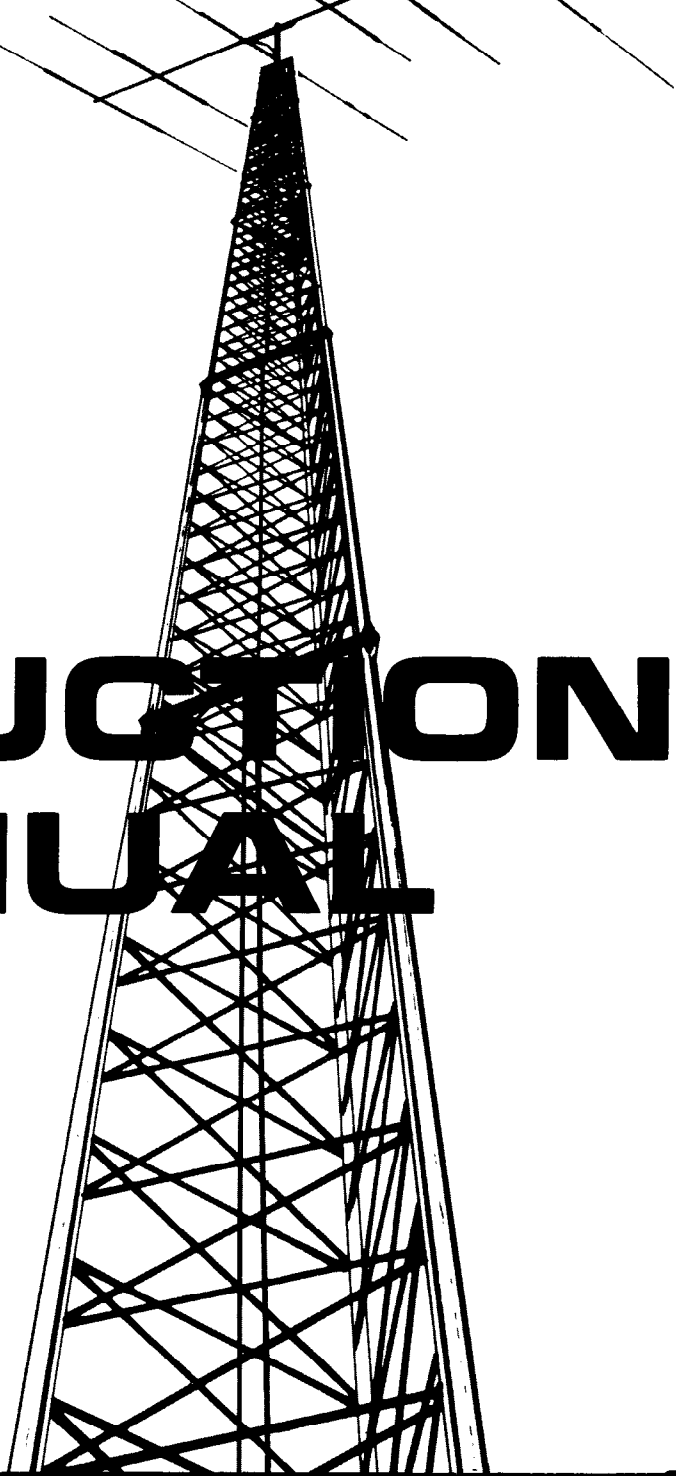


hy-gain®

INSTRUCTION MANUAL

Antennas, Towers and Accessories for
Commercial, Industrial, Military and
Private use.



**MODEL HDR-300
HEAVY DUTY ROTATOR
SYSTEM
ORDER NO. 300**

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TELEX COMMUNICATIONS, INC.

8601 NORTHEAST HIGHWAY SIX, LINCOLN, NE 68505 U.S.A.

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Date of Purchase _____

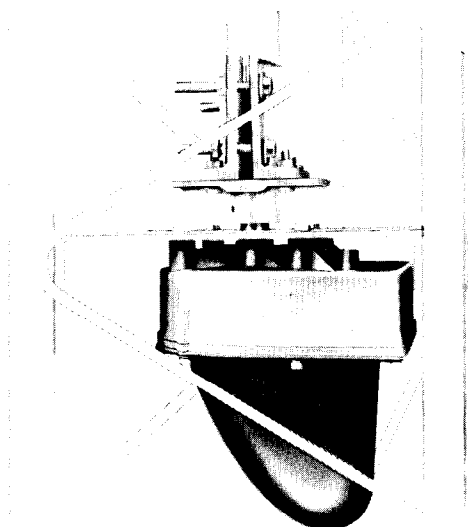
Purchased From _____

Price Paid _____

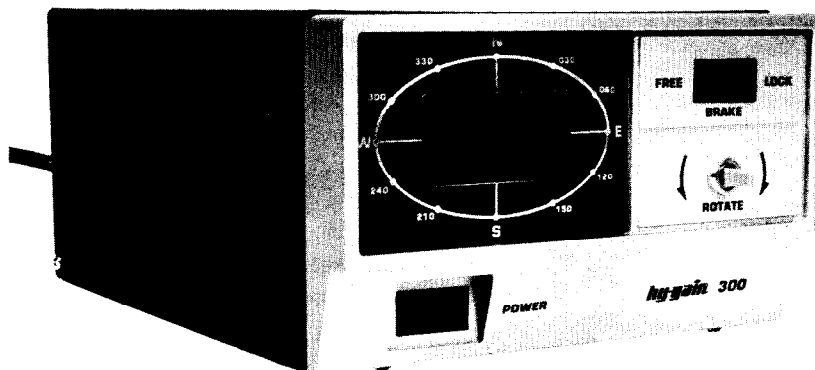
Serial Number (on Gearmotor) _____

Please retain your copy of the Bill-of-Sale for Warranty Claims.

SECTION I



Gear Motor Assembly



Control Console

Figure 1

General Description

Gear Motor Assembly

The Hy-Gain HDR 300 Rotator is a compact, high torque antenna rotator that can be used for positioning large antenna systems. The gear train is constructed of heavy steel-spur gears for maximum strength and reliability. To provide for quiet, vibration free operation a fiber drive gear from the motor is used. An aluminum housing reduces weight and helps prevent corrosion. The gears are lubricated with a low temperature grease that is stable from -60°F to 280°F.

The gear train is driven by a 1/10 HP permanent magnet split capacitor motor. The motor is supplied with 24 VAC, 60 HZ, single phase power through one of two limit switches. Gear motor stall torque at 70°F typically exceeds 5000 inch/pounds. The motor contains a thermal overload circuit breaker which will not allow the motor to operate if it is too hot. The breaker will automatically reset after the motor cools down. This usually takes 5 to 15 minutes depending upon ambient temperature. The gear motor will operate reliably from -30°F to +120°F.

The Hy-Gain HDR 300 Rotator has a low voltage solenoid brake/clutch assembly. This assembly is installed on the motor shaft and prevents gear damage by slipping when the braking torque or brake-holding torque exceeds 7500 inch/pounds. This value may drop if the clutch is allowed to slip several times. The braking torque and brake-holding torque will always be greater than 5000 inch/pounds unless the rotator system is subjected to misuse, neglect or incorrect wiring.

Azimuth indication is provided by a 3-turn, 1000 ohm wire wound potentiometer that is geared to the rotator output shaft. An analog output is obtained by a varying DC voltage as the rotator is turned. Because a 3-turn potentiometer is used, the amount of overtravel can be as great as 180° without damage to the potentiometer. However, the overtravel is limited to approximately 20° by the limit switches. This gives a maximum travel of 400°.

General Description Control Console

The Control Console actually consists of two separate systems. The first system supplies 24 VAC to the motor. The second system supplies 5 VDC to the azimuth potentiometer and receives the analog signal from the potentiometer which is converted into seven segment LED's, digital form and displayed on the front panel.

The 24 VAC transformer comes wired for 115 VAC systems, although it can be easily rewired for 230 VAC operation. Power is supplied to the rotation control switch through the brake control switch. Before the antenna can be turned the brake must be in the "free" position. This also permits the operator to allow the antenna to coast to a stop before locking the brake. This will prevent the brake/clutch assembly from slipping under high torque conditions. The brake switch has a reminder light to tell you that the antenna is free to rotate.

The smaller transformer for the azimuth display system also comes wired for 115 VAC, although it can also be wired for 230 VAC operation. When the power switch is turned on, 5 VDC is supplied to the potentiometer in the rotator. As the rotator is turned from 0° to 360°, output voltage from the potentiometer is varied from .833 to 2.500 VDC. This analog voltage is compared to a reference voltage and finally converted into a digital format for display purposes. The display system is capable of displaying -99° to +999°, although the limit switches on the rotator limit the rotation from -20° to +380°. Potentiometers are available through the backplate for zero and gain calibration.

