AvL TECHNOLOGIES

Operation and Maintenance Manual

MODEL 1200K/1210K - RCI SNG Antenna System

Operation and Maintenance Manual

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TABLE OF CONTENTS

SECTION 1 - OVERVIEW

TECHNICAL DESCRIPTION

The 1.2M SNG Antenna System is an elevation over azimuth positioner featuring the simple, rugged Roto-Lok® drive system which produces very low backlash, high-stiffness and high-reliability and driven by a low backlash, gear box with DC motors. All drive components are high-strength steel, housed in lubricated-for-life housings which results in the most reliable, no maintenance system with the minimum of weight. The reflector is an offset, prime focus, carbon fiber reflector illuminated by a corrugated feed horn. The RF power amplifier may be installed on the feed boom, positioner backing structure or inside the truck. Handcranks across az and el axis are included allowing easy antenna positioning if the controller malfunctions. The basic 2-port antenna system weighs only 117 pounds.

RF SYSTEM

The offset reflector/feed system produces co-polarization patterns that easily meet the 29-25 log theta requirement. The .8 f/d optics reduces off-axis cross-pol in the asymmetrical plane. The RF power amplifier may be installed on the feed boom, positioner backing structure or inside the truck. Waveguide run to power amp across each axis can be via twist-flex or rotary joints. The system can be configured for either 2-port or 4-port.

ROTO-LOK® DRIVE SYSTEM

The patented Roto-Lok® drive system utilizes highly-reliable aircraft control cables in a redundant configuration to achieve a zero-backlash, light-weight, very stiff drive system. It achieves this high-tech performance using low-tech components by simply wrapping the cable around the driver capstan several times before wrapping the larger drive drum. The method used to wrap the capstan results a minimum free-length of cable. The load in the cable on the main drum is exponentially reduced as it is wrapped around the drum. Therefore the total elongation of the cable when under load is minimized. The Roto-Lok® system results in stiffness of up to 10 times that of comparable gear or harmonic drive systems. The cables are pre-tensioned and spring-loaded at the main drum attachment point, which eliminates backlash at installation and from any unexpected cable stretch in the future.

SECONDARY DRIVE SYSTEM

The Az and El Roto-Lok® drive systems are driven by a low backlash worm gear set with a 40:1 ratio. The factory low backlash of the worm-gear set is reduced further by the Roto-Lok® drive ratio resulting in a lash equivalent to only .06 dB as seen by the RF system. The gear sets are housed in a sealed housing which allows the gear set to be continuously lubricated in synthetic oil which maximizes gear efficiency and minimizes wear.

MOTOR DRIVES

Lightweight, reliable, servo-quality DC motors with integral gear box are used for az, el and pol drives. These motors were selected because they provide the best torque-to-weight ratio as well as allowing dual speed operation for slewing and peaking. These motors produce constant torque over the speed range with no cogging at low speeds which ensures smooth operation when peaking antenna. The 24V DC design provides current limiting torque control and will allow vehicle battery operation if necessary.

CONTROLS

The system will interface with a jog controller which allows remote control of the system. Each axis position is displayed as well as limit indications. The unit will also interface with a full function controller with features such as automatic stow, GPS/flux-gate input and automatic satellite pointing and tracking.

CONSTRUCTION

Except for the drive components and bearings, the trunion and backing structure and covers will be all aluminum. The fabrications on parts and assembly will be of world wide quality standards AvL is noted.

1200/1210K SPECIFICATIONS

MECHANICAL

Reflector	1.2M Prime Focus Offset
Mount Geometry	Elevation over Azimuth
Polarization	Rotation of Feed
Travel	
Azimuth	270° or 400°
Elevation	
Operational	0° - 70° of reflector boresight (Standard) 0° - 90° (Optional)
Total	0° - 160°
Polarization	±/-95° for 2-Port ±/-50° for Electronic H/V Switching or 4-Port
Speed	
Slewing/Deploying	2°/second
Peaking	0.2°/second
Motors	24V DC Variable Speed, Constant Torque
RF Interface	
HPA Storage	Feed Boom, Rear of Reflector or Inside Truck
Axis Transition	Twist-Flex or Rotary Joints
Waveguide	WR 75 Cover Flange at Interface Point
Coax	RG59 run from feed to base plus 8 ft.
Electrical Interface	25 ft. Cable with Connectors for Controller
Optional Manual Drive	½" Hex Socket Wrench
Weight	110 to 150 lbs. depending on options selected

