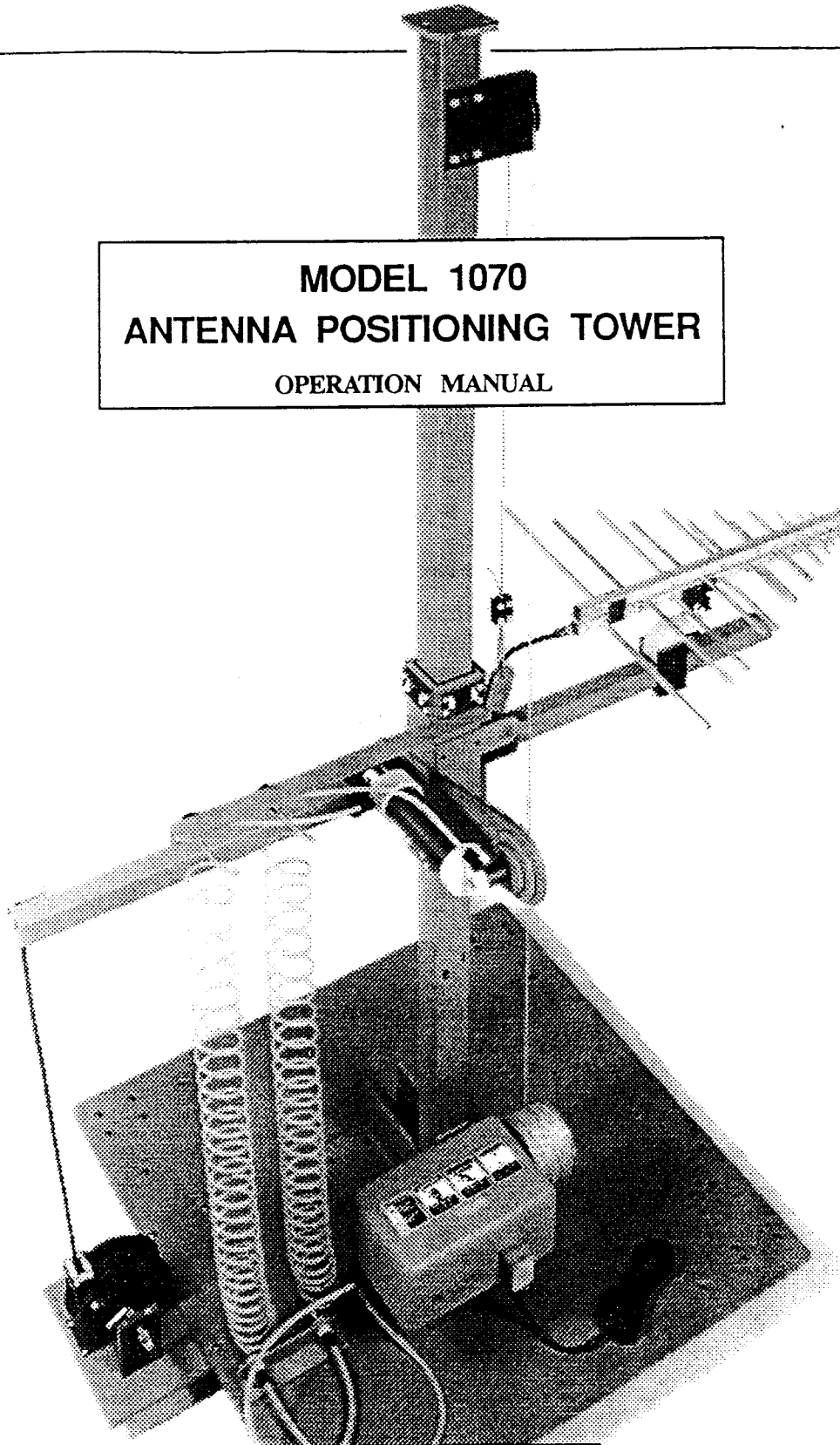


**MODEL 1070**  
**ANTENNA POSITIONING TOWER**  
**OPERATION MANUAL**



**CONTROL COPY**  
# 100/2

TABLE OF CONTENTS

|  |    |
|--|----|
| GENERAL DESCRIPTION .....                          | 1  |
| SPECIFICATIONS.....                                | 2  |
| DESCRIPTION OF OPTIONS .....                       | 2  |
| ACCESSORIES.....                                   | 3  |
| ASSEMBLY INSTRUCTIONS .....                        | 4  |
| Erecting the Mast.....                             | 4  |
| Setting the Mechanical Up/Down Travel Limits ..... | 5  |
| Electrical Installation.....                       | 6  |
| MAINTENANCE INSTRUCTIONS .....                     | 7  |
| ELECTRIC BRAKE ADJUSTMENTS.....                    | 7  |
| REPLACEMENT PARTS LIST .....                       | 8  |
| SCHEMATICS .....                                   | 16 |
| WARRANTY .....                                     | 18 |
| SHIPPING LIST.....                                 | 19 |

LIST OF FIGURES

|   |    |
|---|----|
| FIGURE 1. MODEL 1070 ANTENNA POSITIONING TOWER .....        | 10 |
| FIGURE 2. MODEL 1070 ANTENNA POSITIONING TOWER .....        | 11 |
| FIGURE 3. TOP VIEW, ANTENNA POSITIONING TOWER .....         | 12 |
| FIGURE 4. MECHANICAL LIMITS- SWITCHES AND CAMS .....        | 13 |
| FIGURE 5. MODEL 1070 SERIES INPUT POWER ASSEMBLY .....      | 14 |
| FIGURE 6. ELECTRIC BRAKE (LOCATED ON THE END OF MOTOR)..... | 15 |

# **EQUIPMENT MANUAL FOR THE EMCO MODEL 1070 ANTENNA POSITIONING TOWER**

## **GENERAL DESCRIPTION**

The Electro-Mechanics Company (EMCO) Model 1070 Antenna Positioning Tower (Figures 1 & 2) is a portable mast and platform system designed for use in EMI compliance testing at elevations from 0.5 to 6 meters above ground level. The mast, carrier, boom, platform, lift rope, and guying system are non-conductive and non-magnetic. The antenna carrier is raised and lowered by a fractional horsepower electric motor, gear reduction system, and an electric brake located on the motor base assembly at the base of the system. In addition, a mechanical safety brake installed on the antenna carrier operates automatically to prevent the carrier from falling.

The mast section of the tower is constructed of square fiberglass tubing for strength and rigidity. The assembled mast consists of three or four sections, depending on whether a 4 or 6-meter height of the mast is desired. A 4-meter height is attained by using the base section, one center section, and the top section. A 6-meter height is attained by use of two center sections along with the base and top sections. Mylar (low stretch) guy lines attach to the top section of the mast **MUST** be firmly anchored to the ground to provide safe, adequate vertical stability.