SECTION II

Technical Specifications

Mechanical

Stall torque	5000 in.-lbs. (565 Nm)
Braking torque (minimum)	5000 in.-lbs. (565 Nm)
Coasting torque	600 in.-lbs. (67.8 Nm)
Maximum vertical load	500 lbs. (226.8 kg)
Maximum antenna area	25 sq. ft. (2.325 sq.m)
(when mounted inside tower)	
Maximum travel	400°
Rotation time	approx. 60 seconds for 360°
Mast size	1¼" to 3" O.D. (3.2 to 7.6 cm)
Temperature range	-30° to +120°F (-35°C to 49°C)
Weight (Rotator)	27 lbs. (12.2 kg)
(Control Console)	21 lbs. (9.52 kg)
Recommended inside tower width	9.5" (24.13 cm) minimum

Electrical

Power requirement	115 VAC 50/60 cycle 2.5A or 230 VAC 50/60 cycle 1.5A
Motor	24 VAC, 9A maximum, 1/10 HP, PSC, single phase
Control cable requirements:	

	<u>Minimum</u>	<u>Recommended for Maximum Torque</u>
0-100 Feet:	two #18 and six #22 AWG Bertek 6308-18 or Belden 8448	two #16 and six #18 AWG Belden 9405
100-200 Feet:	two #16 and six #18 Belden 9405	seven #14 Belden 8628
200-300 Feet:	seven #14 Belden 8628	twelve #14 Belden 8629

Belden 9495 (3-#14 AWG) and Belden 8489 (4-#18 AWG) can be used in place of Belden 8628. Also, Belden 8620 (4-#16 AWG) and 3-#12 hook-up wire can be used in place of Belden 8629.

The three large wires are used on pins 1, 2 and 3. The four smaller wires are used on pins 4, 8, 9, and 10.

Digital readout accuracy ±1°

SECTION III

Preinstallation Check

It is required that a preliminary operational check be made on the rotator system prior to actual installation. First, check each item against the parts list. If any of these items are missing or damaged, follow the instructions on our warranty label.

Next, set up the control unit and the rotor assembly for an operational check using the following procedure:

STEP 1: Determine if you wish to operate this unit on 115 VAC or 230 VAC. The HDR 300 comes prewired for 115 VAC, but can be easily modified for 230 VAC operation. If 230 VAC operation is desired, go to Section IV before returning to Step 2.

STEP 2: Referring to Figure 2, Control Console, install a 2.5 A fuse (1.5A for 230 VAC) and a 12A fuse in the appropriate fuse holders.

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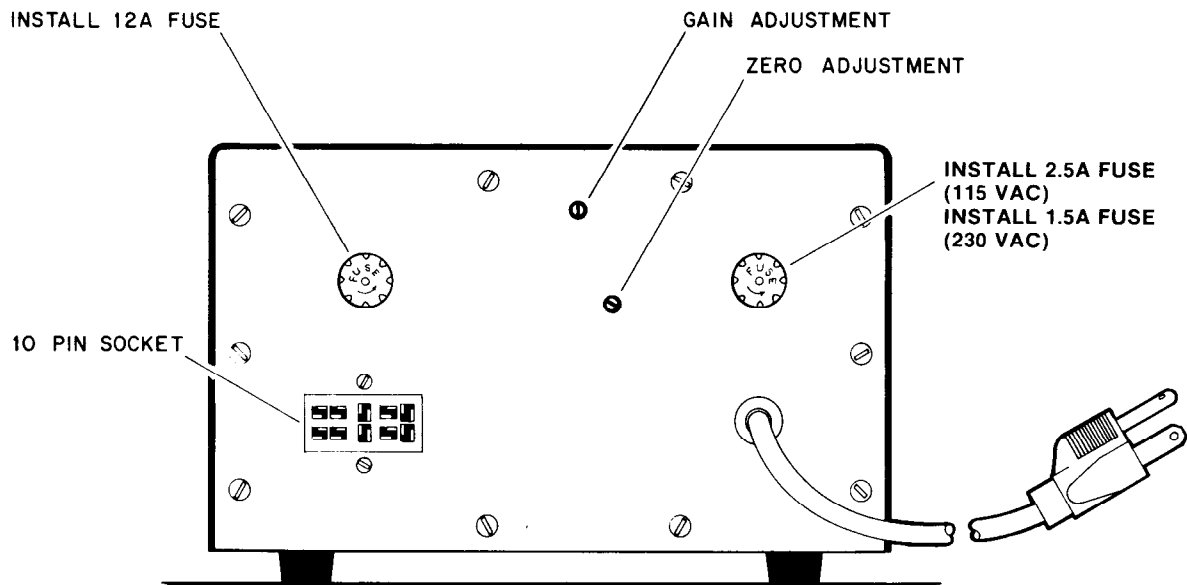


Figure 2
Rear Panel

STEP 3: With the Control Console setting on a suitable workbench, plug the power cord into the appropriate wall socket.

STEP 4: Turn the power switch on. The switch light should come on and stay lit until turned off. The LED digital readout should also come on. You will notice that the digits will change for a second or two until the system has stabilized. Once stabilized, the display should read between "-85" and "-99" or "---". All of these are under-range indicators showing that the control cable has not been plugged in. The over-range indicator is "EEE". This will occasionally appear during stabilization, but should not stay on unless there is a wiring mistake. Turn the power switch off.

- STEP 5: Measure out the control cable required for your installation. (See Specifications) Stretch the cable out to its full length when testing. Strip the wires on one end as shown in Figure 3, and attach to the 10 pin plug.
- STEP 6: Remove the screws that hold the plastic housing on the rotor assembly. Gently lift the housing off of the rotor. Inspect the rotor to insure all parts are included. Refer to Figure 4.
- STEP 7: The hole in the side of the plastic housing is provided for the control cable to enter the rotor. It is large enough to accommodate the smallest control cable. If you wish to use a larger control cable, you should drill out this hole to the proper size. Be sure not to drill too large of a hole. Slip the control cable through this hole before attaching the cable to the rotor.
- STEP 8: For a permanent installation, the rotor end of the control cable should be prepared as shown in Table 1 (page 6). The wires should be soldered to each lug as shown in Figures 4 and 5. If your installation is temporary, you may use the wire nuts supplied to connect the control cable to short wires that can be installed in place of the control cable. Also, connect the loose wire from the motor as shown in Figure 5. Wrap the control cable with black tape where it enters the plastic housing. This will act as a strain relief. See Figure 4.

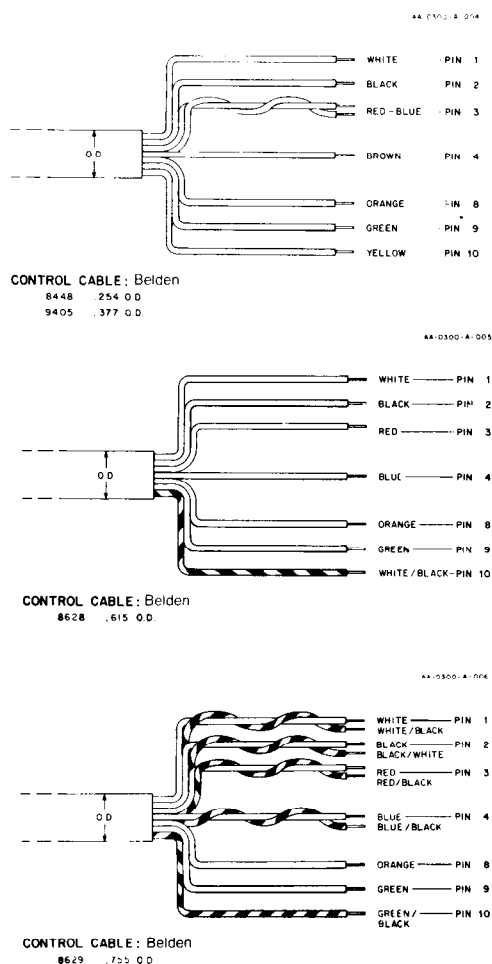
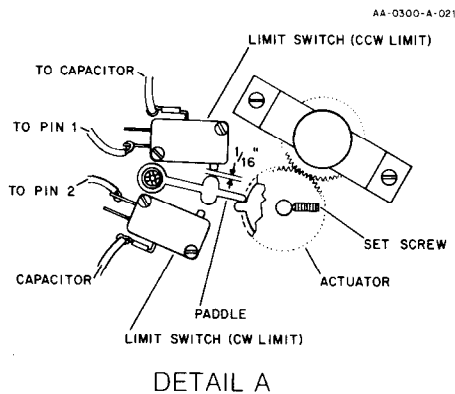
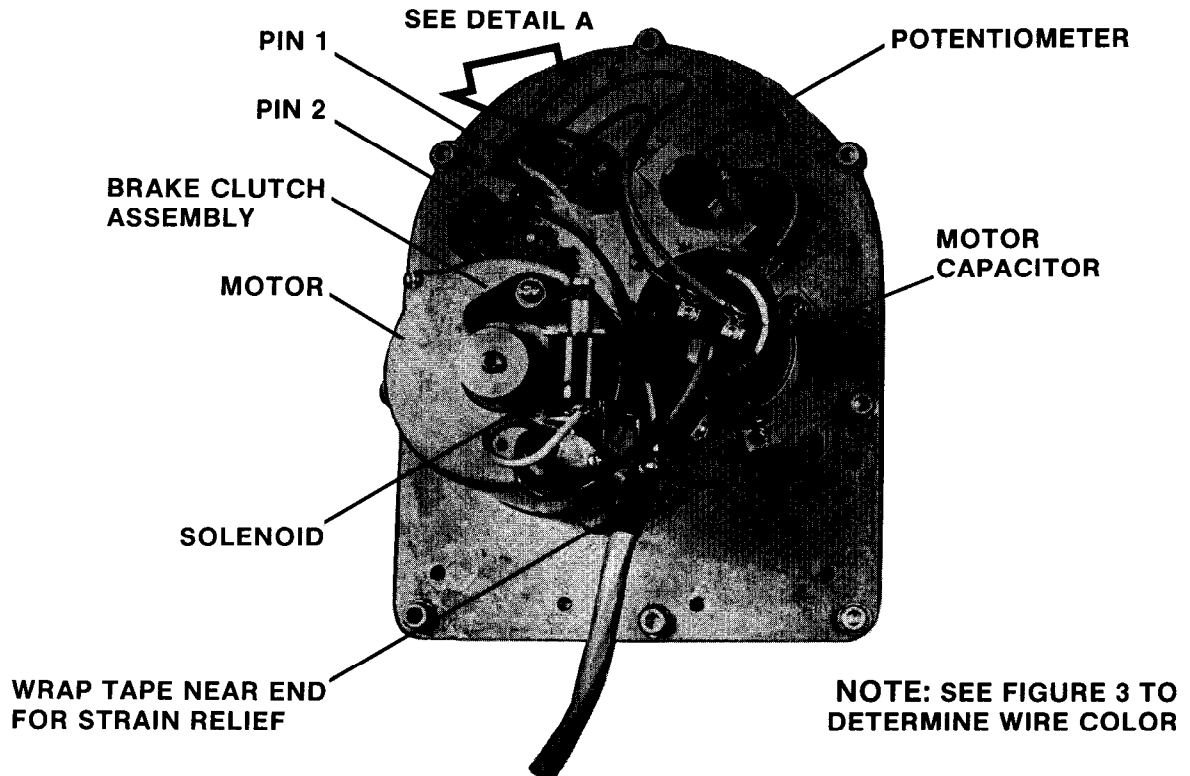


