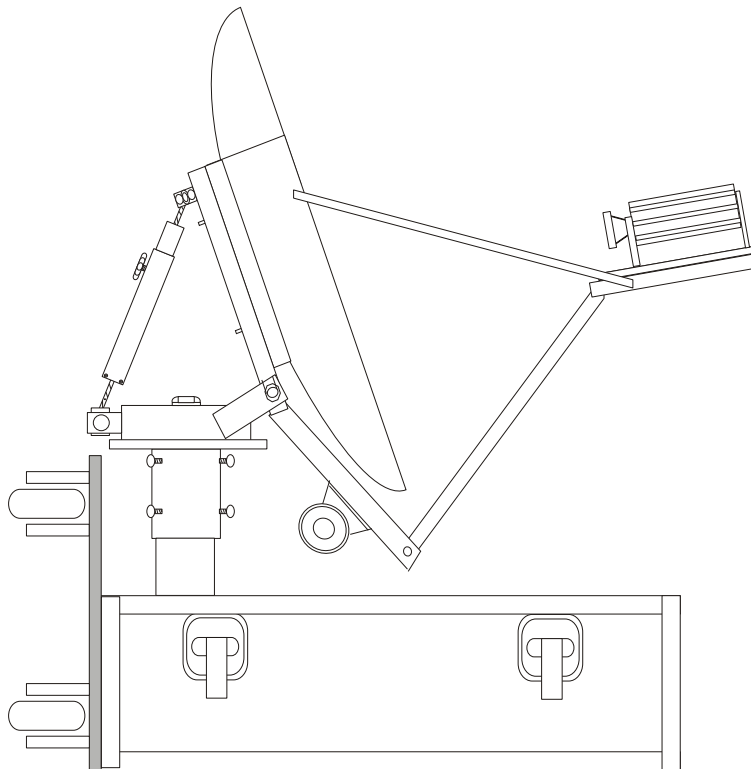


California Digital Group

Portable Satellite Antenna

Operating Manual - Model 1292B

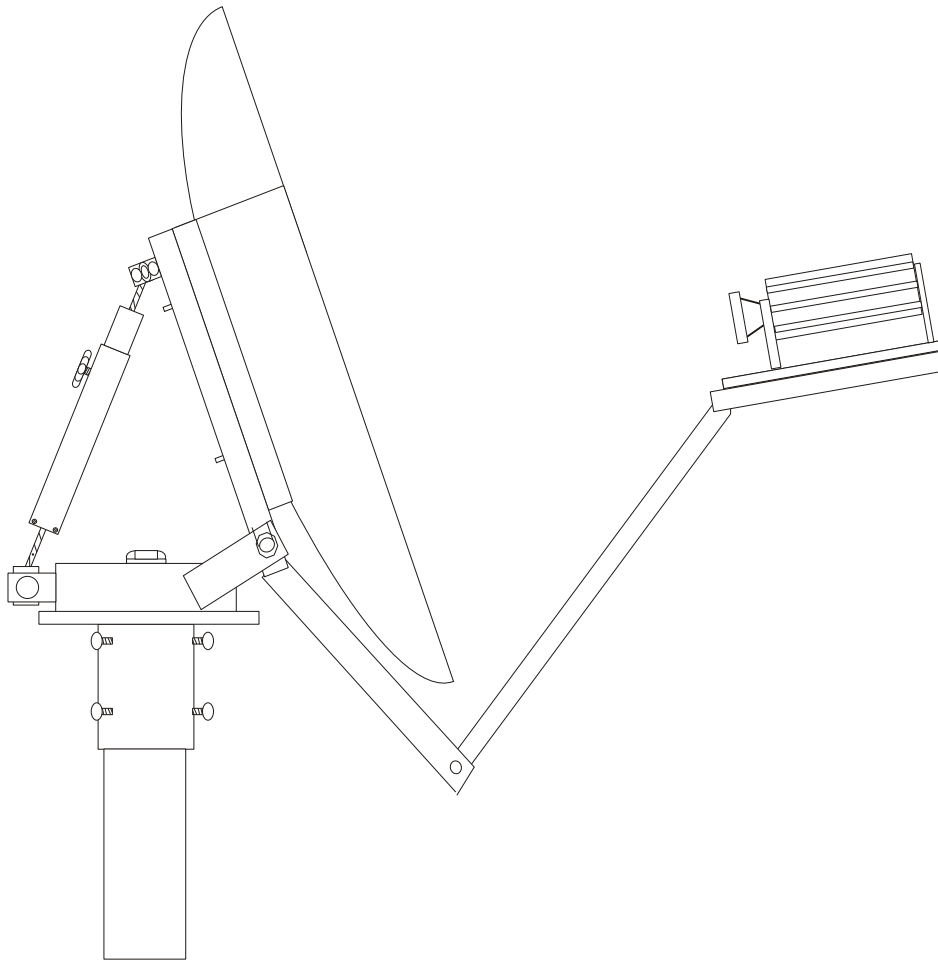


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Operating Manual -

Portable 1.2 Meter Satellite Antenna

Model 1292B



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Revision B - April 4, 1994

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1.0 Introduction

Thank you for purchasing a portable satellite antenna from California Digital. It was designed to be a rugged, transportable unit for remote field service. It has been designed to handle rough environments, while providing fast, easy setup and disassembly.

The unit is designed to be shipped as air freight/cargo or by common ground carrier. The case features heavy duty wheeled casters which allow for easy handling and maneuverability from the freight dock to local ground transportation service. The unit has been designed to fit into most common mini-vans and pickup trucks. The complete antenna case with equipment weights approximately 192 pounds and is readily handled by two persons using the fold away case handles.

The antenna is designed to be assembled in less than ten minutes without tools. Hardware interconnections include large diameter nuts, wing nuts, and thumb screws, none of which require excessive tightening. Most of the hardware items are common elements which are readily available from local suppliers and hardware stores. This was done to allow quick and easy replacement of small pieces which may be lost or damaged, without the need to contact California Digital for spares or replacements. This should save both time and money.

2.0 Portable Satellite Antenna Components -

The portable antenna unit was designed to be relatively simple with as few parts as possible to minimize complexity and facilitate the ease of setup. The antenna unit contains the following items, which are described in the following paragraphs.

1) **Transit case.** The transit case is a two piece case which serves as a shipping container, a storage container, and as a functional base for the antenna itself. The case consists of two halves, each of which have foam cushion inserts which protect the antenna components during transit. The transit case rolls upon its wheeled casters in an upright position.