Rollers built into the carrier assembly section allow smooth motion when carrying antenna loads of up to 75 lbs. The vertical drive mechanism consists of the drive motor, a gear reduction system, and an electric brake which stops the vertical motion typically within 2 centimeters of the desired location. The motor drive system winds and unwinds a rope onto a guided take-up cylinder.

To prevent overrunning of the high and low limits of the mast assembly, the absolute upper and lower limits of operation must be set by using the dual cam mechanism in the motor enclosure. Within the mechanical limits set above, maximum and minimum antenna height positions can be entered into the EMCO Model 1090 Positioning Controller (please see the Operation Manual for EMCO Model 1090 Positioning Controller, #399174).

## **SPECIFICATIONS**

|                             |                             |                              |
|-----------------------------|-----------------------------|------------------------------|
| Voltage (Switch Selectable) | 100/115 VAC                 | 230 VAC                      |
| Frequency                   | 60 Hz                       | 50 Hz                        |
| Max Power Input             | 750 VA                      | 750 VA                       |
| Motor Horsepower            | 1/6 hp                      | 1/6 hp                       |
| Max Load Rating             |                             |                              |
| Crossboom (Tip)             | 22.7 kg (50 lb)             | 22.7 kg (50 lb)              |
| Crossboom (Center)          | 34.0 kg (75 lb)             | 34.0 kg (75 lb)              |
| Lift Velocity               | 11.9 cm/sec<br>(4.7 in/sec) | 10.16 cm/sec<br>(4.0 in/sec) |
| Overall Size                |                             |                              |
| Height                      | 7 m (23 ft)                 | 7 m (23 ft)                  |
| Base Width                  | 1.2 m (48.0 in)             | 1.2 m (48.0 in)              |
| Base Depth                  | 1.2 m (48.0 in)             | 1.2 m (48.0 in)              |
| Weight                      | 86.2 kg (190 lb)            | 86.2 kg (190 lb)             |
| Polarization Option         |                             |                              |
| Angular Velocity            | 3-30 deg/sec                | 3-30 deg/sec                 |
| Max psi                     | 35 psi (2.4 bar)            | 35 psi (2.4 bar)             |

Conversion: 1 bar = 100 kpa = 14.5 psi

## **DESCRIPTION OF OPTIONS**

Any one or combination of the following options is available:

**STD -** Standard Option Package:

Includes 10 m (32.8 ft) control cable, safety brake, and manual antenna polarization change.

**AIR - Air Actuated 90 Degree Antenna Polarization Change:**

This option is constructed of electromagnetically non-reflective material and allows automated antenna polarization changes by the EMCO Model 1090 Controller. The rate of polarization is in the range of 3 to 30 degrees per second. A 0.25 inch NPT inlet is provided. Operation at 1.4 to 2.1 bar (20 to 30 psi) is recommended. Air supply is not included.

**R&S - Rohde & Schwarz Antenna Adapter:**

This option permits mounting of Rohde & Schwarz antennas. The adapter is a separate cross-boom that can be easily interchanged with the standard unit.

**COLD - Cold Weather Kit:**

This option permits operation at below freezing temperature. It includes AGMA #8 synthetic motor gearbox oil.

**ACCESSORIES**

**100817 - Standard Coaxial Take-Up Reel:**

The spring loaded coaxial take-up reel option keeps antenna cables neatly out of the way during ascent and descent of the cross-boom. It also helps to assure consistency of readings during testing.

**102290 - Coaxial Take-Up Reel with Cold Weather Cable:**

Includes Belden #8214 (RG-8/U type) coaxial cable which retains flexibility in cold weather.

**102268 - Universal Antenna Mount:**

Mount for most common antennas, especially EMCO Models 3108 and 3109.

## **ASSEMBLY INSTRUCTIONS**

**Tools Required:**

- 6" adjustable wrench (provided)
- 1/8" Allen wrench (provided)
- 1.5 mm Allen wrench (provided)
- FTG 1/4" NPT (provided) (for the AIR option)
- Small EMCO screw driver (provided)
- Guy rope stakes (not provided)

**Personnel Required:** Two qualified personnel.

**Time Needed:** One to two hours.

### **Erecting the Mast**

Please refer to Figures 1 & 2 for the following steps. From shipping position of parts:

1. Tilt the lower mast section from horizontal to vertical position and insert the mast locking pin to lock in vertical position.
2. While holding the carrier brake in the disengaged position, carefully slide carrier into position over bottom section of the mast (now vertical).
3. If you have the AIR option: With air cylinder in closed position and cable clamp pointing downward, insert the boom through the boom lever, bearing, and boom collar so that dimension A is 69.9 cm (27.5 in).

On a standard mast without AIR option, dimension A is set at 81.3 cm (32 in) between clamp end of boom and the carrier side plates.

4. Tighten boom lever and boom collar set screws securely, making sure that set screws on the boom collar are orientated in the same position as on the boom lever (1/8 in Allen wrench supplied).

On standard masts without AIR option, the set screws are located in the side plates on the carrier.

5. If the mast has the Coaxial Take-Up Reel, assemble the take-up reel in the position shown with the four carriage bolts, washers, and nuts, supplied on the base of mast. Pull the coaxial cable to the

approximate length shown in Figure 2 and secure in the clamp block provided on the boom. The clamps which are with stand-offs are positioned on the boom lever and boom collar on masts with AIR option, but they are positioned on the carrier side plates when the mast does not have AIR option.

6. Remove the mast lockpin then return lower mast section, with carrier, back to horizontal (as it was in shipment). Insert the mast sections into each other; match the color coded marks at the joints to insure the sections are installed in the proper orientation.
7. Unwind rope from the winch drum, pull through the top pulley, and secure through the hoisting eye located on the carrier brake with the rope clamp provided. The rope should be feeding off the side of the drum nearest the mast. Double the rope back under the clamp, then neatly tie the rope above the clamp.
8. Attach the guy ropes to the mast using the ropes provided to insure safe operation (Follow the guying diagram shown in Figure 3).
9. Carefully lift mast into vertical position and lock by using the locking pin.
10. Set cams on the limit switches inside of the motor cover to the desired upper and lower limits (Refer to Setting the Mechanical Up/Down Travel Limits section).
11. A grounding lug (brass 1/4-20 stud) is provided for bonding the Motor Assembly to ground. This is for RF grounding purposes.