Figure 3
Control Cable
Attachment to 10 pin plug

TABLE 1	
Control Cable Wire Cutting Chart for Attachment to Rotor	
Wire Connected to Pin Number	Wire Length
1	7'
2	7'
3	3"
4	3"
8	9"
9	9"
10	9"

NOTE: See Figure 3 to determine wire color.

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Actuator shown in the "000" position.

Figure 4
Control Cable-Rotor Wiring Guide

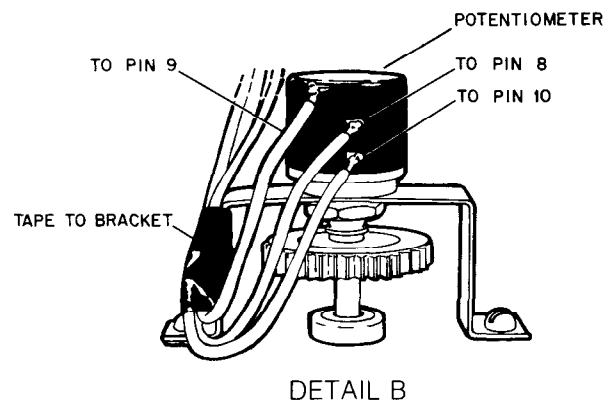
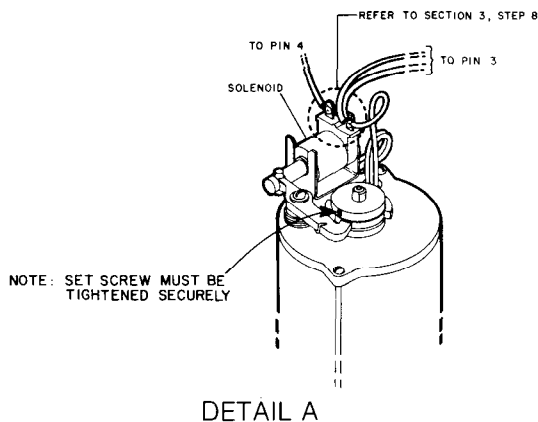


Figure 5

STEP 9: Plug the control cable into the control console. With the plastic housing still off of the rotor, turn on the control console power switch. The digital readout should show a heading between -10 and 010 degrees. If it doesn't, refer to Section VIII, Troubleshooting guide. Final calibration will take place in Section V.

STEP 10: Set the rotor so that the motor is facing you. Move the brake switch to the "FREE" position. The switch should light up, indicating that the antenna is free to turn. You should also hear the solenoid release the brake and the solenoid will make a humming noise which is normal.

STEP 11: Set the rotor so that the output shaft is facing you. Move the rotate switch to the right.

NOTE: The brake must be in the "FREE" position before the rotate switch will operate.

The output shaft should rotate clockwise. If not, refer to Section VIII. Move the rotate switch back to the center position. The output shaft should coast to a stop.

Move the rotate switch to the left. The output shaft should rotate counterclockwise.

STEP 12: Repeat Step 11. This time note that as the rotation is in a clockwise direction, the digital readout increases positively. As the rotation is in a counterclockwise direction, the digital readout decreases. AS 000 degrees is passed, the readout becomes negative. If not, refer to Section VIII. Return the output shaft to its original setting and lock the brake.

Before installation, make sure that the brake clutch assembly is firmly secured to the motor output shaft. Tighten the setscrew in this assembly so that it will not come off of the motor shaft. See Figure 5 and Detail A.

STEP 13: If all controls are functioning properly, then install the plastic housing on the gearmotor using eleven #10-24 x 5/16" round head screws. Make sure the control cable wires are routed so that they do not interfere with the brake system or the plastic gears. Tighten the screws so that there is no gap between the housing and the gear motor.

STEP 14: If the rotator is to be used in a climate that has heavy rainfall, additional precautions should be taken to weatherproof the gearmotor assembly. You can apply a bead of RTV or silicone sealant around the outside edge of the black plastic housing before securing it to the gearmotor assembly.

SECTION IV

If you are using 115 VAC power, skip this section.

Conversion from 115 VAC to 230 VAC: (Refer to Figure 6)

- (1) Remove the black jumper wire that connects the 115 VAC terminals on Transformer DL 24-12.
 - (2) Unsolder one end of the white jumper wire that connects the 0 VAC terminals. Move this end to the adjacent 115 VAC terminal and solder.
 - (3) Remove the red jumper wire that connects 115 VAC terminals on Transformer DL 12.8-0.5.
 - (4) Unsolder one end of the white jumper wire that connects the 0 VAC terminals. Move this end to the lower 115 VAC terminal and solder.
 - (5) Unsolder one end of the long white wire that connects to the 0 VAC terminal on Transformer DL 12.8-0.5. Move this end to the adjacent 0 VAC terminal.
 - (6) There is a white wire connecting pin 3 of the power switch to the 24 VAC transformer. Disconnect this wire from the power switch and unsolder it from the transformer. Unsolder the connector from the wire and replace the connector on another wire 12 inches long.
- Plug the connector back on pin 3 of the power switch. Solder the other end to the white wire that connects terminals 0 and 115 on Transformer DL 12.8-0.5.
- (7) Modify the power cord to fit your 230 VAC socket. Use the 1.5 Ampere fuse instead of the 2.5 Ampere fuse.