ENVIRONMENTAL

(Wind) Survival	
Deployed	75 mph
Stowed	100 mph
Operational	
Tracking	45 mph (at 60° F Min. Temperature)
Temperature	
Operational	-20°F to 125°F
Survival	-40°F to 140°F

ELECTRICAL	Receive	Transmit
Frequency	11.7 - 12.2 GHz	14.0 - 14.5 GHz
Gain (Midband)		
R/T	42.0 dBi	43.5 dBi
VSWR	1.30:1	1.30:1
Beamwidth (degrees)		
-3 dB	1.5	1.2
-10 dB	2.6	2.1
First Sidelobe Level (+/-2 dB)	-20 dB	-20 dB
Radiation Pattern	Meets Current FCC requirements for 2° Spacing	
Antenna Noise Temperature		
30° Elevation Angle	30°K	
Polarization	Linear	
Power Handling Capability		0.5KW per port
Cross-Pol Isolation		
On-Axis	35 dB	35 dB
Off-Axis (within .5 dB BW)	32 dB	32 dB
Off-Axis (within 1 dB BW)	30 dB	30 dB
Feed Port Isolation		
RX/RX	30 dB	
TX/RX	60 dB	

CONTROLLER

Type	Jog or Full Function Controller
Manual Mode Input	Front Panel Keypad for Jog/Run/Run To/Stow
Automatic Mode Input	GPS, Flux-Gate Compass and Antenna LNB
Size	Two or Three rack units high
Input Power	110V AC 1 ph 60 Hz 15 amp or 220V AC 1 ph 60 Hz 7.5 amp

SECTION 2 - INSTALLATION AND SET-UP 1.2M - SNG

2.1 GENERAL

The AvL 1.2M positioner has been fully tested with the RCI 3000/3050 controller prior to shipment. All position feedback, limit sensing, limit switches (except elevation stow) and motor speeds have been calibrated or set. The positioner should be secured to the vehicle, connecting wave quide or boom mounted HPA cables, connecting coax, connecting control cables to controller and connecting auxiliary control cable to wave quide switch if applicable.

The vehicle roof should be reinforced with a substructure capable of carrying the wind loads as specified on the interface drawing to the vehicle frame. The structure should be stiff enough to prevent no more than a 0.5 dB of TX gain loss in a 30 mph gusting to 45 mph wind. (850 IN/LB moment @ .25°)

A 11-inch diameter hole should be in the mounting surface. The mounting surface must be flat within .005 inch to prevent binding the azimuth bearing after torquing the mounting bolts. No obstruction should be above the interface surface in a 17-inch diameter envelope. Any other roof-mounted equipment such as air conditioners should be more than 64 inches from center of interface bolt pattern. A hard flat surface is required for the feed bumpers as shown on the interface drawing.

The 12-inch diameter, 12-bolt pattern must be oriented properly with two bolts 15° on either side of the centerline of the vehicle.

2.2 INSTALLATION TO VEHICLE

Remove the top of the shipping crate. Remove the narrow end at the azimuth platform end of the crate. Hand crank using RH access and raise the antenna in elevation until the backing structure is vertical. (Fig. 2.1)

Figure 2.1

Remove the bolts attaching the positioner to the shipping base. Adjust the forks on a forklift to just straddle the azimuth ring and under the elevation pivot assemblies. **Place cardboard pieces between the positioner and the forks.**

Carefully raise positioner out of crate watching control cables. Safety strap positioner to forklift truck. Maneuver over to rear of truck. Raise positioner to clear vehicle roof by about two feet. Lower control cables into center of mounting hole and install ¼ - 20 x 1" long screws (provided) into holes in azimuth ring diametrically opposed. Use these as guides to position azimuth ring directly over bolt circle. **Note: Positioner must be installed with azimuth cable termination housing aligned on centerline of vehicle.** (Fig. 2.2)

Remove and replace set screws with mounting bolts provided.
APPLY LOCKTITE 242 OR EQUIVALENT TO BOLTS.

IF INTERFACE SURFACE IS NOT FLAT WITHIN .005 INCH, apply a thin layer of structural epoxy grout between azimuth ring and vehicle surface. Snug bolts finger tight and allow epoxy to cure before final torquing .**IF INTERFACE SURFACE IS FLAT WITHIN .005 INCH,** apply a thin coat of silicone between azimuth ring and surface.

TORQUE ALL 12 BOLTS TO 9 - 10 FT. LBS.