**CAUTION: NEVER OPERATE THE MAST WITHOUT HAVING IT FULLY GUYED DOWN AND STATIONARY. USE EXTREME CAUTION WHEN OPERATING IN GUSTY WINDS OR QUESTIONABLE WEATHER CONDITIONS.**

**WARNING: NEVER STAND DIRECTLY UNDER THE BOOM.**

### **Setting the Mechanical Up/Down Travel Limits**

The mechanical limits must be properly set prior to operation of the Antenna Positioning Tower. Please see Figure 4 for a pictorial description of the parts and procedure noted below.



The mechanical limit switches are located in the Motor Assembly at the base of the mast. To set them, remove the cover and loosen both brass cams on the limit switches with a 1.5 mm Allen wrench (supplied). Lower the antenna carrier to a position near the bottom of the mast. No more than two turns of rope should remain on the winch drum when the carrier is at the bottom of the mast. This prevents the rope running off the drum when the carrier is at the top of the mast.

The lower limit is set by rotating and adjusting the brass cam above the lower limit switch so that the switch just closes (a detente can be felt and a small "click" heard when the switch closes). Tighten the set screw on the lower limit cam with the Allen wrench.

**Note: When setting the mechanical lower limit, be cautious of the lower positioning of the vertically polarized antenna. Make sure the vertically polarized antenna will not, at any time, collide with the ground.**

The upper limit is set by raising the antenna carrier to a point near the top of the mast and adjusting the brass cam above the upper limit switch as described above. Tighten the set screw on the cam. While visually monitoring the mast assembly, test both cams for proper adjustment in normal operation. Replace the motor cover.

### **Electrical Installation**

The Model 1070 motor base is provided with an input AC power cord with an approximate length of 2.45 m (8 ft). This power cord is suitable for portable indoor applications without modification. See Figure 5.

If this equipment is to be installed outdoors, the installation should be accomplished by a qualified electrician. In the event that modifications are required, the installation should be compliant with all local and national electrical safety codes. As with all electrical devices, power should be removed prior to servicing the equipment.

To remove the power input cord, first disconnect the power cord from the supply mains. Remove the four phillips head screws which fasten the junction box gasket and cover. The main power fuse is located under this cover. Remove the two power leads from the terminal strip and the protective safety ground lead from the side of the enclosure. The strain relief and power cord can now be removed from the junction box. The remaining hole is properly sized for attachment with standard 1/2 inch electrical conduit fittings. Power connections are to be accomplished using the existing terminal block. **Properly terminate a safety ground wire to**

the position provided for connection of the Protective Earth conductor.

**CAUTION: PRIOR TO APPLYING POWER, CHECK THE POSITION OF THE VOLTAGE SELECT SWITCH WHICH IS LOCATED UNDER THE MOTOR BASE COVER.**

### **MAINTENANCE INSTRUCTIONS**

1. Mylar ropes should be frequently inspected for fraying or degradation due to usage and replaced every two years as a safety precaution.
2. Mast and carrier must be kept clean to assure smooth operation. Do not use oil or grease to decrease friction between the mast and carrier.
3. Inspect bearing at top of mast every six months and keep clean to prevent excessive wear or binding.
4. The coaxial cable used with optional take-up reel should be inspected frequently and replaced at least every two years, or sooner if wear is detected in the cable or cable connectors. The coaxial rotary joint that is supplied with the take-up reel should be checked frequently for noise generation.
5. Remove the motor base cover every six months and inspect upper and lower limit cams to insure tightness on shaft. Tighten the Allen set screws in the cams with the 1.5 mm Allen wrench (supplied), as necessary.
6. Inspect the carrier's mechanical brake spring every month to insure that it has tension and is capable of positioning the brake firmly against the mast, should the rope break.

### **ELECTRIC BRAKE ADJUSTMENTS**

For proper operation of the electric brake it is necessary to adjust the air gap (reference A on Figure 6). As this air gap increases due to wear of the friction discs, the stopping time of the brake will increase accordingly. Before air gap "A" reaches 13/32 in (10.32 mm) (measured on center line

of plunger), adjustment for wear is required. Misadjusting the air gap will result in a loss of torque and/or coil burnout.

To adjust the brake refer to Figure 6 and proceed as follows::

1. Remove cover. (Ref 01)
2. Insert allen wrench into adjusting Set Screw #10-32 x 24 (Ref 02) and turn clockwise until solenoid air gap is approximately 11/32 in (8.7 mm). Gap is measured between Operator Assembly Lever (Ref 03) and solenoid (Ref 04) "C" frame, at center line of solenoid plunger (Ref 05).
3. Replace cover.

**NOTE:** The 11/32 in (8.7 mm) dimension for the air gap is a nominal position. Observe motor starting characteristics after adjusting gap. Motor should start quickly. If not, increase air gap by turning adjusting Set Screw (Ref 02) 1/8 (one eighth) turn counter clockwise.

## REPLACEMENT PARTS LIST

For those users that prefer to repair the tower at the major sub-assembly level, the following list of field replaceable parts is provided:

| <u>P/N</u> | <u>Description</u>           | <u>Used on Option</u> |
|------------|------------------------------|-----------------------|
| 101763     | ASSEMBLY TOOLS               | ALL MODELS            |
| 102595-10  | CABLE ASSEMBLY, 10 METERS    | ALL MODELS            |
| 700004     | MAGNETIC DISK BRAKE          | ALL MODELS            |
| 700023     | MOTOR, 110/220 VAC, 50/60 Hz | ALL MODELS            |
| 480015     | FUSE, 6.3 A, SLO-BLO         | ALL MODELS            |
| 485011     | FUSE HOLDER                  | ALL MODELS            |
| 670004     | AC POWER CORD                | ALL MODELS            |
| 690027     | POWER INLET FILTER           | ALL MODELS            |
| 890359     | JUNCTION BOX GASKET          | ALL MODELS            |
| 890360     | COVER PLATE GASKET           | ALL MODELS            |
| 102683     | DIGITAL BOARD ASSEMBLY       | ALL MODELS            |
| 102684     | AC RELAY BOARD ASSEMBLY      | ALL MODELS            |
| 620009     | SOLID STATE RELAY            | ALL MODELS            |
| 101519     | OPTICAL SWITCH ASSEMBLY      | ALL MODELS            |
| 630096     | LIMIT SWITCH                 | ALL MODELS            |
| 102702     | MOTOR BASE CABLE ASSEMBLY    | ALL MODELS            |

| <u>P/N</u> | <u>Description</u>        | <u>Used on Option</u> |
|------------|---------------------------|-----------------------|
| 438002     | CAPACITOR, 10 UF, 400 VAC | ALL MODELS            |
| 630095     | SWITCH SELECT 115/220 VAC | ALL MODELS            |
| W3/16      | MYLAR ROPE                | ALL MODELS            |
| 860106     | TUBING, URETHANE          | AIR                   |
| 905036     | AIR SOLENOID VALVE        | AIR                   |
| 101596     | AIR CYLINDER ASSEMBLY     | AIR                   |
| 890046     | POLY TUBING, NEUTRAL      | AIR                   |
| 890062     | SELF STORING AIR HOSE     | AIR                   |