115 VAC

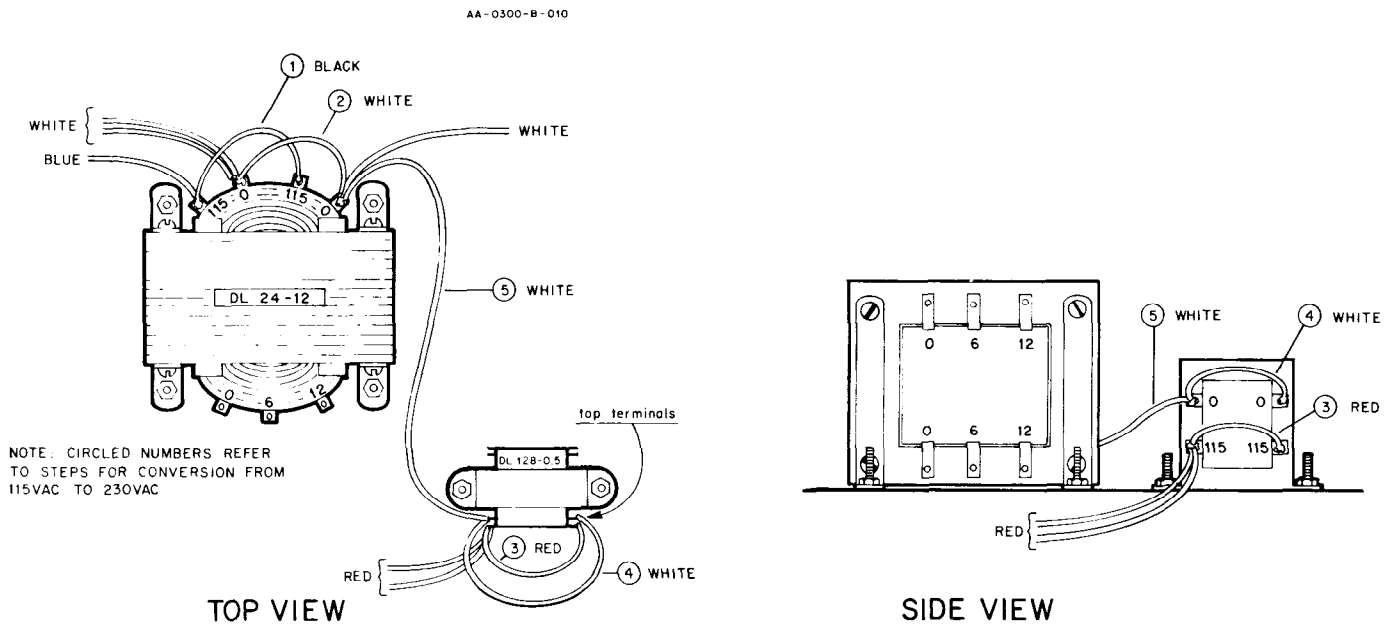
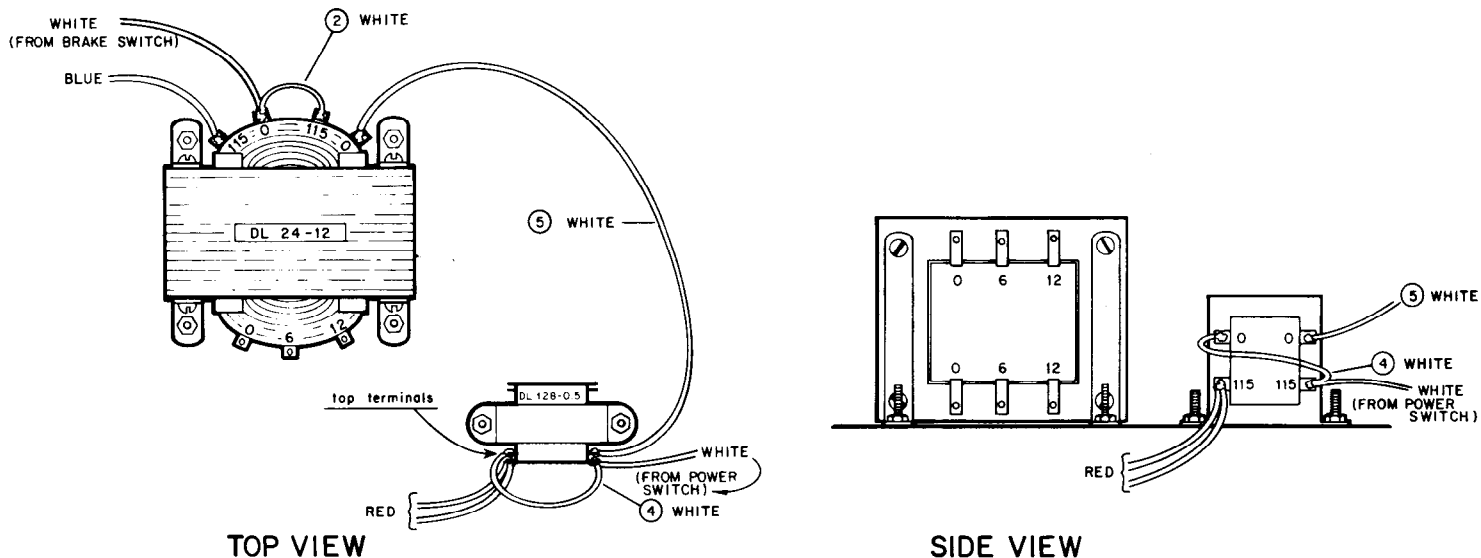


Figure 6

230 VAC

AA-0300-B-011



**Figure 6
(cont.)**

SECTION V

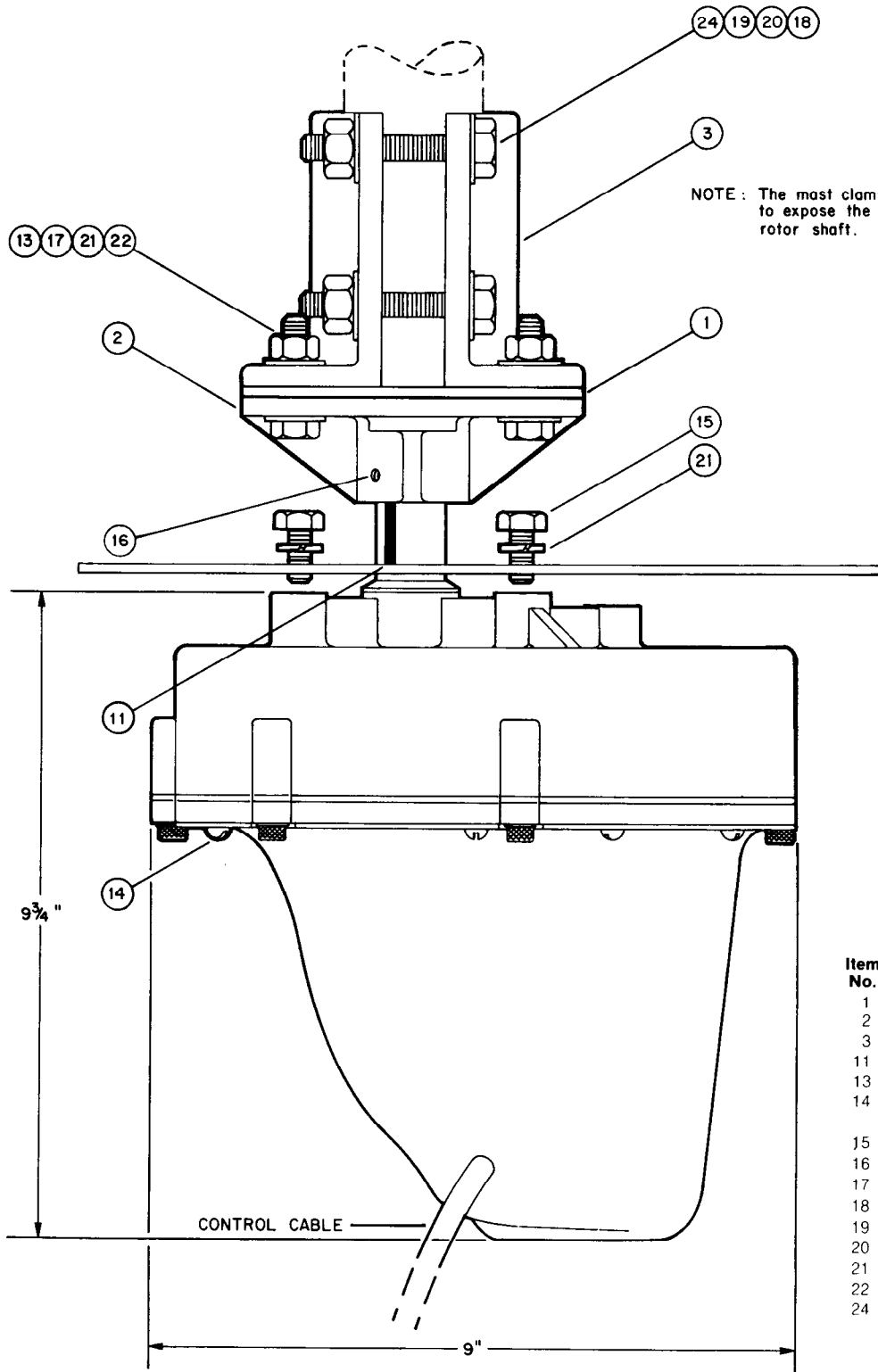
Calibration

The HDR-300 is shipped from the factory with two calibration steps completed. The 3-turn potentiometer is matched to the rotor assembly and the digital display is calibrated to zero.

If these items are replaced or become uncalibrated, refer to Section IX for calibration procedures.

Only one calibration step should normally have to be performed. This is a gain adjustment to the digital voltmeter incorporated into the display circuitry. This adjustment can be made either with the rotator installed or on the bench. The best method is to adjust it on the bench first, then check it again on the tower!

Set the rotor on the bench with the output shaft parallel to the bench top. Assemble the mast clamps and platform as shown in Figure 7. Insert the key into the keyway in the platform, and slide the mast clamp assembly onto the output shaft. This may unbalance the rotor, so you may wish to tip it back on the plastic housing. Turn on the control console and turn the rotator so the display reads "000". Line up the mast clamp assembly on a distant object, so that after turning the rotator through 360°, the mast clamp assembly is again lined up on the same object. Turn the rotator clockwise until this alignment is obtained. Using a small screwdriver, adjust the gain potentiometer so that the display reads "360". See Figure 2.