2.3 CONTROLLER INSTALLATION

Install controller into electronics rack. Connect cables to rear making sure P1 and P2 are connected to correct sockets. (P1 to J1 and P2 to J2) **Confirm controller voltage and fuse are correct,** if not convert to correct voltage by following instructions in the RCI 3000/3050 Controller manual Section 2.2.1. Connect AC power cable to controller.

2.4 CONTROLLER / POSITIONER VERIFICATION TEST

Turn power on. Wait for self-check to complete. Hit mode button once to reach display/function mode. Press deploy button to Deploy. Antenna will drive until:

ELEVATION	20.0° (approx)
AZIMUTH	0.0°
POLARIZATION	0.0°

Press speed button to change speed to FAST

HAVE SOMEONE OUTSIDE AND ELEVATED SO ANTENNA MOVEMENT CAN BE OBSERVED DURING TEST!
Push El UP button. Antenna elevation reading should increase. Move until elevation reads 20°. Place inclinometer on feed boom tubes. Inclinometer should indicate that feed boom tubes are 20° above horizontal. (Note: The feed boom tubes are indicated on the interface drawing and are parallel to the antenna boresight.) If not, refer to RCI 3000/3050 Controller manual for elevation zero voltage setting.

Press az CW and az display should increase, and az should rotate CW as viewed from above the antenna.

Press az CCW and az display should decrease.

Press pol CW and pol display should increase.
Press pol CCW and pol display should decrease, and the feed az should rotate CW as viewed from behind the reflector.

2.5 ELEVATION STOW POSITION SETTING

HAVE SOMEONE OUTSIDE AND ELEVATED SO ANTENNA MOVEMENT MAY BE OBSERVED DURING TEST!

Press mode key to change screens and Select STOW.

Watch reflector surface approach feed horn.

Press **STOP** when reflector is within 2" of feed horn.

Jog down until reflector presses on rubber padding on feed housing.

Adjust stow limit switch if necessary by bending lever. Stow switch is on east side with long lever. (East is the left side as viewed from behind the reflector.)

2.6 FINAL CALIBRATION OF SYSTEM

Check az ZERO position on roof. If azimuth controller will stow at az = 0.0 degrees you may adjust as zero voltage +/-2° to bias stow position. Adjust zero voltage per Section 4.1.1 of controller manual.

SECTION 3 - AZIMUTH POSITIONING SYSTEM

3.1 AZIMUTH BEARING

The azimuth bearing is a precision ground, sealed Kaydon Slim Line ball bearing with a dynamic and static moment capacity of over four times the worst-case wind load specification. It is press fit into a special aluminum-bearing ring consisting of main internal and external rings with clamping rings. The bearing is packed with synthetic grease at assembly and no further greasing is required.

Because of the excess capacity, low rpm, and low number of cycles, no maintenance is required.

3.2 AZIMUTH GEAR BOX

The azimuth gearbox is a low backlash worm gear box. The worm gear drive isolates any backlash in the motor drive from the system. In addition, since it is a 40:1 ratio it will not back drive, eliminating any need for a brake on the drive train. (Fig 3.1)

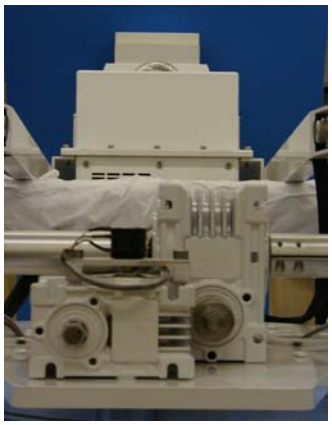


Figure 3.1

The motor drives the input worm via a quill/female hole and square key. The worm shaft is extended with a hex shape installed for the hand crank. The azimuth capstan is secured to the output shaft with a square key knurl plus permanent locktite to eliminate any backlash between the capstan and gearbox.

The low backlash is achieved by selective fit of the worm and worm gear. The nominal backlash for the gearbox is 30' which is reduced by the Roto-Lok® drive to less than 4' of the beam of the antenna. The gearbox contains synthetic oil filled half way to the level plugs. Because of the design capacity of the gearbox, low rpm and limited cycles experienced by an SNG system, no maintenance is required.

3.3 AZIMUTH MOTOR

The azimuth drive motor is a 24 DC motor with integral 30:1 spur gear train. (Fig 3.2.) The motor armature rotates at up to 3000 rpm causing a high frequency noise that will vary depending of the loading condition of the motor.