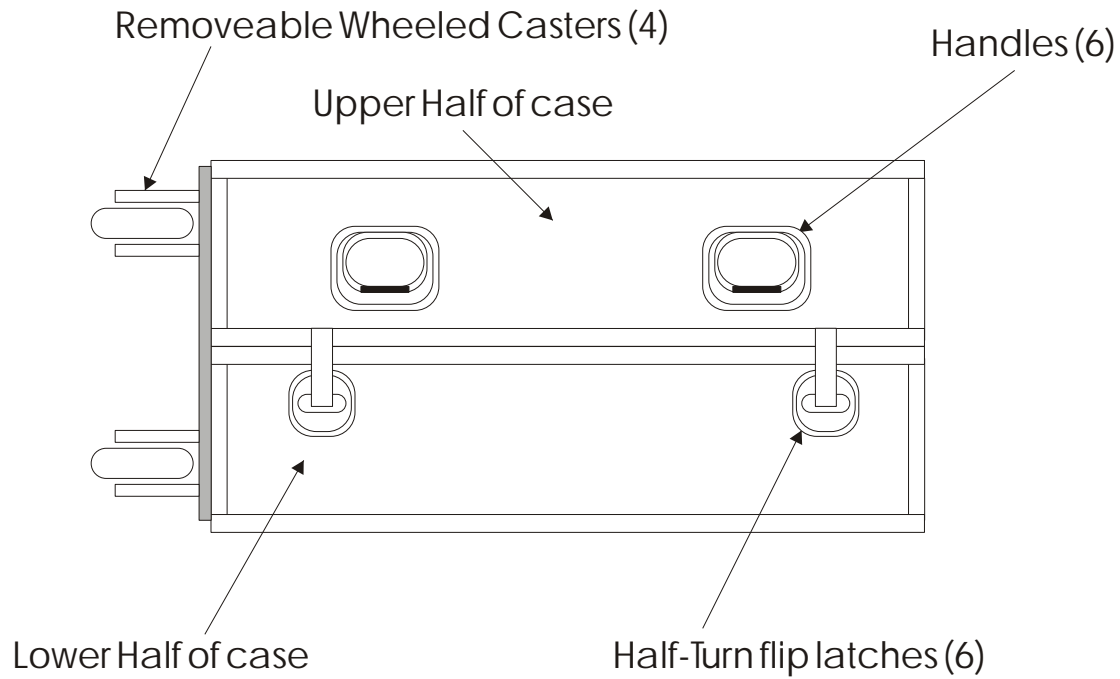
For usage, the case is laid upon its side. In this position, the case has upper and lower halves. The top of the case has six folding handles and is removed by de coupling the six half-turn butterfly latches. The upper half lifts straight off. It has no hinges or other connections. The foam cut-outs and retainers in the upper half do require, however, that it be replaced in the same orientation. The lower half of the case serves not only to store and protect the antenna elements, but it also serves as the antenna base, or platform. Figure 1 shows the transit case placed upon its side.

It is suggested that a label be made and applied to the outside of the case indicating your name, address, phone number, and other pertinent information which may preclude the case from being lost or misdirected during shipments.

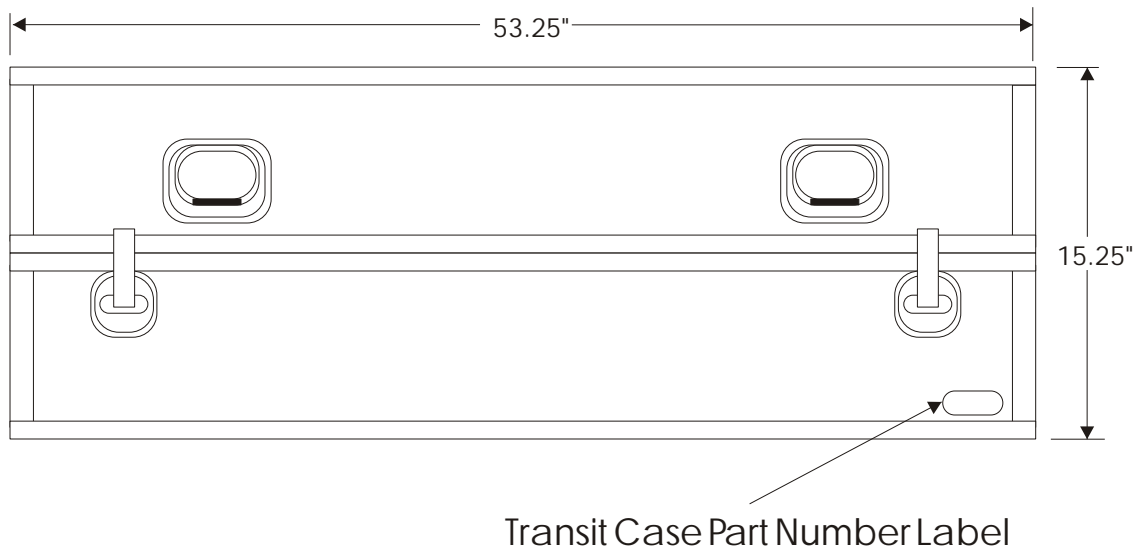
2) **Lower reflector dish segment with support arm.** The 1.2 meter dish is separated into two segments. The larger segment of the reflector dish is stored in the bottom of the case along with the main support arm. The upper and lower dish segments are shown in Figure 2.

3) **Upper reflector dish segment.** The upper segment connects to the lower segment with four latches located on the dish perimeter and backside ribs.

Figure 1. Model 1292B - Transit Case



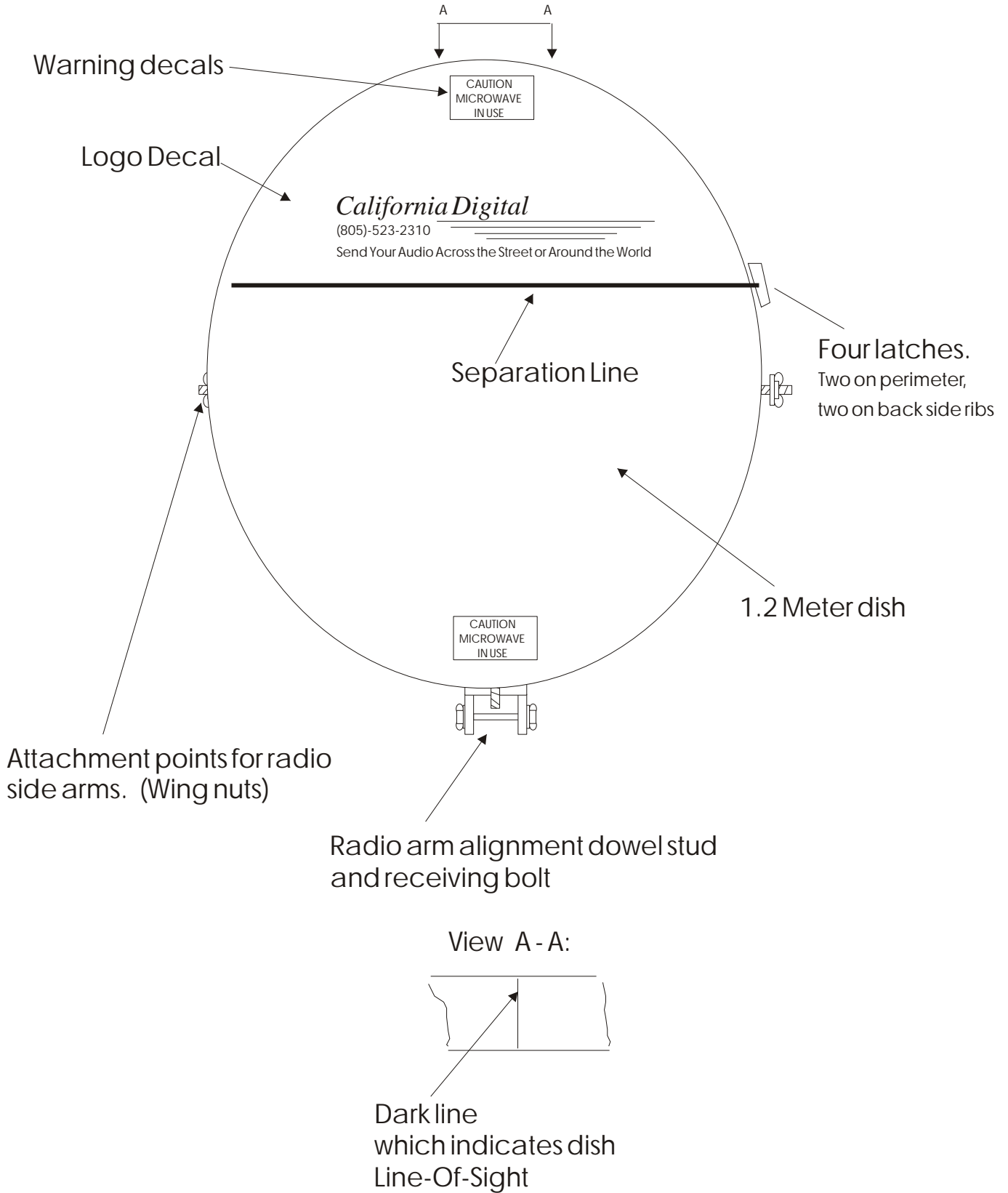
End View - Case placed on side, prior to opening