Item No.	Description	Qty
1	Platform plate.....	1
2	Platform.....	1
3	Clamp.....	2
11	Key, 1/2 inch.....	1
13	Cap screw, 5/16"-18 x 1 1/2", hexhead, SS ...	4
14	Sheet metal screw, #10-24 x 3/16", round head, stainless steel.....	7
15	Screw, 5/16"-18, 3/8", hex head, SS.....	4
16	Setscrew, Allen, 1/4"-20 x 3/8".....	2
17	Nut, 5/16"-18, hex, stainless steel.....	4
18	Nut, 3/8"-16, hex, stainless steel.....	4
19	Flatwasher, 3/8", stainless steel.....	4
20	Lockwasher, split, 3/8", stainless steel.....	4
21	Lockwasher, split, 1/16", stainless steel.....	8
22	Flatwasher, 1/16", stainless steel.....	4
24	Screw, 3/8"-16 x 3 1/2", hexhead, SS.....	4

Figure 7

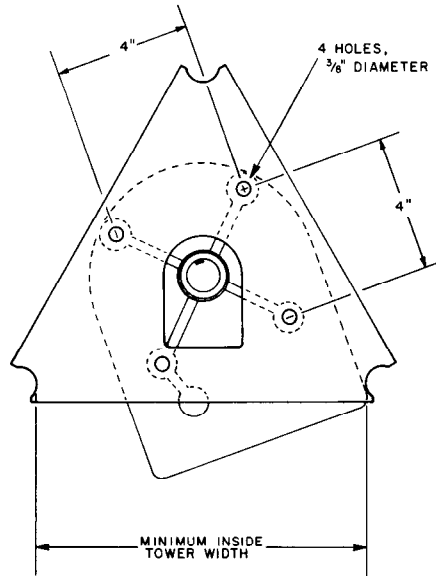


Figure 8
Top View of HDR-300 and Tower Mounting Plate
for Hy-Gain Crank-Up Towers HG-37SS and HG-52SS

Turn the rotator back to "000" to check the alignment again. If "360" cannot be obtained by adjusting the gain potentiometer, refer to Section VIII. Turn the rotator both counterclockwise and clockwise until each limit switch is found. The counterclockwise limit switch should be between -10 and -25 degrees. The clockwise limit switch should be between 370 and 385 degrees. Return the rotator to "000".

If everything checks out, the HDR-300 is now ready for installation.

During installation the rotator can be pulled up the tower by first attaching the mounting plate to the rotator. The rope can then be attached to the mounting plate. Under **no** circumstances should the rotator be lifted by the mast clamp assembly. Another method is to screw a 5/16"-18 eyebolt into one of the mounting holes and attach the rope to it for lifting.

Installation

If your rotor mounting plate is not permanently attached to the tower, it can be used to support the rotator while carrying it up a tower. Tie a sturdy rope to the mounting plate and to the control cable. This will prevent damage to the rotor while hoisting it up the tower. The mast clamp assembly can be installed once the rotator is securely installed within the tower.

Remove the mast clamp assembly from the output shaft. Assemble the rotator to the rotor mounting plate supplied with your tower (see Figures 7 and 8). The rotator requires four mounting holes, each $\frac{3}{8}$ inch in diameter, four inches apart on a 5.656 inch ($5\frac{21}{32}$ ") diameter circle. Refer to the template for mounting hole locations on the mounting plate which is furnished in this manual.

NOTE: The mounting holes must be arranged on the mounting plate so that the output shaft is centered within the tower.

The holes must be arranged on the mounting plate so that the gear housing doesn't interfere with a tower leg or bracing. Remember that the HDR-300 mounts on the bottom of the mounting plate. The output shaft extends through the plate. With the rotator and mounting plate assembled within the tower, tape the control cable to the tower to relieve stress on the plastic housing. Slide the mast clamp assembly on the output shaft until the platform plate hits the output shaft. Do not forget the $\frac{1}{4}$ inch key.

Tighten the setscrew into the platform. Lower the mast into the mast clamp. Tighten the four $\frac{3}{8}$ inch bolts so that the mast is held securely. Center the mast above the output shaft and tighten the four $\frac{5}{16}$ inch bolts on the platform. The antenna should be oriented so that it is pointing north when the readout shows "000".

Route the control cable down the tower using appropriate strain relief. Route the control cable to the control console and plug it in. Using the same calibration steps as before, line the antenna up with a distant object. Rotate the antenna until the antenna is again lined up with the same object. Check the digital readout and adjust if necessary.

CAUTION

If using a crank-up tower, do not completely nest the tower with the HDR-300 installed. Because of the shape of the gear box, a portion of the rotator extends out of the tower.

SECTION VI

Operations

The HDR-300 brake release feature is designed to decrease the effects of torsional forces caused by rapid deceleration and instant stopping of large antennas and beams. By releasing the rotate switch slightly before the point of intended antenna position, letting the unit coast to a full stop, then locking the brake, the torque on both the tower and rotator is held to a minimum. This will prolong the life of your rotator system and will maintain the maximum braking torque.

NOTE: When the rotator is not in use, the brake switch should be set in the "lock" position. The brake switch incorporates a light to remind you that the antenna is free to turn.

The brake switch must be in the "FREE" position before the rotator will turn.

CAUTION

Although operation of the HDR-300 at its rated capacity of 25 square feet in strong winds (50 mph plus) is not recommended, it is possible as long as certain precautions are taken.

- 1. Always allow the antenna to coast to a stop before locking the brake.***
- 2. Always keep the brake locked when the rotator is not being turned.***
- 3. Avoid rotating near the ends of rotation. Do not depend on the limit switches to stop rotation of a large antenna in strong winds.***

These precautions should also be followed when rotating medium size antennas (7 to 15 square feet) in light winds. When followed, the life of the rotator system will be prolonged.

Use the Digital Readout System

The HDR-300 incorporates a very accurate digital display of azimuth bearing information. This display will always indicate the exact direction of the antenna once calibrated. A readout of "000" degrees indicates that the antenna is pointing due North. A readout of "090" indicates East, "180" indicates South, "270" indicates West and "360" indicates North again.

Because of the type of digital readout system used, overtravel in the clockwise direction is indicated by 360 to 385 which would correspond to 000 to 025 degrees. Overtravel in the counterclockwise direction is indicated by negative numbers such as -01 to -25 degrees.

During normal rotation the display will increment in steps of approximately 4 degrees. This is because the rotation is faster than the display system. Once the rotator is allowed to coast, the increments will be in steps of 1 degree. The conversion rate of the digital display system is 4 Hz. This prevents a rapid flickering of the display during rotation.

The digital display system also incorporates two filters that eliminate both 60 Hz and RF modulation of the display.

SECTION VII

Maintenance

Rotor Assembly:

The gears are lubricated with a special low temperature grease that is stable from -60°F to +280°F. After three to five years of service, the gears should be checked to insure adequate lubricant. This grease can be obtained through Hy-Gain's Customer Service Department for a nominal charge.

The output shaft of the rotor is plated to prevent corrosion; however, after many years of service some rusting may occur. You may wish to coat this output shaft with grease at a later date to prevent corrosion.

The HDR-300 has numerous features to prevent water entry. The output shaft uses a special V-shaped O-ring to prevent water entry at this point. The mast clamp assembly uses an aluminum plate to keep the platform from damaging the O-ring and to prevent water from running through the mast clamp assembly.

Also, a plastic housing is provided to keep the motor, capacitor, limit switches, and potentiometer dry. A drain hole is provided to eliminate condensation water. Periodically, check the O-ring and the plastic housing to insure moisture resistance.

SECTION VIII

Troubleshooting

<u>Symptom</u>	<u>Possible Causes</u>
Power switch has no effect	Fuse not installed Fuse blown
Power switch lights but LED's do not light.	14 wire jumper cable disconnected Digital readout not zeroed
Digital display still reads "-85" and "-99" or "---" (Step 9, Section III)	Control cable not plugged in Potentiometer wired incorrectly 10 pin plug wired incorrectly Potentiometer not installed correctly
Digital display reads between "-99" and "-10" (Step 9, Section III)	Potentiometer not installed correctly Digital readout not zeroed Potentiometer wired incorrectly 10 pin plug wired incorrectly
Digital display reads greater than "10" (Step 9, Section III)	Potentiometer not installed correctly Digital readout not zeroed Potentiometer wired incorrectly 10 pin plug wired incorrectly
Brake switch has no effect when switched to "FREE" position	Solenoid wired incorrectly 10 pin plug wired incorrectly Control cable not plugged in 12 Amp fuse not installed
Brake solenoid buzzes but doesn't release brake	Too much voltage drop in control cable Use a heavier cable
Rotate switch has no effect	Brake still in lock position Control cable not plugged in 10 pin plug wired incorrectly Limit switch stuck End of rotation - Switch direction Limit switch wired incorrectly Not pushing hard enough on rotate switch 12 Amp fuse not installed or blown out Motor is too hot - wait 10 minutes
Motor hums when rotate switch is pressed but motor won't turn	Motor output shaft is binding within the motor Loosen the 2 long screws holding the motor housing and recenter it.