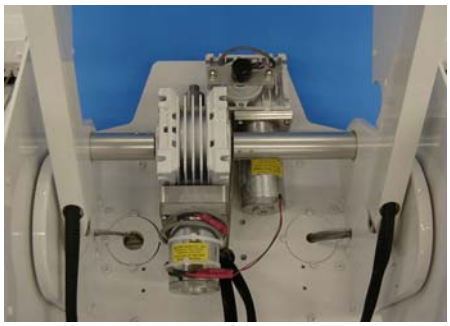


Figure 3.2

The maximum output speed is 100 rpm. The output shaft is “D” shaped with a special adapter with a slot for a square key.

Since the low backlash worm gear drive isolates the backlash from the motor, any backlash between the shaft adapter, square key or motor gear train will not be seen by the reflector boresight. The motor is mounted to an adapter plate that is bolted to gearbox with (4) screws.

No maintenance of the azimuth motor is required.

3.4 AZIMUTH ROTO-LOK® CABLE DRIVE

Figure 3.3

The patented azimuth Roto-Lok® drive produces a drive system with zero backlash, high stiffness, no wear, no lubrication, and maximum reliability. The system consists of three or four 1/16, 7 x 19 stainless steel aircraft control cables reverse wrapped twice around the grooved capstan and once around the drum, with solid connections on one end and high force, Belleville springs on the other end (Fig 3.3.) One cable has the capacity to withstand a 75 mph wind load. The additional cables are used to provided increased stiffness and drive redundancy. **If a cable becomes damaged during usage, cut off cable and continue to use positioner. Replace cable when time permits at your maintenance facility.**

The cables are sized to last the life of the positioner. The springs will automatically compensate for any elongation of the cable.

Cable position should be checked as per the periodic maintenance schedule in Section 7. If cables have drifted, manually move cables using blunt instrument on azimuth drum until correct position is obtained.

At installation the Belleville springs are collapsed until no “air” is seen between the springs. You should check this condition yearly to account for the slow settling of the cable strands. Use pliers to hold stud and ¼ box end wrench to tighten nut. **Be sure not to over tighten. Tighten until springs are <u>almost</u> fully collapsed.** (Fig 3.3)

3.5 AZIMUTH POSITION FEEDBACK

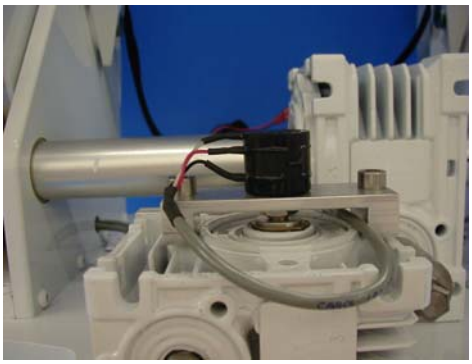


Figure 3.4

The azimuth position feedback is produced by a 10 turn, 1K-ohm potentiometer driven by the output shaft of the worm gear box. (Fig 3.4) Since the Roto-Lok drive has no backlash, the position feedback is as accurate (1%) as the resolution (.3°) and accuracy of the potentiometer and the backlash between the potentiometer and the azimuth capstan. The potentiometer is sealed and rated for IP 65 environment - wind, rain, dust, etc.

The potentiometer is mounted on a bracket that straddles the az gear box. The azimuth potentiometer is slotted and driven with a cross pin in the az capstan. The potentiometer is mechanically centered at the travel position (5 turns from either end) when az platform is in the az stow position. This is accomplished by loosening the ½” nut, which secures the potentiometer to the bracket. The potentiometer may also be electrically zeroed by the controller. See Section 2.3 in the RCI 3000/3050 Controller manual.

3.6 AZIMUTH STOW AND LIMIT SWITCHES

Figure 3.5

The RCI 3000/3050 Controller uses the az potentiometer voltage to determine limits. Therefore, the AvL positioner is equipped with only an azimuth stow position switch. Limit switch mounting holes are provided if needed for other brand controllers.

The azimuth stow and limit switches are mounted under the azimuth platform accessible through the access hole on the base. (Fig 3.5) The switches are fixed to relative to the mounting surface and are actuated by a cam located on the azimuth bearing clamp ring. The stow switch actuation occurs at slightly different positions depending if you approach the stow position from CW or CCW.

Therefore, the azimuth stow position will vary approximately 1° from stowing from CW or CCW.

Since the controller drives to 0° az after sensing the stow switch, the az stow position can be varied by either changing the zero position of the az potentiometer or zero voltage of the controller.