Top Side View - Case placed on side, prior to opening

Weight with all antenna elements stored = approximately 192 lbs

Figure 2. Reflector Dish



4) The **trunion assembly** is stored in a corner of the lower half of the case and provides two axis (azimuth and elevation) freedom for the dish. The trunion mounts directly on to the trunion support tube which is an integral part of the case. The pivotal bolt on the back side of the reflector dish rests in the vertical slot in the trunion forks. The trunion assembly is shown in Figure 3. The trunion actually consists of upper and lower halves, drawn together by a single, large bolt. This bolt is tightened prior to shipment and it is not intended that it be utilized for antenna operations. Should it become loose it can be re tightened with a 15/16" wrench.

5) The **elevation adjustment mechanism** provides both coarse and fine elevation adjustment. Coarse adjustment comes from the telescopic action of the inner and outer cylinders, locked in place with the large black knob. Fine adjustment is possible by turning the entire assembly when it is installed between the antenna support arm and the elevation support bracket (on the trunion assembly). The elevation adjustment assembly is shown in Figure 4.

6) The **radio arm** provides the primary central support and proper alignment (less polarization) of the radio with respect to the reflector. A slot in the end of the radio arm engages a bolt in the lower end of the dish support arm while a hole in the radio arm engages the dish with an alignment pin. The radio arm is held upright by the side arms. The radio arm is depicted in Figure 5.

7) Two **radio side arms**, shown in Figure 6, provide the side connections between the dish and the radio arm. The two arms are slotted at each end and are interchangeable from left to right.

8) **Inclinometer**. A magnetic Polycast Protractor is included with the antenna. This large dial readout device will assist with elevation adjustments. After determining the required look angle, use this device to set the elevation angle of the antenna. This protractor has a magnetic base and can be attached to the angled box-beam segment of the antenna support arm (on the back side of the lower dish segment). It should be noted that this protractor, when magnetically attached to the lower segment of the dish support arm will read the complement of the antenna look angle ($90 \text{ minus look angle}$). For instance, if you desire a 37 degree look angle (37 degrees from local horizontal) then you would tilt the reflector dish in elevation until the protractor reads $90 - 37 = 53$ degrees. Figure 11 will show where the magnetic inclinometer attaches to the dish support arm.

9) **Compass** (and inclinometer). A Silva Ranger compass, model 15CL, is also included in the antenna package. This compass will help to point the antenna in the proper azimuth direction. This device can also be used as an inclinometer instead of, or in addition to, the Polycast Protractor. It can be adjusted to indicate the actual look angle (as opposed to the complement). It has a smaller dial than the Polycast Protractor, however. Refer to the Silva instruction manual for operational details and features, including the procedure for inserting magnetic declination.