**Troubleshooting
(cont.)**

<u>Symptom</u>	<u>Possible Causes</u>
Rotator able to go less than -50 or greater than 450 degrees	Rotator has coasted past one of the limit switches
Output shaft runs opposite the direction indicated by the rotate switch	Limit switches wired incorrectly 10 pin plug wired incorrectly
Digital display runs opposite the direction indicated by the output shaft.	Potentiometer wired incorrectly 10 pin plug wired incorrectly
"360" can not be obtained by adjusting the gain potentiometer (Section V)	Potentiometer not installed correctly Digital readout not zeroed
Digital readout is changing more than ± 1 degree with brake switch locked.	High winds causing antenna to rock High RF field near control cable Brake system failed. 250 μ F capacitor not working
Digital readout is changing more than ± 5 degrees with brake switch locked	Extremely high winds causing antenna to rock Brake system failed Very high RF field near control cable 250 μ F capacitor not working
Rotator able to go less than -25 degrees and/or greater than 385 degrees	Limit switch(es) broken Limit switch actuator cam loose or misadjusted Gain control not calibrated Digital readout not zeroed
Rotator will turn with no load but will not turn a large antenna	Mast is binding in tower Control cable is too small Winds are too strong Antenna is too large Thrust bearing is not used.
Rotator able to go less than -50 or greater than 450 degrees.	Rotator has coasted past one of the limit switches

Voltage and Resistance Charts

Control unit, 10 pin socket:

<u>Between Pin Numbers</u>	<u>Voltage</u>	<u>or</u>	<u>Resistance</u>
1-3 (with rotate switch to the right)	24 VAC		±10%
2-3 (with rotate switch to the left)	24 VAC		±10%
4-3 (with brake "Free")	24 VAC		±10%
8-10	+5 VDC		±2%
9-10	180 KΩ		±20%
10-chassis	zero ohms		

Rotor unit, 10 pin plug:

<u>Between Pin Numbers</u>	<u>Resistance excluding Control Cable</u>
1-3	1.0 ohm
2-3	1.0 ohm
1-2	2.0 ohms
4-3	32 ohms
8-10	1000 ohms
9-10	150-550 ohms
8-9	450-850 ohms

SECTION IX

Service Information

Do not ship equipment to the manufacturer without prior authorization. We prefer to send special shipping labels which will avoid the delay of an unexpected shipment.

If time is extremely important, wire or call for approval and we will rush labels to you. When a shipment is expected, even the time of sending the labels is less than that lost when an unexpected shipment is received.

It is very important that the shipment be well packed and fully insured. Damage claims must be settled between you and the carrier and will greatly delay any returns. Proper packing normally avoids this trouble.

ALL SHIPMENTS MUST BE SENT TO US PREPAID. We do not accept collect shipments. All returns should be made in our standard cartons only — so save your carton when unpacking the unit. When a shipment is returned, it will be handled in one of three ways:

1. Where all service is in warranty, the shipment will be returned prepaid by a carrier of our choice. Warranty claims must be accompanied by a copy of the bill-of-sale.
2. If there are any charges not covered by warranty, we will hold the shipment and advise you of costs, which you can then send.
3. Or, upon your written authorization, we will ship C.O.D. for any charges not covered by warranty, then the carrier will collect these charges and the transportation costs on arrival. Unclaimed or refused C.O.D. shipments will not be reshipped until payment of service and transportation charges is received. Shipment will then be made collect for reshipment transportation charges.

NOTE

We will not ship by means of a carrier that will not fully insure the shipment. Some carriers have a \$200.00 limit. The exception to this is when there is no other means (APO-FPO-etc.) of shipment than parcel post, and then we will ship by this means with your written agreement that you assume any loss over that which the carrier will insure. C.O.D. shipments cannot be made to APO-FPO addresses.

All replacement parts orders must be prepaid or C.O.D. only. Replacement part price quotes will be furnished on request for those who desire prepaid shipment or cannot accept C.O.D. shipments.

Most replacement parts do not need adjustment or calibration. The two exceptions are the 3-turn potentiometer and the main P.C. board.

Replacement of the potentiometer involves first adjusting the gearmotor to the "000" position. See Figure 4, Detail A. This can be done either by rotating (counterclockwise) the output shaft electrically until the limit switch actuator is exactly half way between the two limit switches or loosening the setscrew on the actuator and manually turning it to the same position. The setscrew must then be retightened.

After the gear motor is positioned, the potentiometer is loosely installed in the mounting bracket as shown in Figure 5. The nut should be hand tightened. The control cable wires should be attached as described in Section 3, Step VIII and Figure 5. The control cable is then plugged into the control console and the console power is turned on. With the two plastic gears meshed and the potentiometer shaft stationary, the potentiometer is turned until the display reads "000". The nut is now tightened, making sure the display still reads "000". Rotate clockwise while watching the display. The display should increase positively.

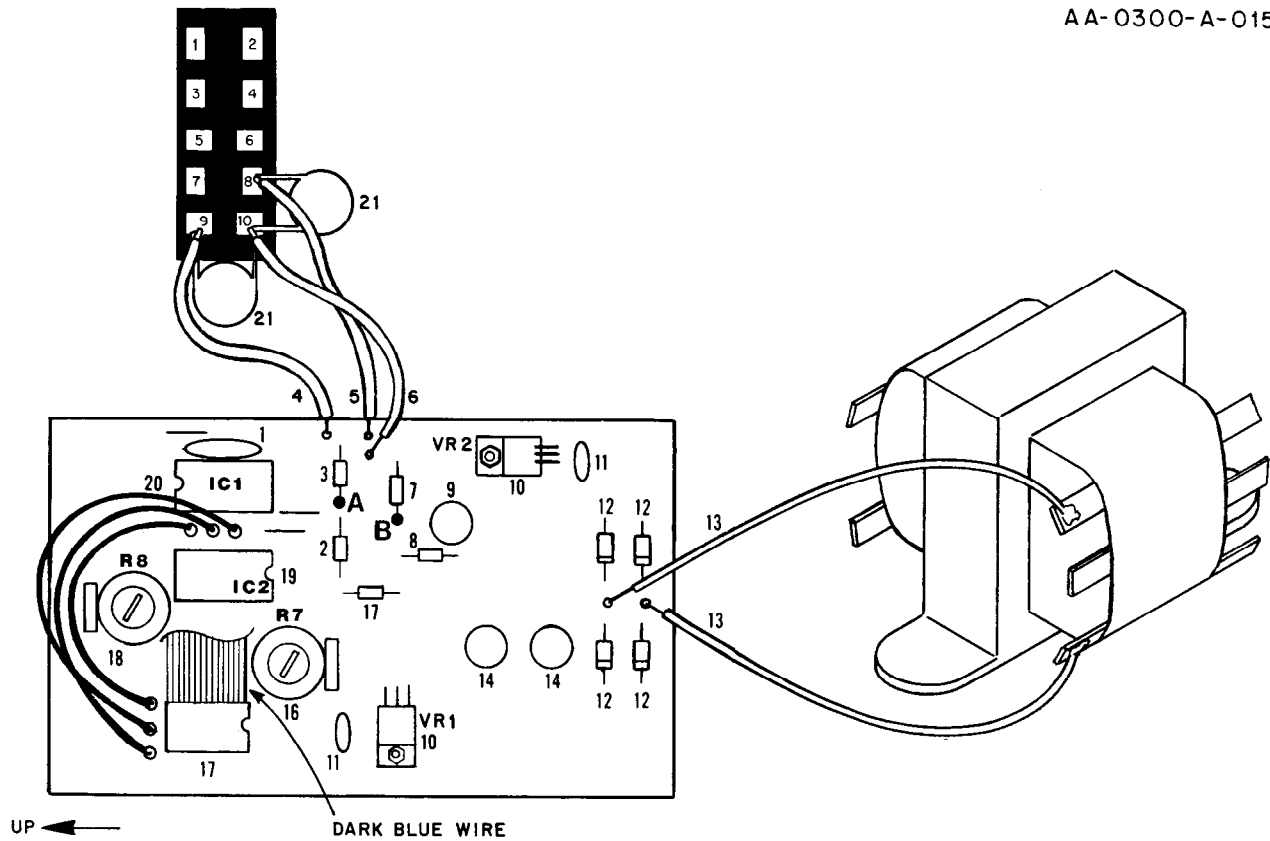
The main P.C. board can also be replaced. Care must be maintained to ensure proper connection. See Figure 9 for the appropriate connections. Once installed, the digital readout system must be zeroed. With the control cable unplugged, a clip lead should short out points A and B. See Figure 9. With the cover closed, adjust the zero calibration potentiometer (see Figure 2) until a reading of "000" is obtained. Remove the clip lead and zero calibration is complete.

CAUTION

Whenever servicing the interior of the control console, make sure the AC line cord is unplugged first. Dangerous voltages are present at many locations within the console.