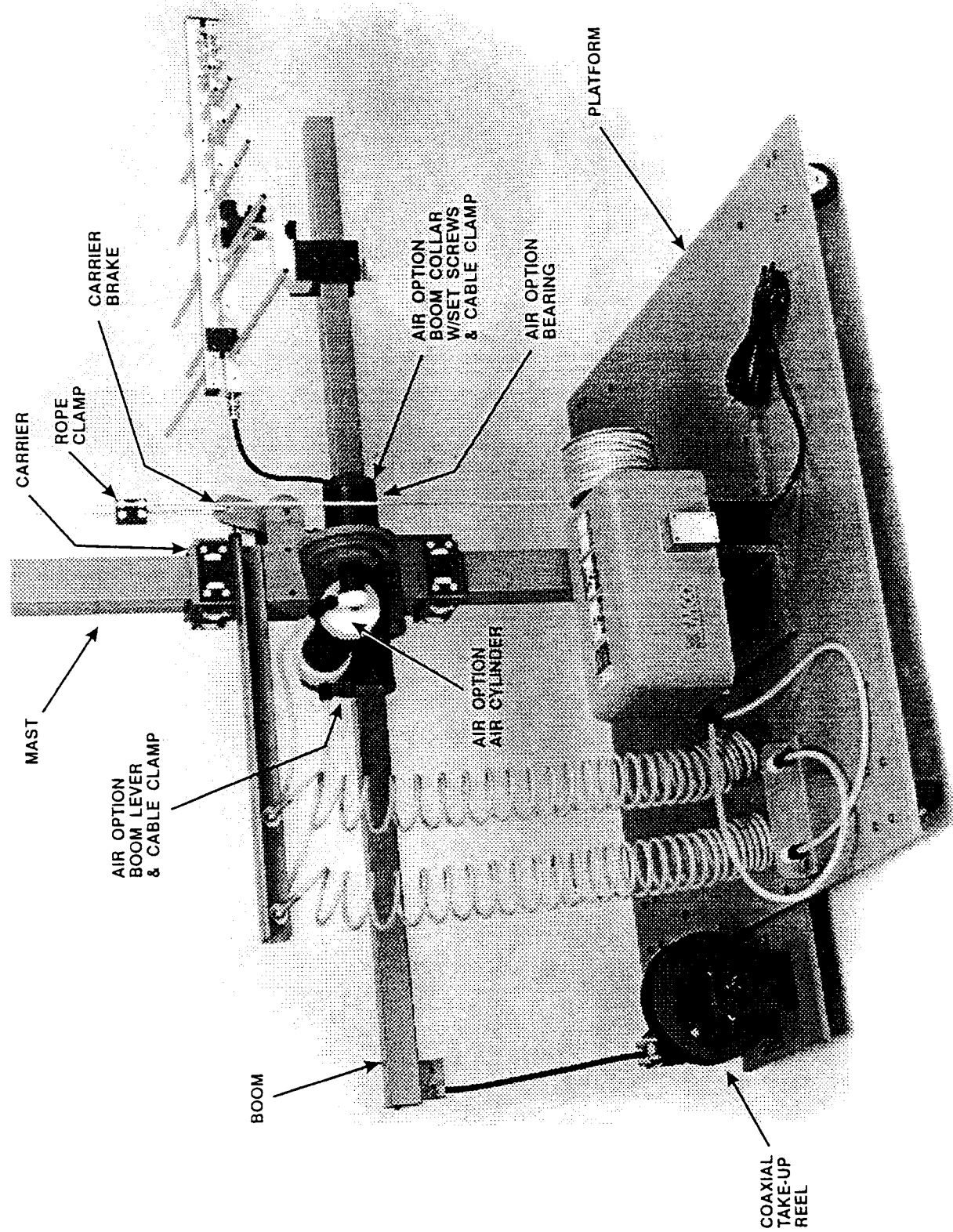


FIGURE 1. MODEL 1070 ANTENNA POSITIONING TOWER

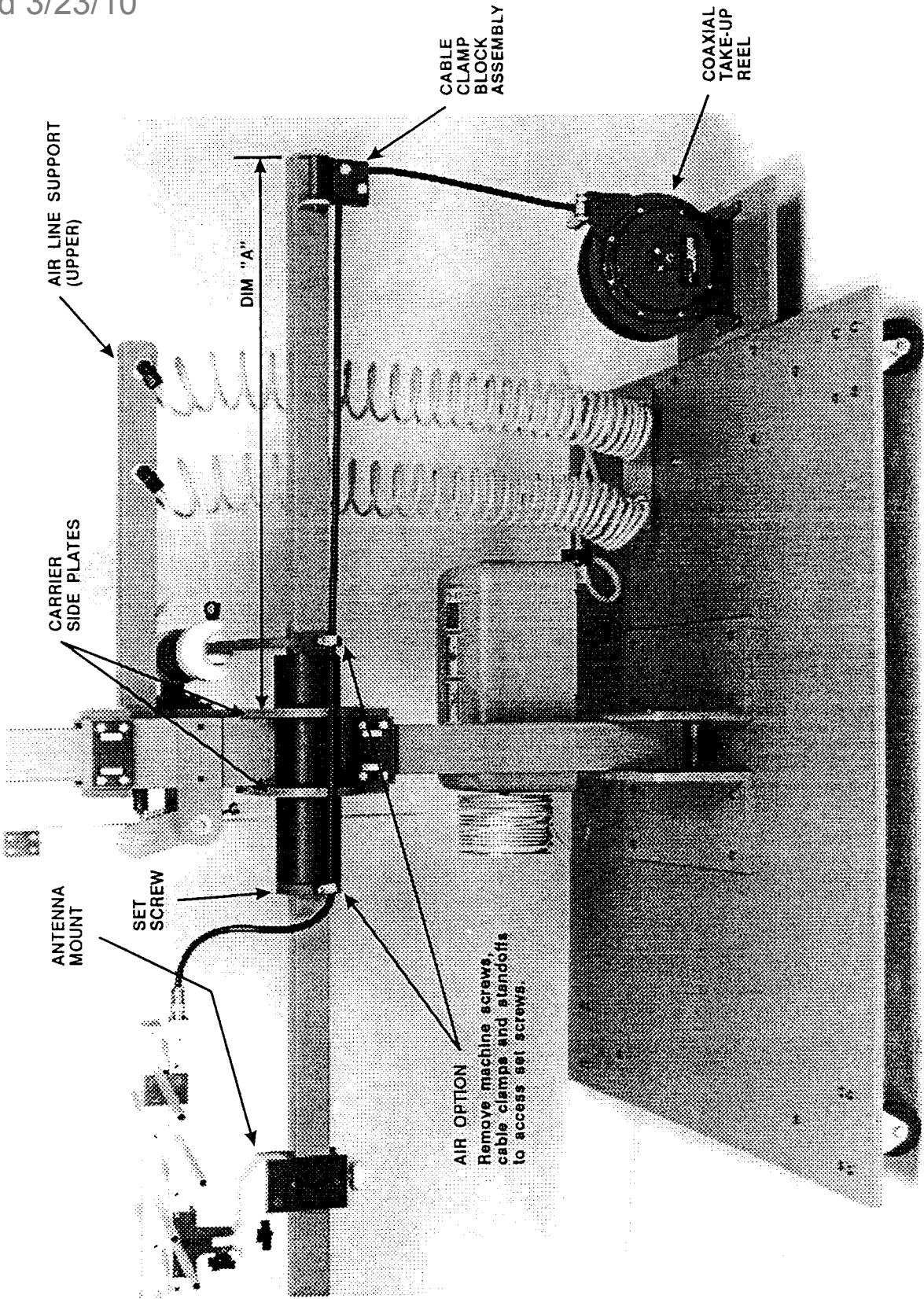