Figure 3. Trunion Assembly for 1292B

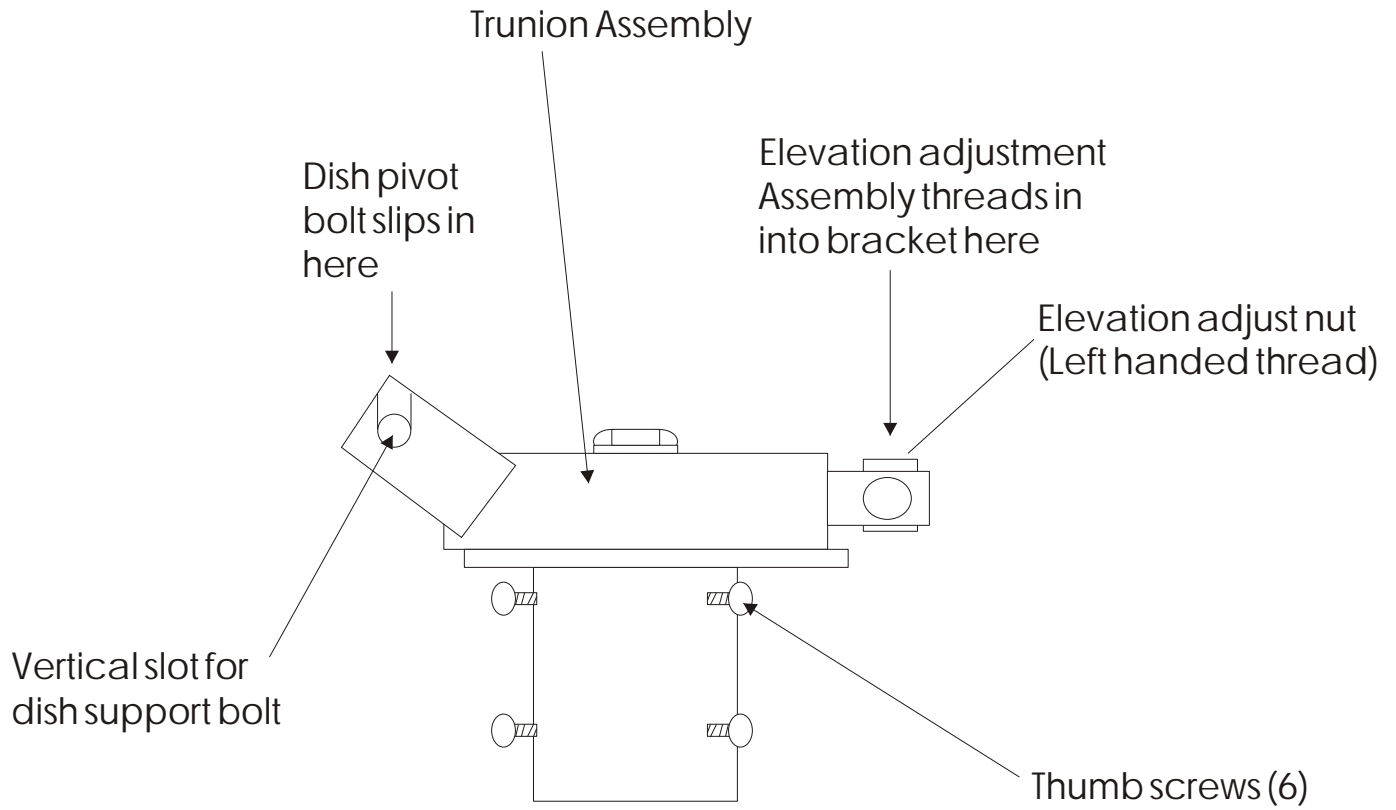
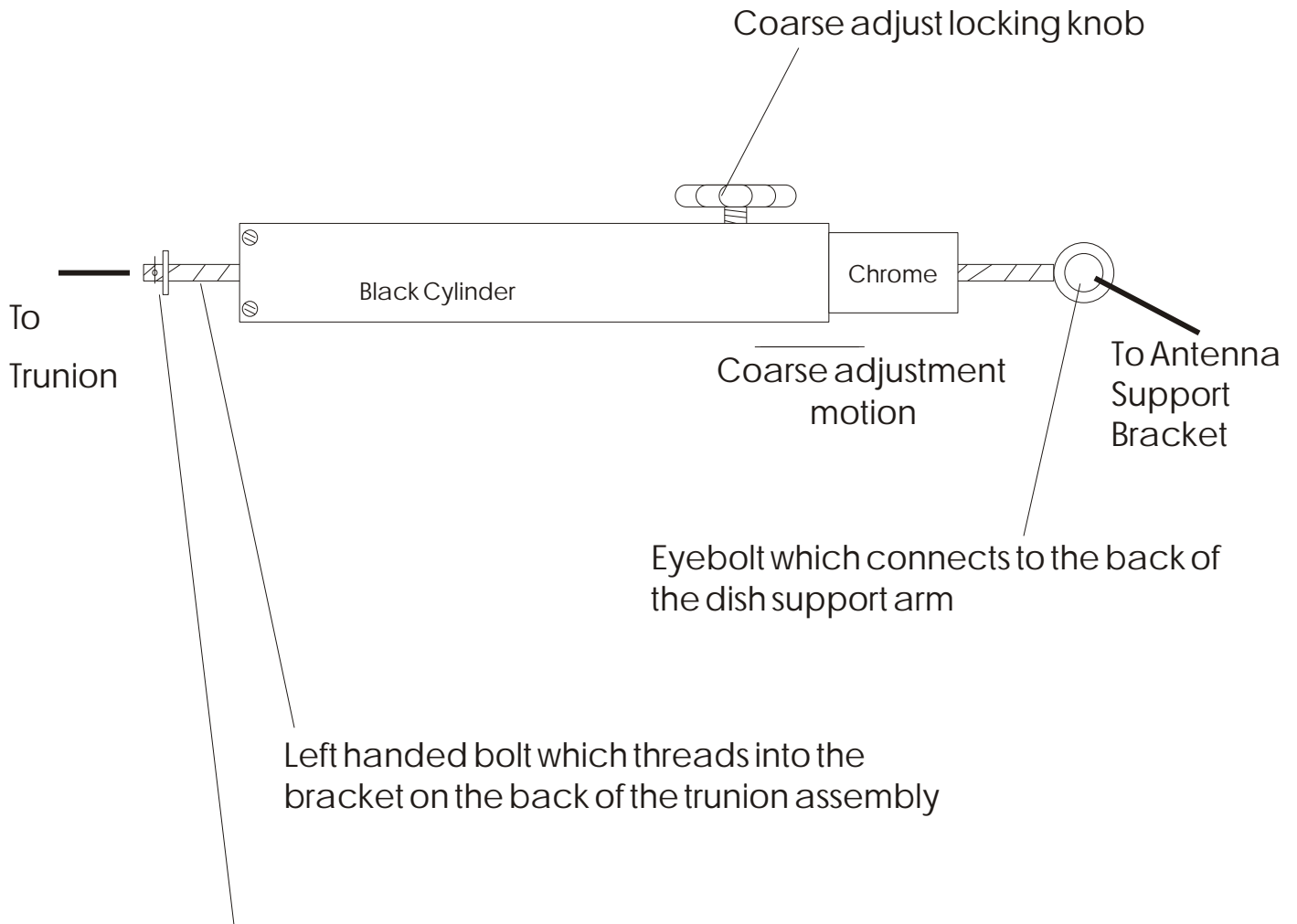


Figure 4. Elevation Adjustment Assembly



Removeable hitch pin and washer which are removed prior to threading this bolt into the trunion bracket. Replace the pin and washer after the bolt has been threaded sufficiently into the bracket. This pin acts as a safety precaution so that the elevation adjustment mechanism cannot be inadvertently disengaged from the trunion bracket during fine adjustment adjustment procedures.