All requests, inquiries, warranty claims or equipment returns should be made to:

Hy-Gain/Turner
Telex Communications, Inc.
ATTN: Customer Service Department
8601 N.E. Highway 6
Lincoln, Nebraska 68505



Main PC Board

Item No.	Part No.	Component	Description	Item No.	Part No.	Component	Description
1	722465	C6	Capacitor, .22 μ F, 12VDC, disc, ceramic	12	761146	D1, D2, D3, D4	Diode, 1000 PIV, 1A
2	722470	R5	Resistor, 39K, $\frac{1}{4}$ W, 1%	13	62W019	Wire	Insulated, white, 22 gauge
3	722469	R4	Resistor, 150K, $\frac{1}{4}$ W, 1%	14	722463	C1 & C2	Capacitor, electrolytic, 1000 μ F, 16VDC
4	62W014	Wire	Insulated, green, 22 gauge	15	722471	R6	Resistor, 3.3K, $\frac{1}{4}$ W, 1%
5	62W012	Wire	Insulated, orange, 22 gauge	16	722467	R7	Potentiometer, 50K, P.C.B.
6	62W013	Wire	Insulated, yellow, 22 gauge	17	640028	Dip Socket	14 pin
7	722472	R1	Resistor, 10K, $\frac{1}{4}$ W, 1%	18	722468	R8	Potentiometer, 10K, P.C.B.
8	722473	R2	Resistor, 380, $\frac{1}{4}$ W, 1%	19	760099	IC2	Driver IC, CA 3161E
9	722464	C5	Capacitor, electrolytic, 250 μ F, 16VDC	20	760098	IC1	A/D IC, CA 3162E
10	760097	VR1 & VR2	Regulator, 5VDC, \pm 2%	21	720162	C7	Capacitor, disc, ceramic, 0.01 μ F
11	722466	C3 & C4	Capacitor, disc, ceramic, 1 μ F, 10VDC				

NOTE: All references to Item Numbers correspond to this drawing only. They do not correspond to the Item Numbers listed in the Parts List.

Figure 9
Components and Wiring of Main PC Board

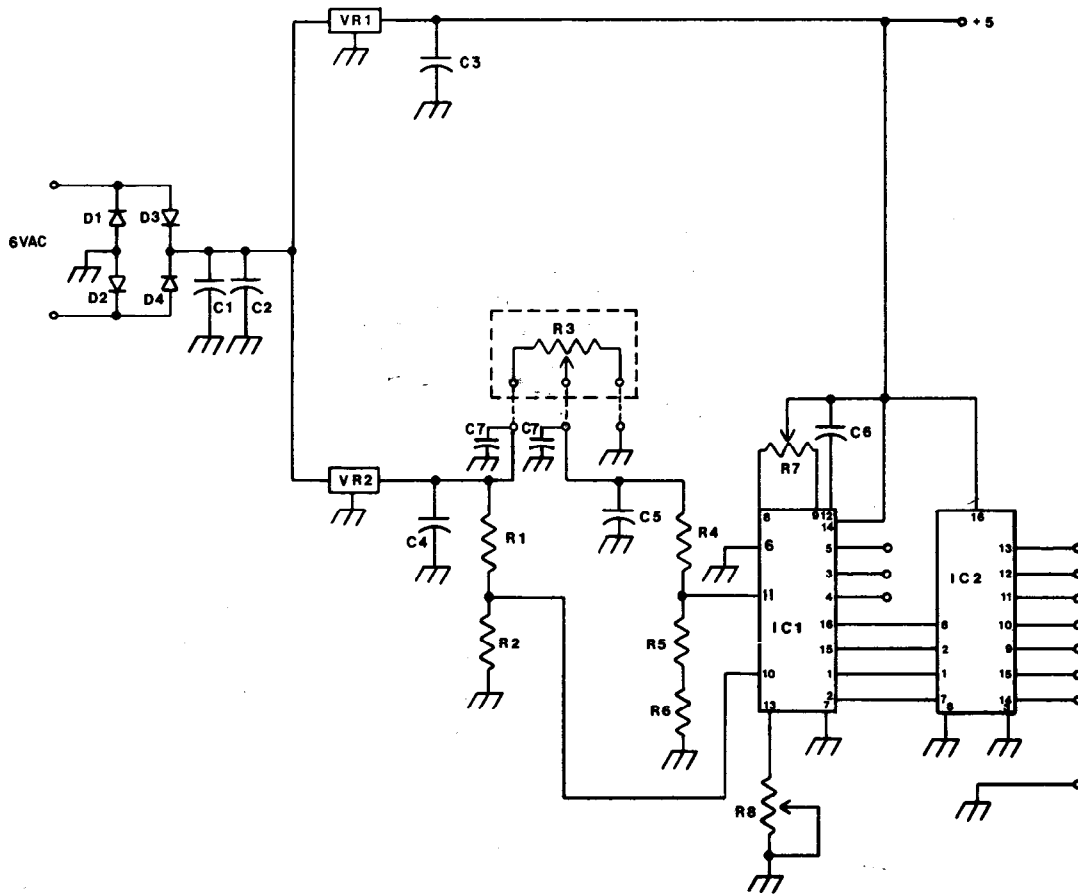
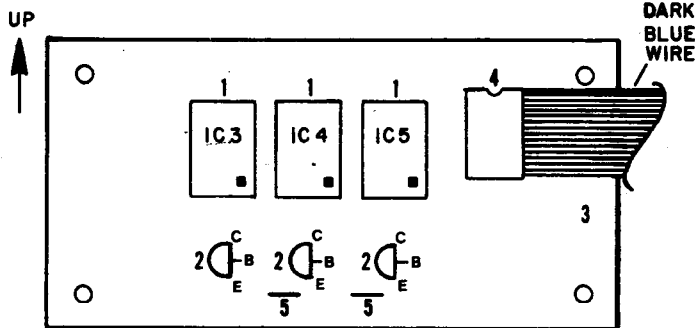


Figure 10
Schematic of Main PC Board



Item No.	Part No.	Component	Description
1	760100	IC3, IC4, IC5	IC. display, FND 507
2	760101	Q1, Q2, Q3	Transistor, M 9571
3	750166	PCB	Display board
4	640028	Dip Socket	14 pin
5	617405	Buss	No. 22, Belden 8021

NOTE: All references to Item Numbers correspond to this drawing only. They do not correspond to the Item Numbers listed in the Parts List.

