exclusive of any duties or taxes. If the Seller determines that warranty service can only be performed at the Buyer's location, the Buyer will not be charged for the Seller's travel related costs.

This warranty does not apply to:

- Normal wear and tear of materials
- Consumable items such as fuses, batteries, etc.
- Products that have been improperly installed, maintained or used
- Products which have been operated outside the specifications
- Products which have been modified without authorization
- Calibration of products, unless necessitated by defects

**THIS WARRANTY IS EXCLUSIVE. NO OTHER WARRANTY, WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED, INCLUDING BUT NOT LMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES PROVIDED BY THIS WARRANTY ARE THE BUYER'S SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT IS THE SELLER LIABLE FOR ANY DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.**

*Note: Please contact the Seller's sales department for a Return Materials Authorization (RMA) number before shipping equipment to us.*

# EUROPEAN COMMUNITY DECLARATION OF CONFORMITY

The EC Declaration of Conformity is the method by which EMC Test Systems, L.P. declares that the equipment listed on this document complies with the EMC and Low-voltage Directives.

**Factory:**
EMC Test Systems, L.P.
P.O. Box 80589
Austin, Texas USA
78708-0589

**Issued by:**
EMC Test Systems, L.P.
P.O. Box 80589
Austin, Texas USA
78708-0589

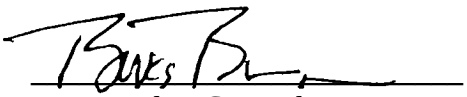
**The products manufactured under the EMCO product name and listed below are eligible to bear the EC Mark:**

Model 2075 series Antenna Positioning Mast

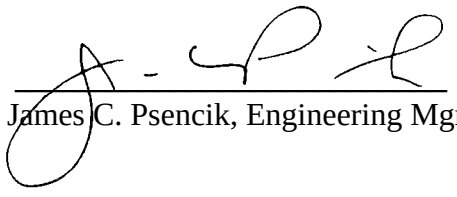
**Applicable Requirements:**

| Standard | Criteria |
|---|---|
| EN55022 | Class B |
| IEC 801-2 | Level 2 4/8kV |
| IEC 801-3 | Level 2 3V/m |
| IEC 801-4 | Level 2 .5 I/O, 1kV AC |
| EN 60204-1:1992 | Safety of Machinery – Electrical equipment of machines |
| EN 292:1991 | Safety of Machinery – Basic Concepts |
| EN 1050:1993 | Safety of Machinery – Risk Assessment |

**Authorized Signatories**



Bruce Butler, General Manager



James C. Psencik, Engineering Mgr.

Charles Garrison, Quality Assurance

**Date of Declaration: January 21, 1998**

The authorizing signature on the EC Declaration of Conformity document authorizes EMC Test Systems, L.P. to affix the CE mark to the indicated product. CE marks placed on these products will be distinct and visible. Other marks or inscriptions liable to be confused with the CE mark will not be affixed to these products. EMC Test Systems, L.P. has ensured that appropriate documentation shall remain available on premises for inspection and validation purposes for a period of no less than 10 years.

# ILLUSTRATIONS