Rotation Direction Convention: + is clockwise (CW) viewed from above mount
- is counter clockwise (CCW) viewed from above mount

NOMINAL AZIMUTH LIMITS

Model	Limits
1200 (With 300° az and no az RJ or with single az RJ)	+145° / -155°
1200 (With 270° az and With dual az RJ)	+120° / -120°
1200 (With 400° az and No az RJ or with single az RJ)	+210° / -190°

Notes:
1) The Limits should be set after the potentiometer has been centered as described above. If the potentiometer is moved from this position, the limits should be reset.
2) The az angle displayed by the controller is affected by several parameters in the controller. (These include az Scale Factor, az Reference Position).
3) While setting the limits, watch the az capstan to make sure it does not run into the spring block at the end of the cables.
4) The angles at the limits in the chart shown above are for nominal values of these parameters, and the values actually displayed by the controller at the limits may vary.

SECTION 4 - ELEVATION POSITIONING SYSTEM

4.1 ELEVATION PIVOT ASSEMBLY

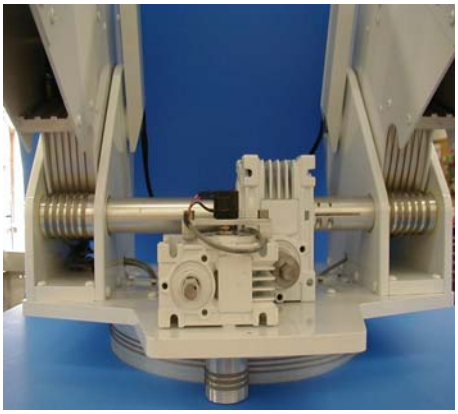


Figure 4.1

The elevation pivot assembly consists of two elevation drum assemblies pivoting between two clevis blades assemblies. The drum shafts pivot in hi-tech plastic bushings. (Fig 4.1) No maintenance is required. If squeaking noise is heard, simply spray silicone lubricant with “straw” nozzle down between the drum side and clevis plate on to the pivot shaft.

4.2 ELEVATION GEARBOX

The elevation gearbox is a low backlash (30') worm gear box. The worm gear drive isolates any backlash in the motor drive from the system. In addition, since it is a 40:1 ratio it will not back drive, eliminating any need for a brake on the drive train.

Figure 4.2

The motor drives the input worm via a quill/female hole and square key. The worm shaft is extended with a hex shape adapter for the hand crank. The dual elevation capstans are driven with a square key and clamped to the gearbox shaft to eliminate backlash. (Fig 4.2)

The gearbox contains synthetic oil filled half-way to the level plugs. Because of the design capacity of the gearbox, low rpm and limited cycles experienced by an SNG system, no maintenance is required.

4.3 ELEVATION MOTOR

The elevation drive motor is a 24V DC motor with integral 32:1 spur gear train. The motor armature
rotates at up to 3300 rpm causing a high frequency noise that will vary depending of the loading condition of the motor. (Fig 4.2)

The maximum output speed is 104 rpm. The output shaft is a standard keyed shaft. The output torque capacity of the motor is rated for the operational wind load.

Since the low backlash worm gear drive, isolates the backlash from the motor, any backlash between the square key and motor gear train will not be seen by the reflector boresight. No maintenance of elevation motor is required.

4.4 ELEVATION ROTO-LOK® CABLE DRIVE

The patented elevation Roto-Lok® drive produces a zero backlash; high stiffness, no wear, no lubrication, and maximum reliability drive system. The system consists of 12 1/16, 7 x 19 stainless steel aircraft control cables reverse wrapped three times around the capstan with solid connections on one end and high force, Belleville springs on the other end. Eight cables have the capacity to withstand a 75 mph wind load. The additional cables are used to provided increased stiffness and drive redundancy. **If a cable becomes damaged during usage, cut off cable and continue to use positioner. Replace cable when time permits at your maintenance facility.**

The cables are sized to last the life of the positioner. The springs will automatically compensate for any elongation of the cable.

The position should be checked per the periodic maintenance schedule in Section 6. If the cables have drifted, manually move cables using blunt instrument on elevation drums until correct position is obtained.

At installation the Belleville springs are collapsed until no “air” is seen between the springs. You should check this condition yearly to account for the slow settling of the cable strands. Use pliers to hold stud and ¼ box end wrench to tighten nut. **Be sure not to over tighten. Just almost fully, collapse springs.** (Fig. 4.3)

Figure 4.3

4.5 ELEVATION POSITION FEEDBACK

The elevation position feedback is produced by an electronic inclinometer located in the feed housing. (Fig 4.4) No adjustment or maintenance is required. The inclinometer is electronically zeroed in the controller. See Section 2.3 in the RCI 3000/3050 Controller Manual.