Figure 11
Components of Display PC Board

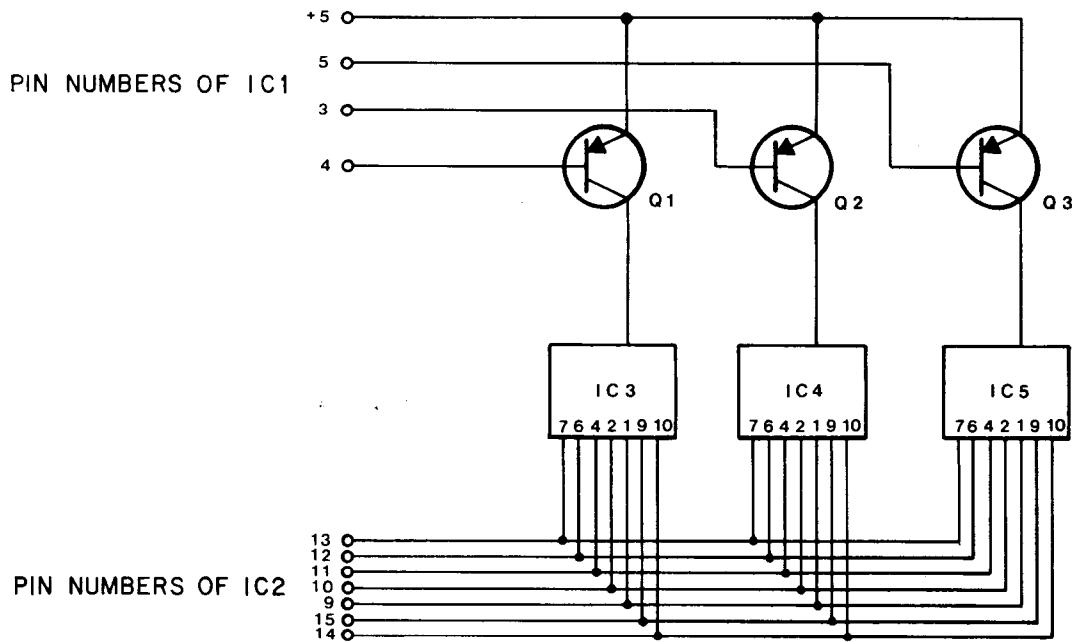


Figure 12
Schematic of Display PC Board

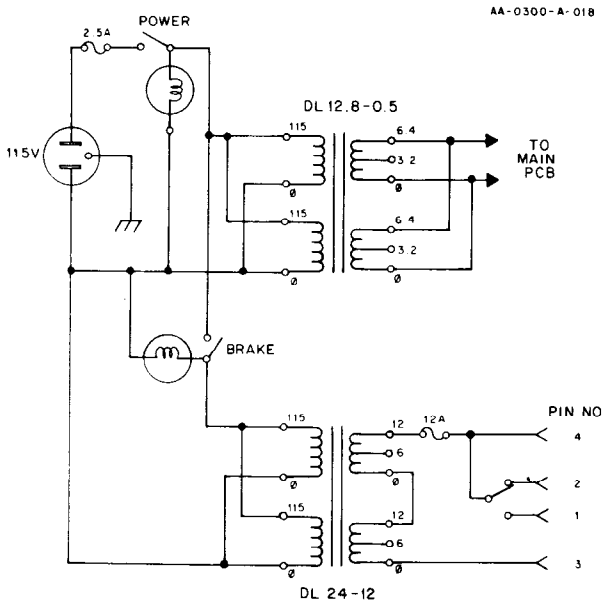


Figure 13
Main Chassis Wiring for 115 VAC

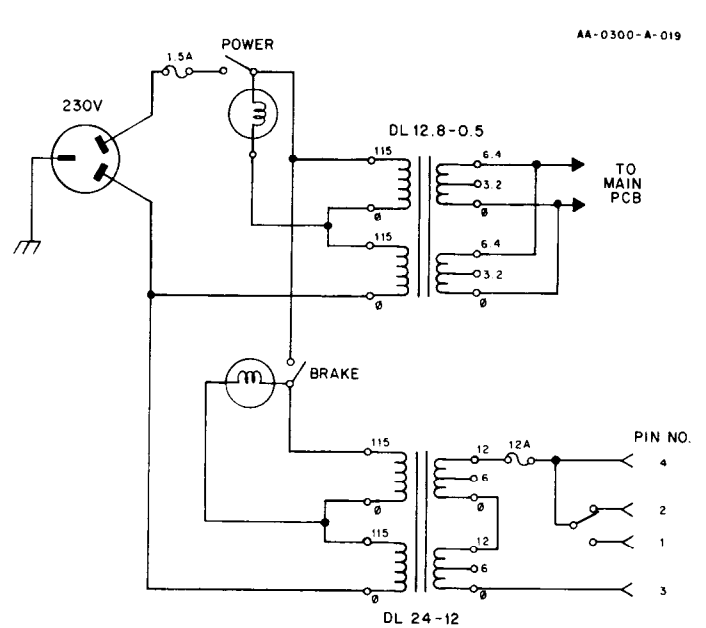
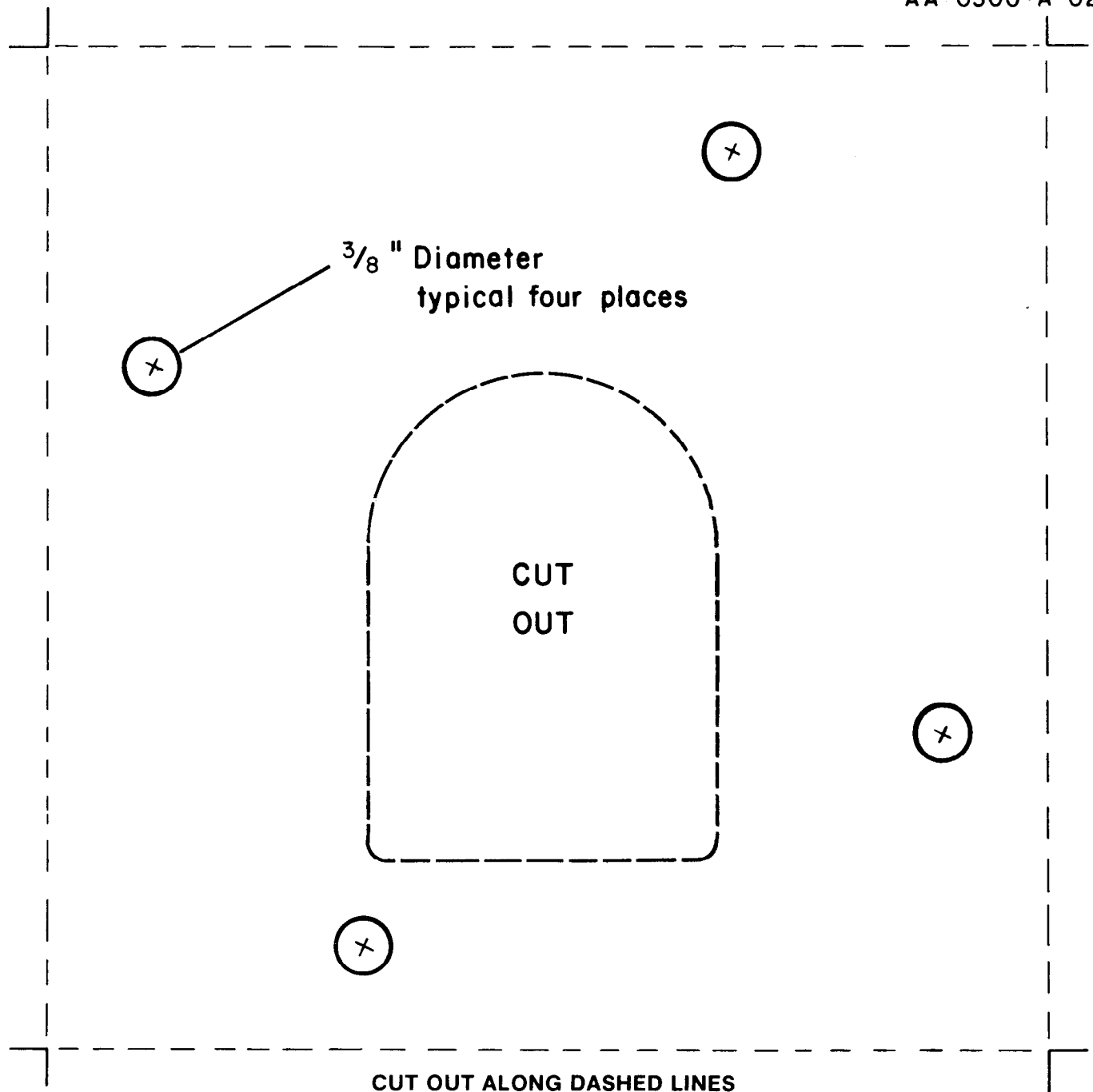


Figure 14
Main Chassis Wiring for 230 VAC

PARTS LIST

Item	Part No.	Description	Qty	Item	Part No.	Description	Qty
1	170429	Platform plate	1	5	871162	Control Console:	1
2	375917	Platform	1		250105	Main PCB spacer #8-32 x 3/8"	4
3	375918	Clamp	2		350834	Backplate	1
4	871159	Rotor Assembly:	1		371025	Console cover	1
	470470	Black plastic cover	1		450375	Front panel label	1
	505671	#10-24 x 5/16" round head screw	4		451623	Strain relief	1
	722462	3-turn potentiometer	1		460293	Front panel	1
	740200-A	Gear housing aluminum casting (Upper)	1		600221	Power cord	1
	-B	Gear housing aluminum casting (Lower)	1		640026	10 pin receptacle	1
	-C	Output gear and shaft assembly #1 (Largest gear)	1		700088	Power and brake switch	2
	-D	Machined steel gear #2 (next smaller)	1		700089	Rotate switch	1
	-E	Machined steel gear #3 (next smaller)	1		718105	Enclosed 3AG fuse holder	2
	-F	Steel and fiber combo gear #4	1		720162	.01µF disc ceramic cap	2
	-G	24 VAC motor assembly, including end plate and mounting hardware	1		730063	24 VAC transformer	1
	-H	24 VAC solenoid and mounting bracket and screws	1		730064	6.3 VAC transformer	1
	-I	Solenoid plunger	1	6	870994	14-wire jumper cable	1
	-J	Brake locking arm, spring, mounting screw and washers	1	7	871165	Main PCB assembly	1
	-K	Clutch/brake assembly w/Allen setscrew	1	8	871166	Display PCB assembly	1
	-L	Motor capacitor	1	9	871170	Main chassis w/feet	1
	-M	Limit switch and insulator and hardware	2	10	871275	Front panel window	1
	-N	Blue jumper wire	1	11	871161	Parts Pack Fuses:	
	-O	Black jumper wire	1	12	710043	1.5 3AG	2
	-P	Plastic paddle arm and push-nut	1	13	710044	2.5A 3AG	2
	-Q	Plastic limit switch actuator w/Allen setscrew	1	14	710045	12A 3AG	2
	-R	Plastic gear (knurled shaft)	1	15	871532	300 Parts Box	1
	-S-	Plastic gear (flatted shaft)	1	16	385928	Key, 1/2 inch	1
	-T	Potentiometer mounting bracket and mounting hardware	1	17		(Not Used)	
	-U	Output shaft bearing and washers	1	18	509712	Cap screw, 5/16"-18 x 1 1/2", hexhead, SS	4
	-V	Gear housing hardware	1	19	505689	Sheet metal screw, #10-24 x 5/16", round head, stainless steel	7
	-W	Low temperature grease	1	20	505842	Screw, 5/16"-18 x 3/4", hex head, SS	4
	-X	V-ring seal	1	21	536395	Setscrew, Allen, 1/4"-20 x 3/8"	2
				22	555747	Nut, 5/16"-18, hex, stainless steel	4
				23	555694	Nut, 3/8"-16, hex, stainless steel	4
				24	567180	Flatwasher, 3/8", stainless steel	4
				25	561016	Lockwasher, split, 3/8", stainless steel	4
					564792	Lockwasher, split, 5/16", stainless steel	8
					560024	Flatwasher, 5/16", stainless steel	4
					670040	Wire nut	8
					505893	Screw, 3/8"-16 x 3 1/2", hex head, SS	4
					640024	10 pin plug	1



Directions for Using Template

1. Cut out template (including the center hole).
2. Lay template on your tower plate.
3. Align the center hole of the template with the hole in your tower plate.
4. Tape the template in place.
5. Using a center punch, make an indent in the center of each of the four holes marked on the template.
6. Remove template and drill holes.

TELEX® **hy-gain**®

TELEX COMMUNICATIONS, INC.

8601 NORTHEAST HIGHWAY SIX, LINCOLN, NE 68505 U.S.A.