Figure 5. Radio Arm

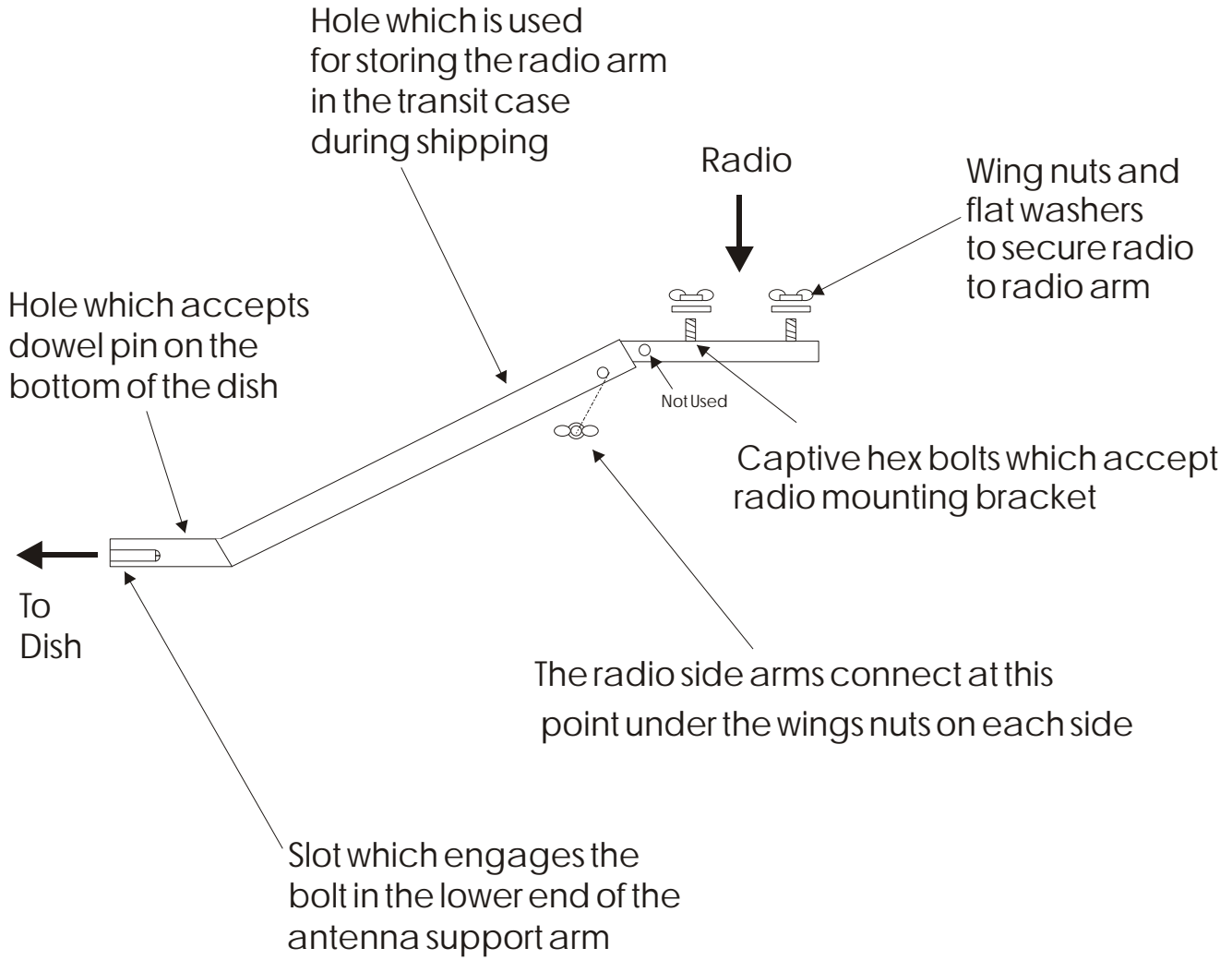
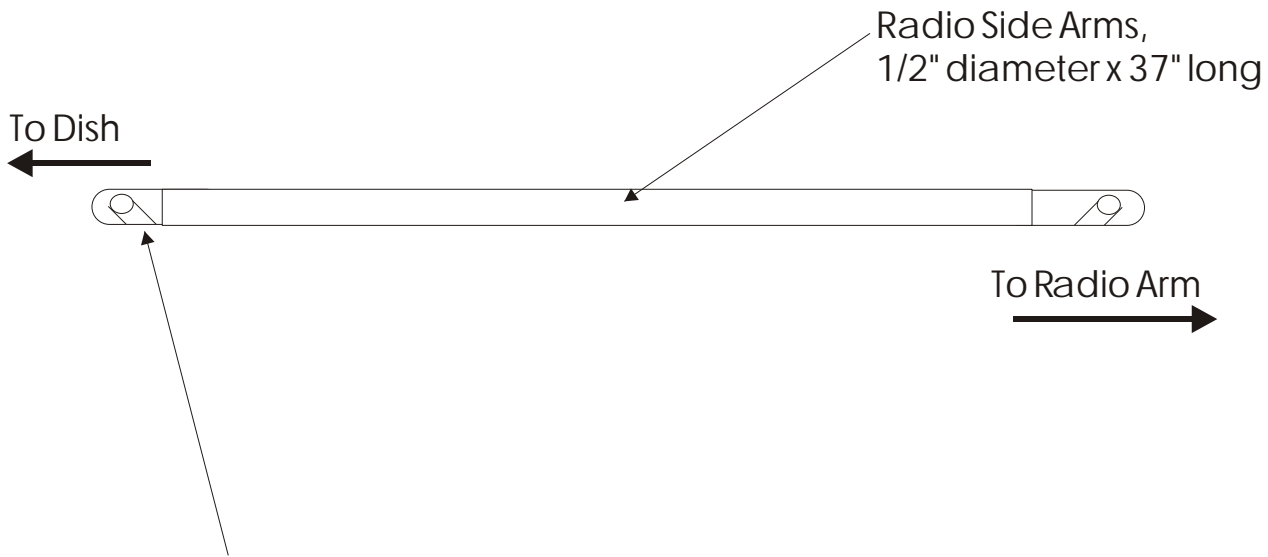


Figure 6. Side Arms



Slots at each end. One end attaches to a dowel stud on the side of the dish and is secured by a wing nut. The other end attaches to the wing nutted bolt on the radio support arm.

10) **Rain tarp.** A tarp is included in the case to be used as protection against light rain, drizzle, snow, or dampness. The tarp is large enough to be tucked in underneath the edges of the case, while operational. It is advisable to keep the foam inserts of the case from becoming wet or extremely damp. During transportation the rain tarp is placed between the upper and lower dish segments to separate the two sections while in transit.

11) **Radio feed horn and support bracket.** A fifty-one degree radio feed horn is supplied with the parabolic dish antenna. This feed horn comes with a radio adapter ring, an O-ring, a mounting bracket, and related hardware (Allen head screws). This horn is designed to operate efficiently with the antenna dish and should mount easily to existing radios. The mounting bracket will secure the radio/horn combination in two places; around the throat of the horn and around the back collar of the radio. This bracket will fit directly onto the radio support arm as the holes in the bracket will align with the captive hex bolts in the radio arm.

It is suggested that the horn (with adapter) and bracket be installed to your radio. The bracket secures the horn with a hoop around the throat of the horn. Do not over tighten these two bolts. The back end of the radio has a collar-type connection which permits the radio to be easily rotated while in the bracket to facilitate polarization adjustments. An allen head set screw secures the radio in the preferred orientation.

3.0 Directions for Set up and Use:

The antenna unit is relatively easy to set up and use.

1. **Roll the case** to the desired location. The free rolling swivel casters make it easy to move the case. The casters are robust enough to handle routine curbs, cracks, and bumps. It should be noted, however, that since the transit case is tall and slender, it could tip if it encounters an incline or surface discontinuity transverse to the longest case axis. It is recommended that the primary direction of motion is length wise as shown in Figure 7.