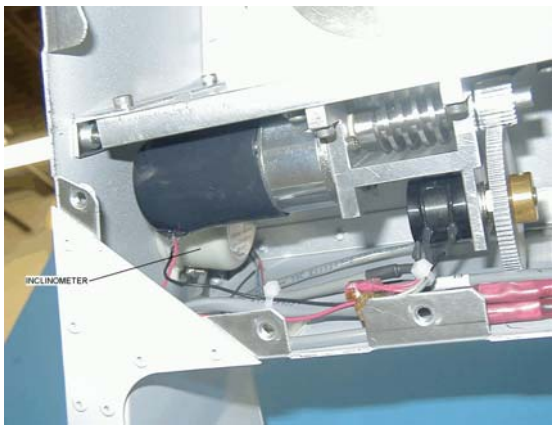


Figure 4.4

4.6 ELEVATION STOW AND LIMIT SWITCHES

The elevation stow, down and up limit switches are mounted on the east elevation pivot assembly under the drum. (Fig 4.5) the switches are fixed to pivot wall and are actuated by a cam profile machined into the drum side plates.

The elevation up and down switches do not require adjustment. The Elevation Stow switch is adjusted by using needle nose pliers and bending the limit switch lever as needed. See section 2.6 above.

Figure 4.5

4.7 ELEVATION STOW IGNITION CUT-OUT SWITCH

A second elevation stow switch is mounted on the west elevation pivot and used as an ignition cutout switch. It should be adjusted to actuate before the elevation stow switch, as the antenna is stowed. See Fig 4.6 for reference, see Fig. 4.1 for east and west side orientation.

Figure 4.6

SECTION 5 - FEED AND POLARIZATION POSITIONING SYSTEM

5.1 GENERAL

The Feed assembly consists of feed boom, feed housing, RF components and polarization drive. The feed boom is pivoted about the elevation axis to eliminate additional flex-guide required if pivoted at edge of reflector. The pivot connection at the end of the feed arms is with delrin bushings and shoulder bolts. The elevation wavequide runs along the outside of the feed boom tubes. A piece of 18" flex waveguide is used at the end of the waveguide tube to the OMT. The feed/OMT is rotated by worm gear drive and 12V DC motor. Position feedback is from a 10 turn potentiometer.

5.2 FEED

The feed assembly consists of an inclinometer, feed horn and OMT with male pivot bushings. The male bushings pivot in delrin female bushings at each end of the OMT. These bushings are mounted to mounting plate. The worm gear attaches to OMT and waveguide attaches to other end with M6 screws at the rear flange of the OMT. The feed/polarization drive is mounted underneath pol mounting plate with worm mating to worm gear, which extends through slot.

5.3 POLARIZATION DRIVE

The feed/polarization drive is mounted underneath pol mounting plate with a worm mating to the worm gear, which extends through a slot. The polarization drive motor (Fig. 5.1) is a 12V DC gear motor. It is attached to a coupling, which attaches to the worm. The worm gear shaft is extended to drive the position potentiometer. This plugs into standard cigarette lighter and has a toggle switch to rotate pol in desired direction. The controller travel limits are +/- 92° for a 2-port and +/-47° for a 4-port. (See RCI 3000/3050 Controller Manual section 3.3). An emergency pol drive is available to drive pol motor in case of controller error or failure. This plugs into standard cigarette lighter and has a toggle switch to rotate pol in desired direction.

Figure 5.1

Since the low backlash worm gear drive isolates the feed from the motor no brake is required. No maintenance of the Polarization motor/assembly is required.

The polarization drive is replaced a complete unit including the motor, motor bracket, worm, bushings and worm shaft.

5.4 POLARIZATION POSITION POTENIOMETER

The polarization feedback is produced by a 10 turn, 1K-ohm potentiometer driven by the worm shaft, and mounted on the polarization motor bracket. The resolution and accuracy is 0.3 degrees. The potentiometer is rated for IP 65 environment, Wind, Rain, and dust etc... The potentiometer is mechanically set at the one-half travel position. (5 turns from either end) and will read approximately 500 ohms at 0° pol (stow). The potentiometer may be set using the controller the voltage reading at pol stow will read 2.5V at 0°. See RCI controller manual Sec. 3.3

5.5 POLARIZATION LIMITS

The RCI 3000 Controller uses the polarization potentiometer voltage to determine limits. The controller drives to 0° pol when it stows. The AvL positioner has the mechanical capability of +/-92° per section 3.3 of the RCI 3000/3050 Controller Manual. If the controller fails to terminate power to the motor and the system is driven to a hard limit stop, the DC motor will stall. To correct, reset pol jam error in the controller.