FIGURE 2. MODEL 1070 ANTENNA POSITIONING TOWER

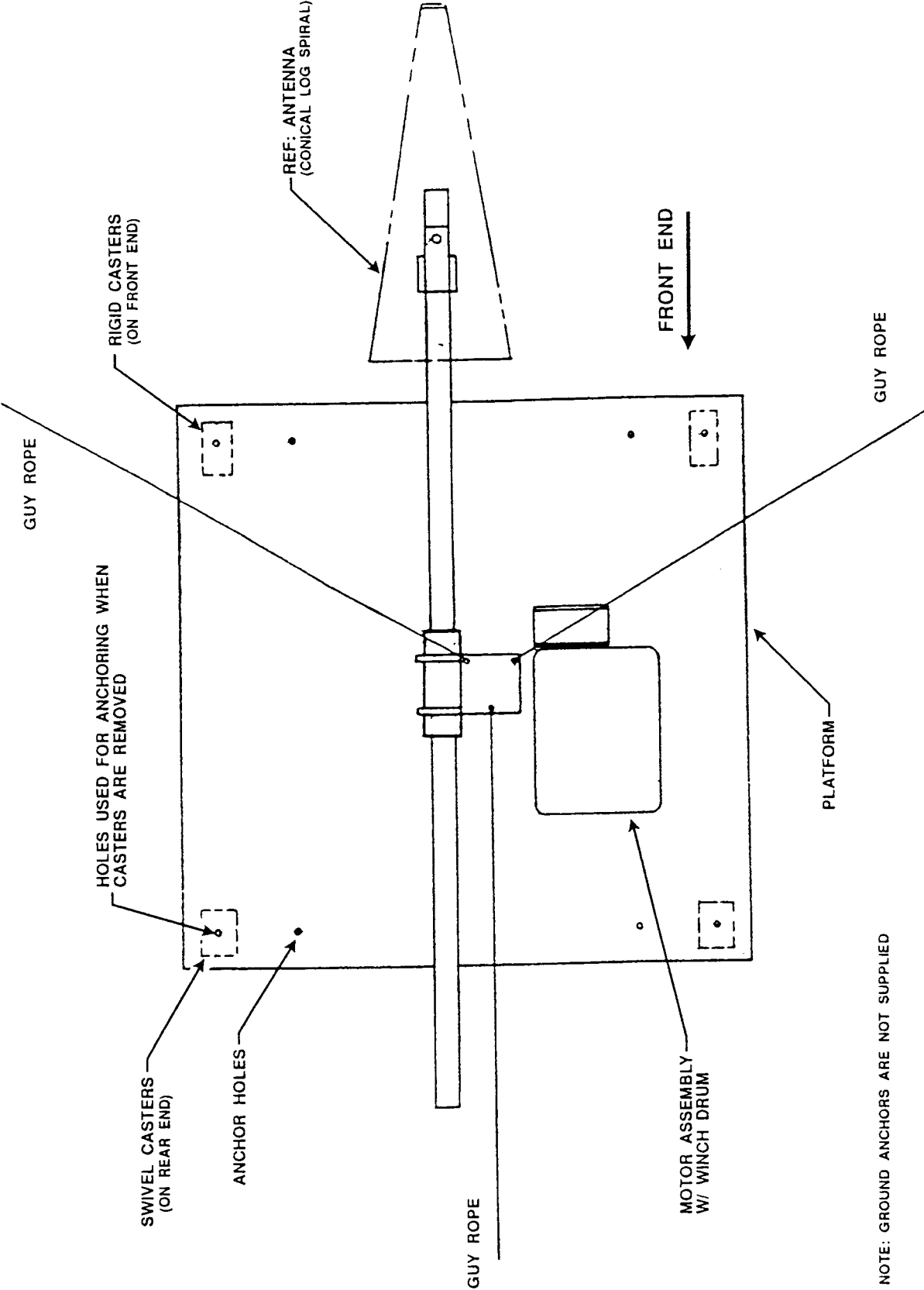
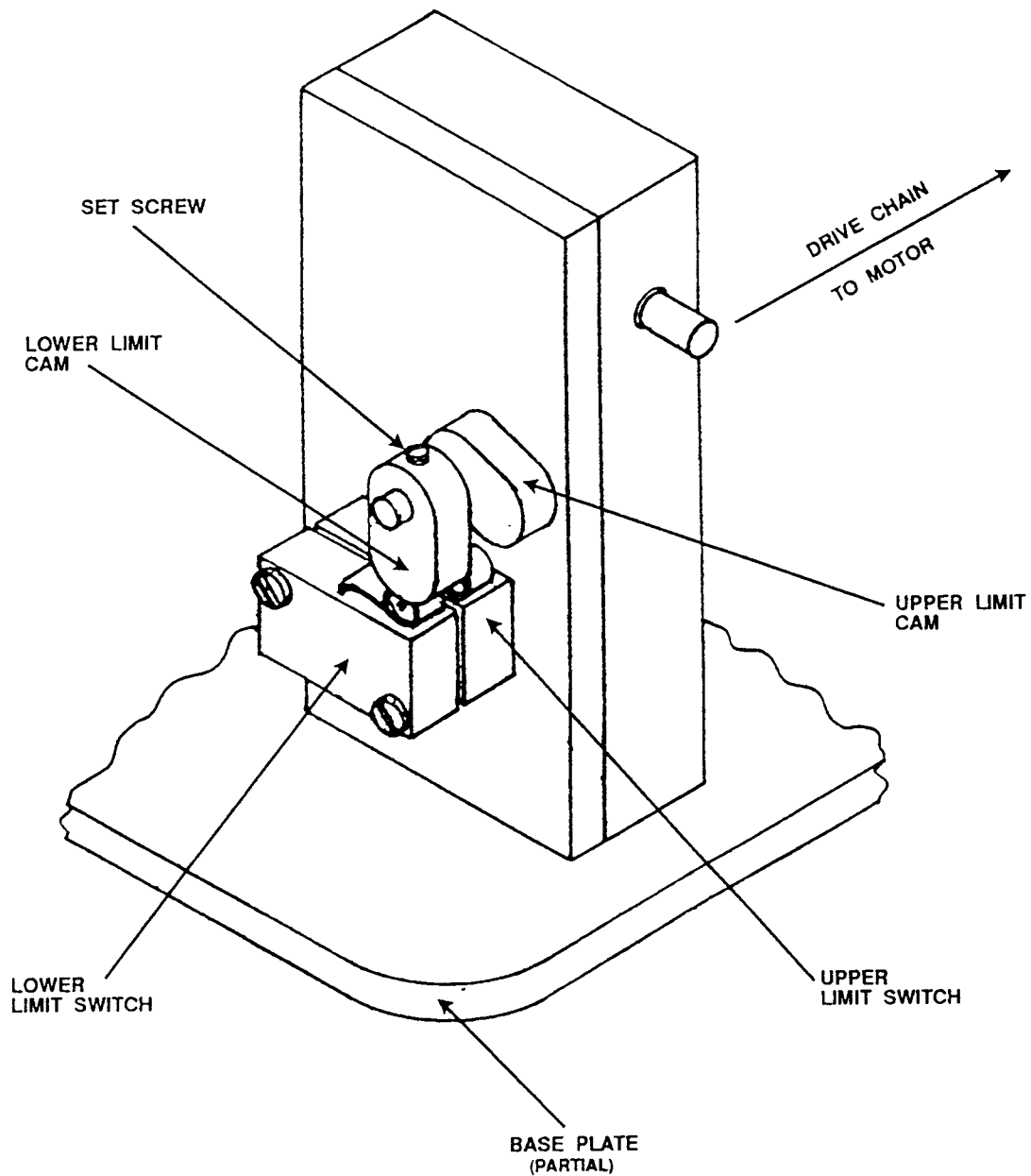