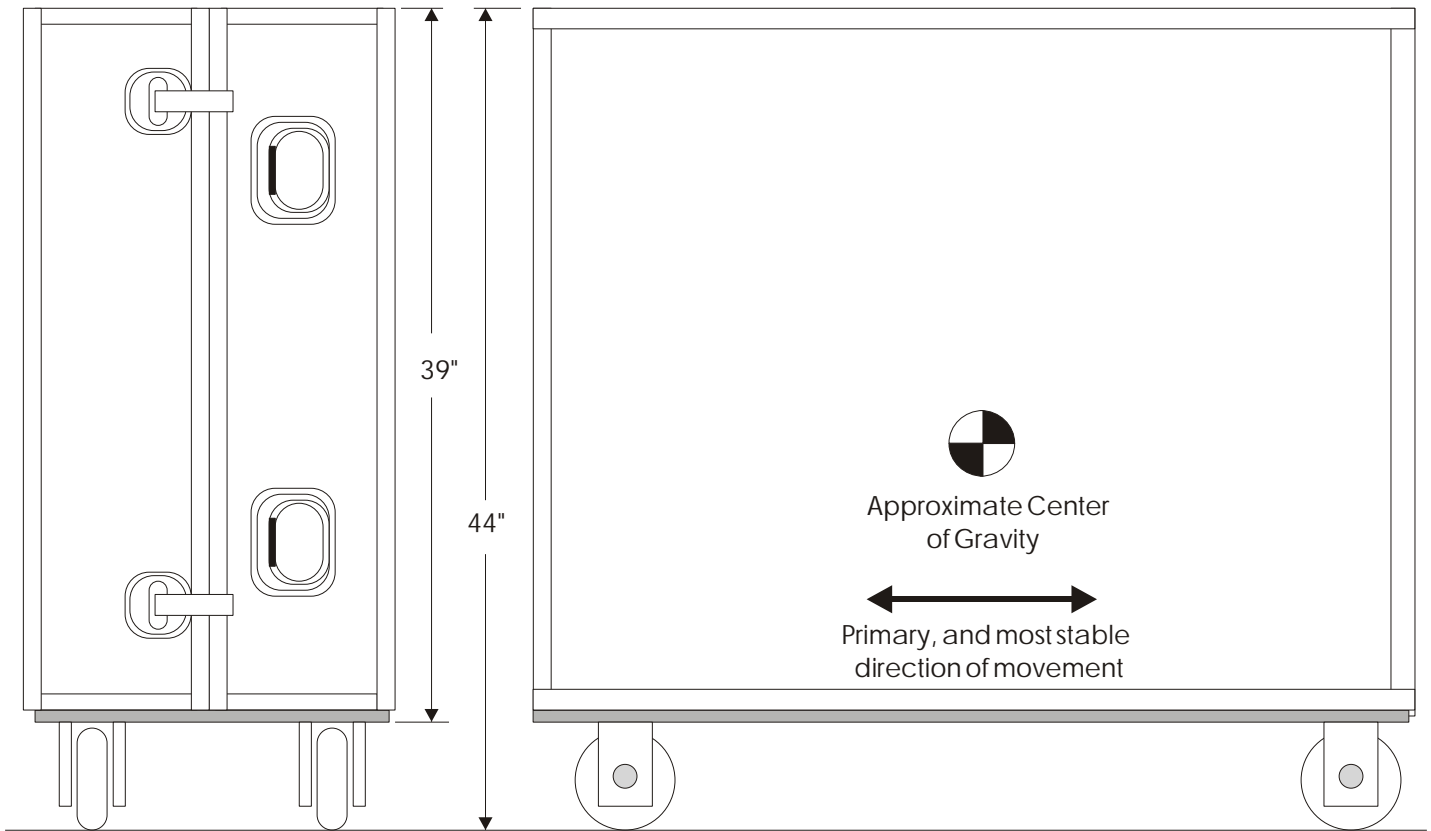
2. **Select a location** which is relatively level and offers an unobstructed line-of-sight to the satellite with which you will be transponding. A level operational site is helpful, but not essential. If you will need to switch from one satellite to another, or are uncertain as to correct look angles, a level position will make satellite acquisition easier.

3. **Preposition the case** so that the trunion post is in the corner opposite to the direction you intend to look. Figure 8 indicates how to preposition the case. This prepositioning step is not absolutely essential, but it creates a situation where the antenna dish and radio will be positioned over the case itself. This will maximize stability, reduce vulnerability to wind, provide a cushioned impact zone under the area where the radio is being handled, and this orientation produces the smallest "footprint" or utilization of space.

4. **Lay the case on its side**, maintaining the prepositioning consideration established in the previous step. To establish top from bottom: the handles are in the upper half of the case, the latches "point up", and the transit case part number label should read properly. The case label is attached to the case bottom.

5. **Remove the upper half** of the case. To do so, turn each of the six butterfly latch handles one-half turn counter clockwise. The latch hooks spring back and down abruptly. The latches may be made to lay flat against case while in their open position by folding the butterfly handles back to their retracted position. Remove the upper case using the handles, lifting straight up. Note that the trunion post projects into the upper half, and removing the upper half of the case in a rolling fashion may damage or tear the foam in the upper half of the case. Set the upper case half aside. As a convenience for replacement, retain the correct orientation.

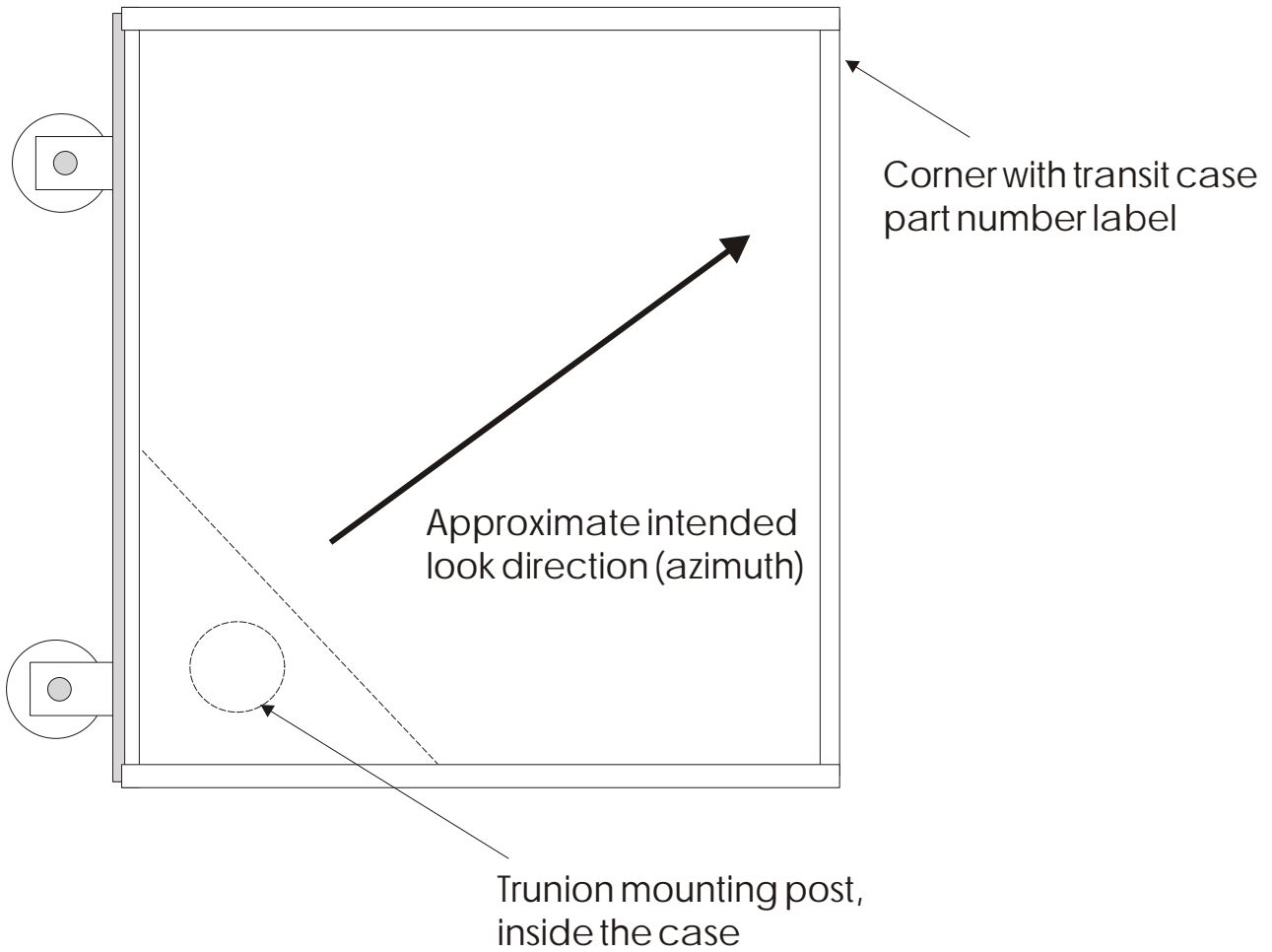
Figure 7. Model 1292B - Transit Case Mobility



End View,
Upright

Side View,
Upright

Figure 8. 1292B - Transit Case Prepositioning



Top View -
Case on its side

6. **Final orientation** of case. Verify that the trunion mounting post is in the far corner, opposite from look direction as shown in Figure 8. Adjust case orientation as required.