5.6 FEED ASSEMBLY

The feed assembly consists of the feed, the polarization drive and the polarization potentiometer. The feed assembly is installed as a complete unit and secured to each side of feed box. The feed horn is mechanically positioned with a template within 1/8" of the theoretical focal point of the reflector. This positioning assures the RF System provides the gain and FCC compliance as stated in the specifications. Minor RF improvement can be realized by optimizing the feed positioning using transmit or receive patterns. Inclinometer is mounted on the inside of feed box.

SECTION 6 - MAINTENANCE

6.1 GENERAL

The AvL Model 1200K/1210K-RCI is designed such that any wear should never degrade performance below specifications and essentially no maintenance will ever be required. However, since it is impossible to ascertain or test for all possible environments, the following check up is recommended each year. If any problems are observed, refer to the appropriate section.

6.2 ANNUAL INSPECTION

AZIMUTH

- Hand crank in azimuth the unit should hand crank easily.
- Check for unusual noise in azimuth bearing and azimuth gearbox.
- Run in azimuth and check for unusual noise in azimuth motor.
- Check position of azimuth drive cables on capstan at 0°az.
- Check drive cables for damage.
- Have someone run to both az limits and observe cable tracking.
- Check oil level in gearbox.
- Remove cable termination block covers and inspect cable terminations. Tighten springs if more than .010 gap exists between spring sets. Tighten With an open-end ¼" wrench and using Visegrip pliers holding stud.
- Inspect az stow switch.
- Inspect and confirm az potentiometer is seated properly and not damaged.
- Check az bearing screws, az gearbox bolts, az pot bracket, etc are tight.

ELEVATION

- Hand cranking in elevation the unit should hand crank easily.
- Unit should hand crank with approximately 50-75 in-lbs. torque.
- Check for unusual noise in elevation pivot bearings and elevation gearbox.
- Run in elevation and check for unusual noise in elevation motor. (Run to limits)
- Check position and tracking of elevation drive cables.
- Check drive cables for damage.
- Check oil level in gearbox.
- Remove backing structure covers and inspect cable terminations. Tighten springs if more than .010 gap exists between spring sets. Tighten with an open-end 7/16" wrench and using Visegrip pliers holding stud.
- Inspect elevation limit switches.