FIGURE 3. TOP VIEW - ANTENNA POSITIONING TOWER



**FIGURE 4. MECHANICAL LIMITS - SWITCHES AND CAMS**  
(Located inside of motor assembly)



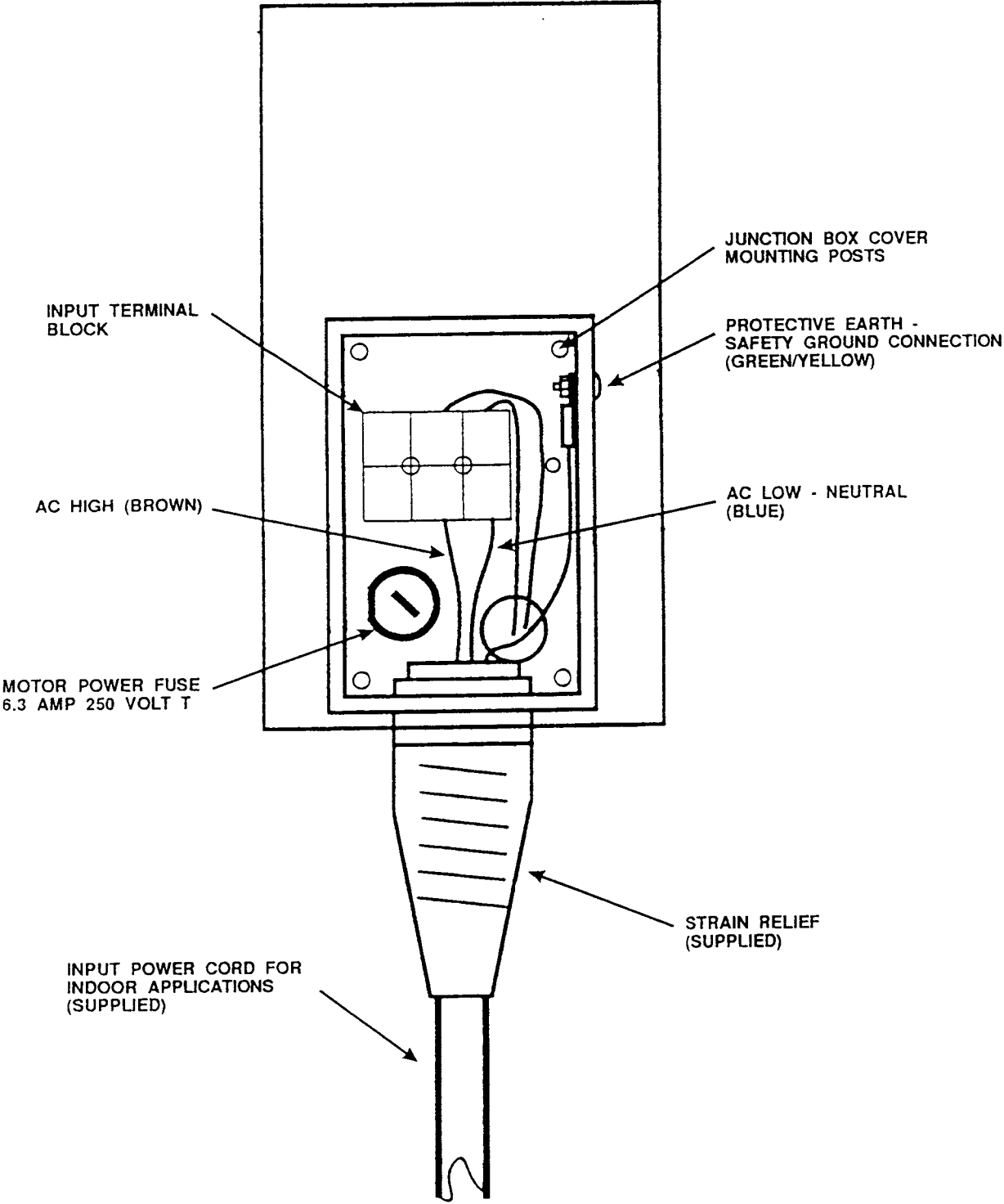


FIGURE 5. MODEL 1070 SERIES INPUT POWER ASSEMBLY

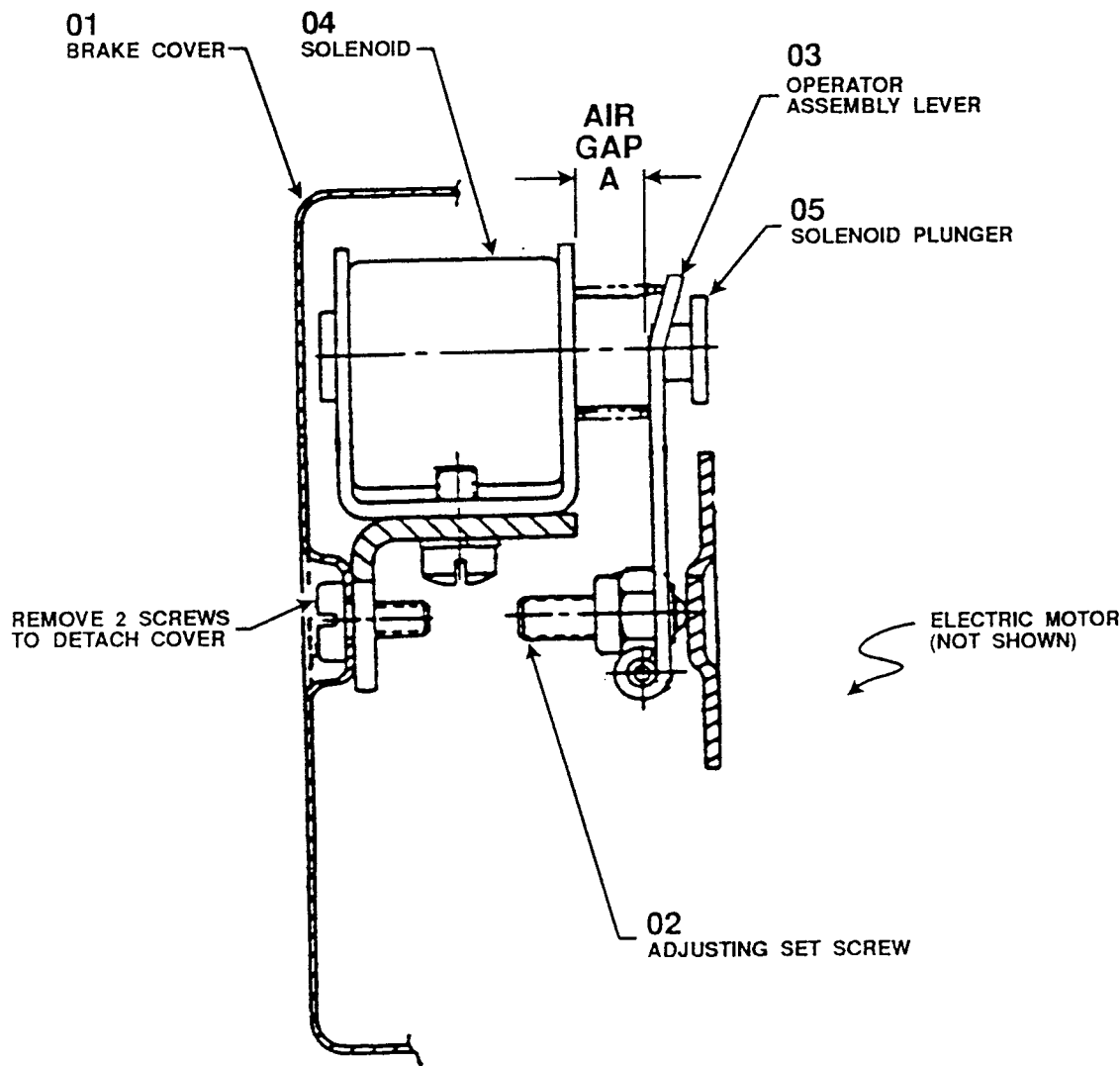
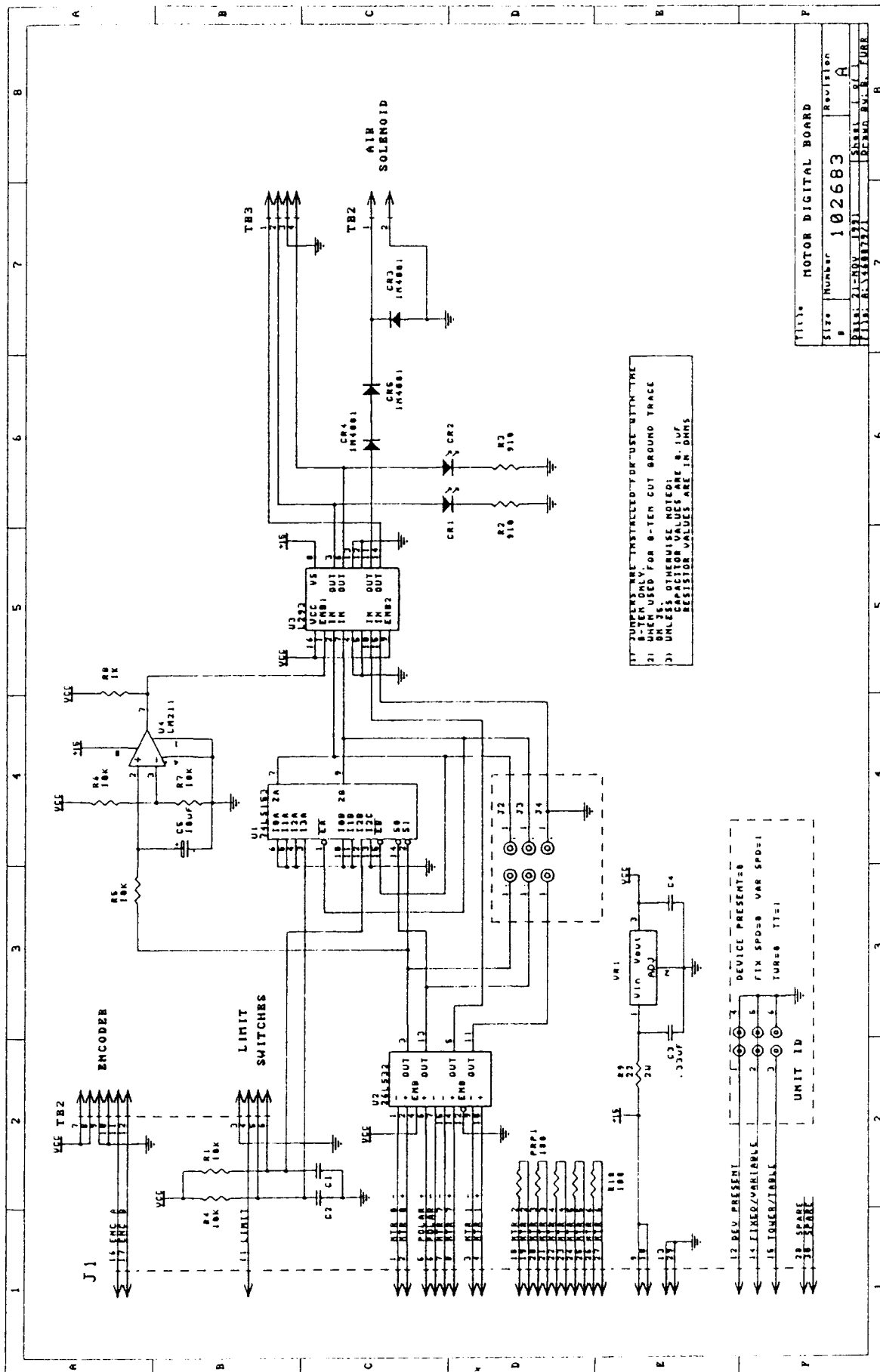
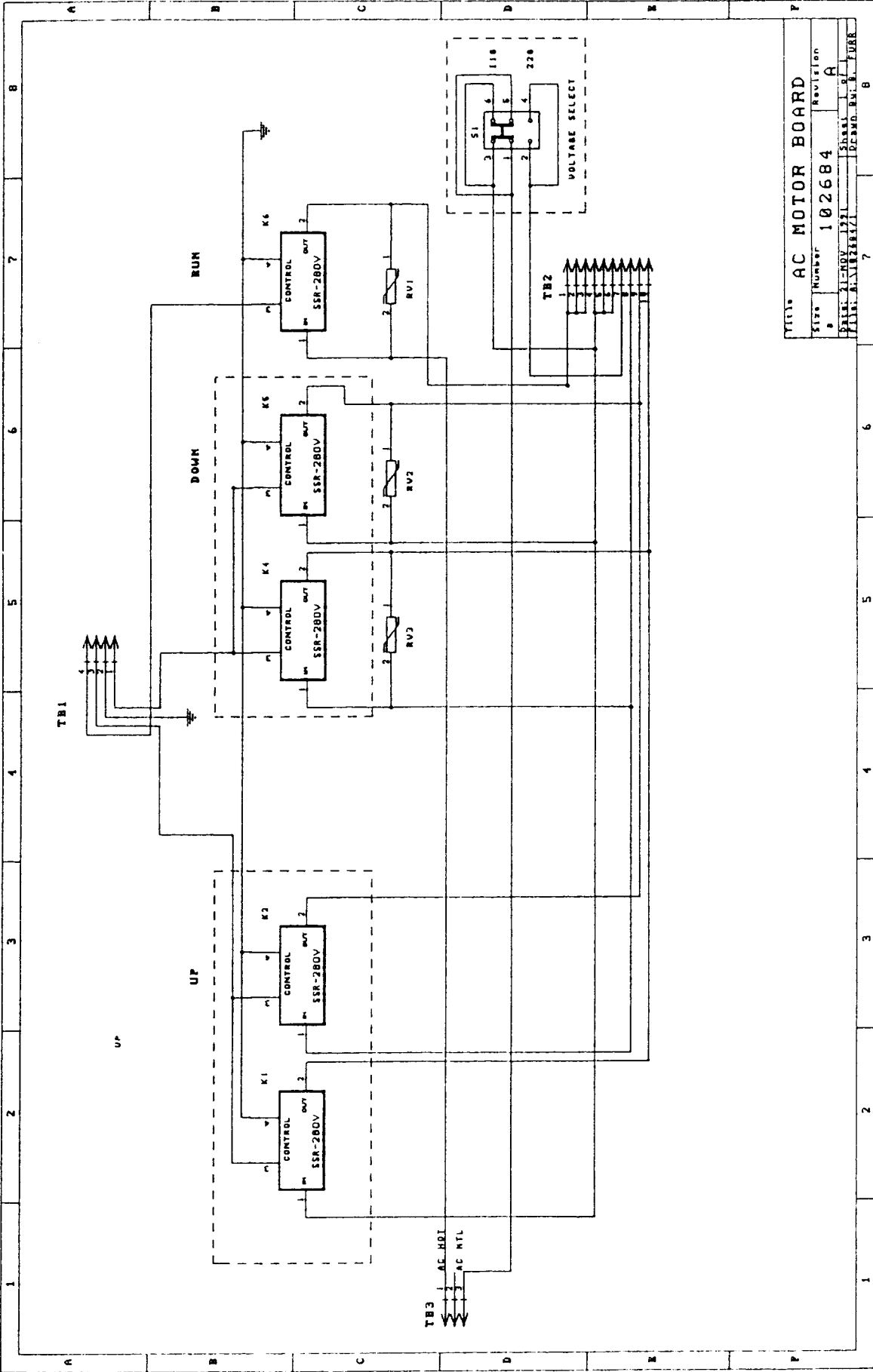


FIGURE 6. ELECTRIC BRAKE  
(Located on end of motor)





## WARRANTY

The Electro-Mechanics Company (EMCO) warrants that our products are free from defects in materials and workmanship for a period of two years from the date of shipment. If you notify us of a defect within the warranty period, we will at our option, either repair or replace those products which prove to be defective. If applicable, we will also recalibrate the product.

There will be no charge for warranty services performed at the location we designate. You must however, prepay inbound shipping costs and any duties or taxes. We will pay outbound shipping costs for a carrier of our choice, exclusive of any duties or taxes. You may request warranty services to be performed at your location, but it is our option to do so. If we determine that warranty services can only be performed at your location, you will not be charged for our travel related costs.

This warranty does not apply to:

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

THIS WARRANTY IS EXCLUSIVE. NO OTHER WARRANTY, WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE.

THE REMEDIES PROVIDED BY THIS WARRANTY ARE YOUR SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT ARE WE 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.

Please contact our sales department for a Return Material Authorization Number before shipping equipment to us.