7. Remove the **trunion assembly** from its corner pocket in the lower half of the case. Place the trunion assembly over the trunion post which protrudes from the lower case. See Figure 9. Ensure that the trunion seats fully and swivels easily in azimuth. Lightly tighten the six thumb screws. Ensure that the trunion does not wobble yet turns freely on the post. The thumbscrews will be tightened slightly more when proper azimuth has been established.

8. Adopt a firm stance and grasp the **lower dish segment/support arm**. Pull the lower dish/support arm from the case, pulling straight up and exercising caution not to tear the case foam or damage peripheral dish hardware (latches and dowel studs). Notice that there is a large 5/8" bolt running through the dish support arm near the merger of the two box-beam segments which make up the support arm. Guide the lower dish assembly so that this bolt slips in to the slotted trunion forks. The antenna support arm fits snugly in between the trunion forks. Guide the 5/8" bolt into the receiving slot in each of the two trunion forks. Spread the 5/8" flat washers such that they are on either side of the trunion forks. Refer to Figure 10 for detail. Hand tighten the 5/8" wing nut.

9. Install the **elevation adjust mechanism**. Remove the elevation adjust mechanism from the case and pull away the hitch pin and associated flat washer from the lower bolt. (Refer to Figure 4.) Thread this bolt into the nut which is welded to the receiving bracket on the back end of the trunion assembly as shown in Figure 11. Note that this nut/bolt combination is left handed and must be engaged by turning counter clockwise. Thread this bolt into the nut by 1/2" or more.

Warning: Never allow the lower end of the elevation adjust mechanism to inadvertently become unthreaded during elevation adjustment. Unthreading of the elevation adjustment mechanism would result in the dish suddenly dropping in elevation, which could damage the radio/LNB.

Remove the 1/2" wing nut and flat washer from the upper elevation receiving bracket on the upper box-beam segment of the antenna support arm. (Figure 11) Tilt the dish back so that the eyelet on the elevation adjust arm slips over the 1/2" bolt. Replace the wing nut and washer, finger tight.