POLARIZATION

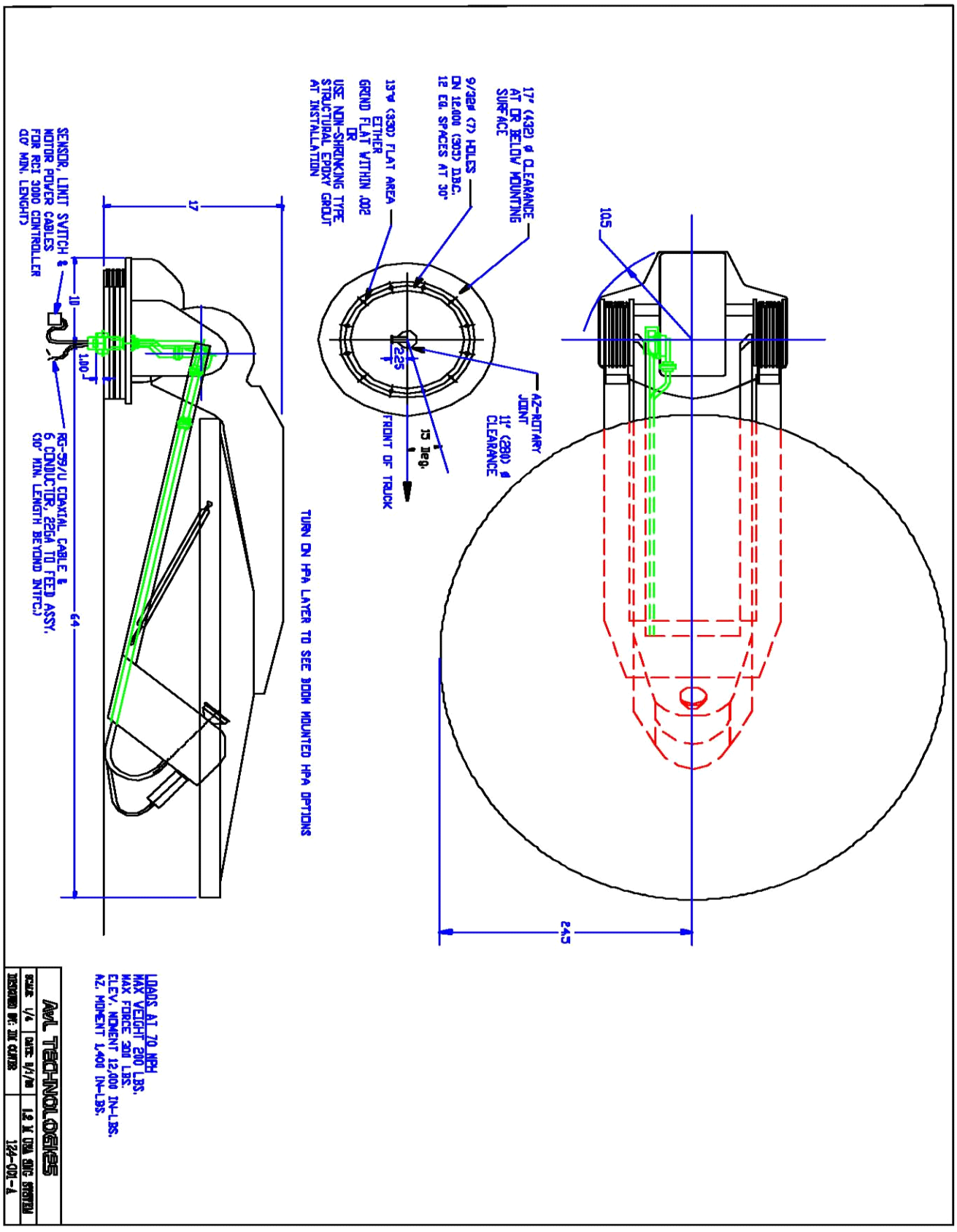
- Remove rear feed cover.
- Run in polarization and check for unusual noise in polarization gearing or motor.
- Inspect polarization potentiometer.
- Inspect wave-guide for any damage, dents, or cracks.

6.3 SPARE / REPLACEMENT PARTS

Since no maintenance is required, only electrical parts are recommended as spares. These parts will not fail from activity, but may fail from environmental exposure.

Description	Manufacture	Manufacture Part No.
Limit Switch (Short Arm)	Omron	D2VW-5L2A-1HS
Limit Switch (Long Arm)	Omron	D2VW-5L2-1HS
Potentiometer, 1k, 10T	ETI	MW20B-2982-1K
Clinometers	Lucas	02111-002-000
Optional		
AZ/EL Rotary Joint	Advanced Microwave AMC-206-CG/CG-RJ-U-B	
WR75 Super flex 18"	Microtech	MTES75-502-N-18B
Elevation Motor	Colman	CYMA-82700-721
Azimuth Motor	Colman	CYMA-82700-731
Polarization Motor	Globe	415A160-2

SECTION 7 - INTERFACE DRAWING


17" (432) ø CLEARANCE AT OR BELOW MOUNTING SURFACE
9/32ø (7) HOLES ON 12.400 (30C) DIA. 12 EQ. SPACES AT 30°
13"ø (330) FLAT AREA EITHER GROUND FLAT WITHIN .002 OR USE NON-SHRINKING TYPE STRUCTURAL EPOXY GROUT AT INSTALLATION
AZ-ROTARY JOINT
11" (280) ø CLEARANCE
FRONT OF TRUCK
15 Deg.
22.5°
10.5
24.5
17
10
64
1.00
SENSOR, LIMIT SWITCH & MOTOR POWER CABLES FOR RCI 3000 CONTROLLER (10' MIN. LENGTH)
RG-59/U COAXIAL CABLE & 6 CONDUCTOR, 22GA TO FEED ASSY. (10' MIN. LENGTH BEYOND INTFC.)
TURN ON HPA LAYER TO SEE BOOM MOUNTED HPA OPTIONS
LOADS AT 70 MPH
MAX WEIGHT 200 LBS.
MAX FORCE 200 LBS.
ELEV. MOMENT 12,000 IN-LBS.
AZ. MOMENT 1,400 IN-LBS.
AvL TECHNOLOGIES
SCALE 1/4
DRAWN BY: JIM CARTER
1.2 M DUAL BAND SNG SYSTEM
124-001-A