Figure 9. Placing the Trunion

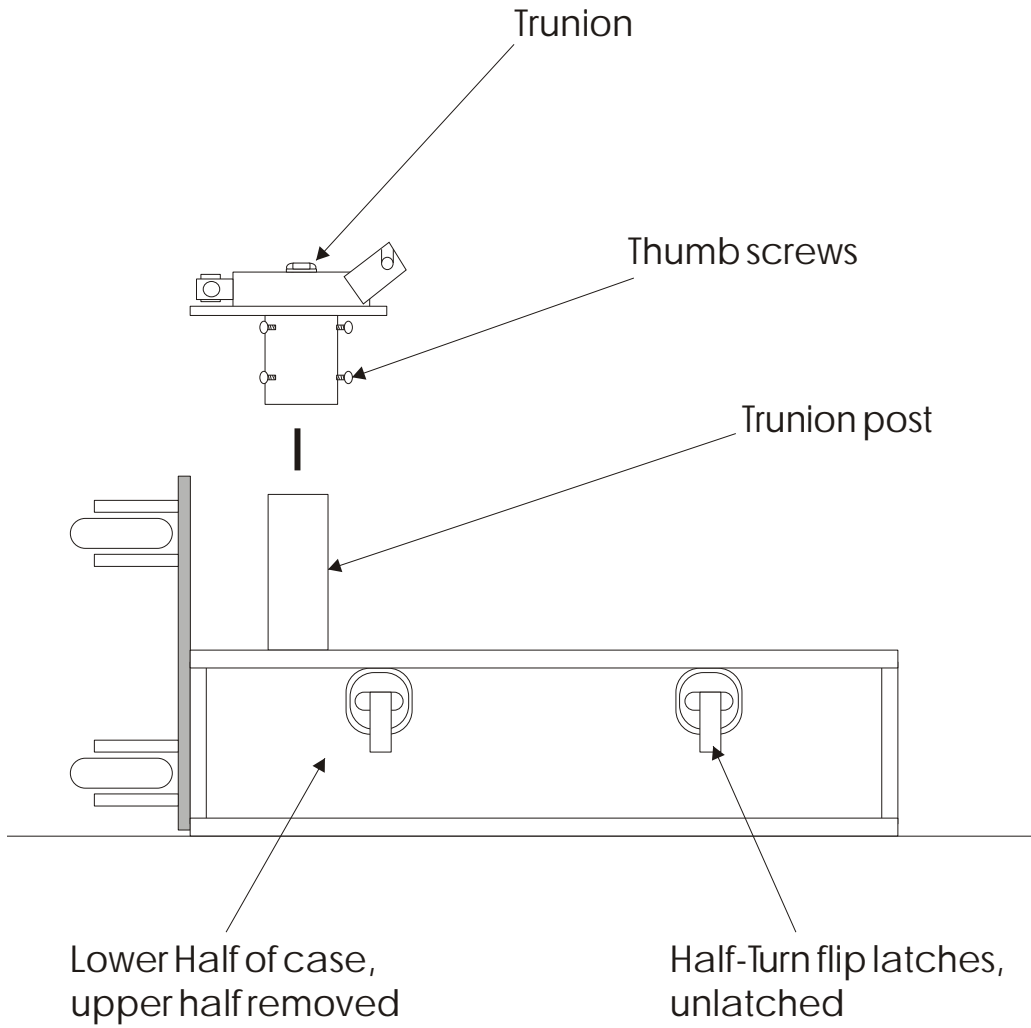


Figure 10. Installing the Antenna on to the Trunion

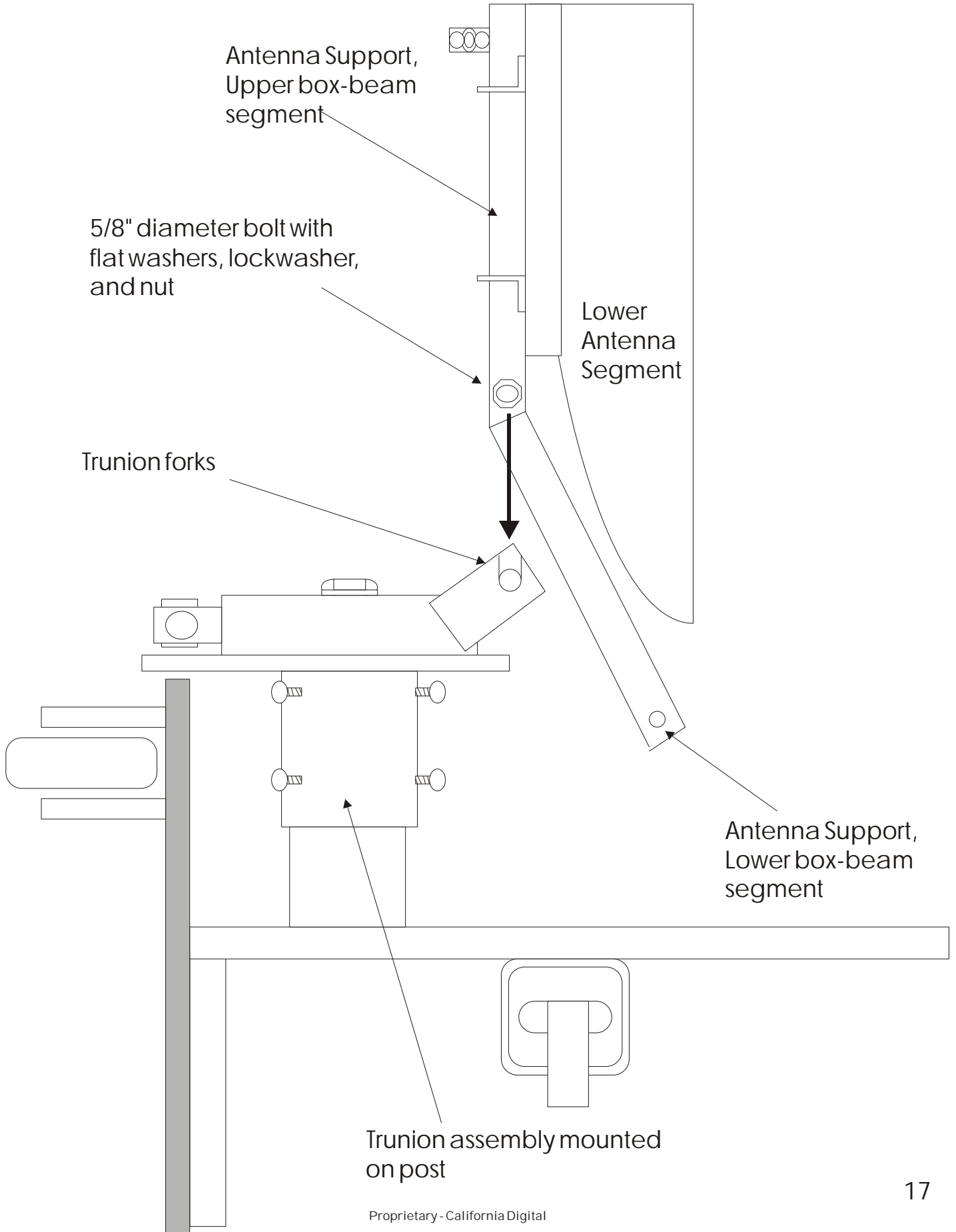
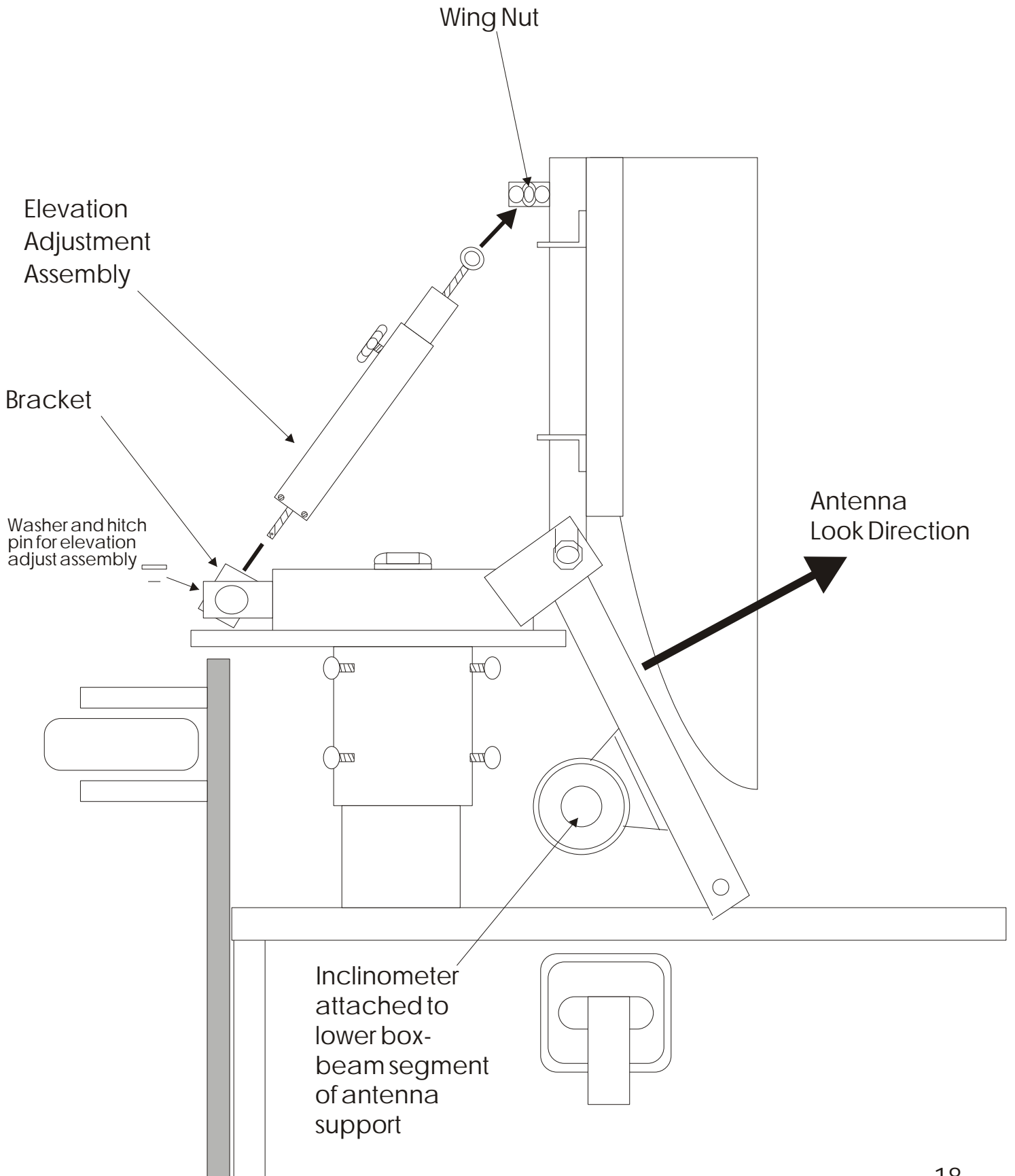


Figure 11. Installing Elevation Adjustment Assembly



10. Perform **coarse elevation** adjustment by loosening the large knob on the elevation adjustment assembly and sliding the inner and outer cylinders with respect to one another to lengthen or shorten the elevation arm. Lock the assembly by tightening the knob. Attach the magnetic inclinometer to the lower box-beam segment of the antenna support arm as shown in Figure 11. Fine adjustments to elevation will be made by rotating the entire elevation adjustment assembly clockwise or counter clockwise as required to fine tune the reflector dish in elevation in step 17 after the radio has been installed.

11. Install the **upper dish** segment. Place the upper dish segment on top of the lower, engaging the latch pins and alignment bolts/pins to ensure a smooth-appearing parabolic fit. When the two segments are aligned, and form a smooth parabolic surface, engage the latches and/or pins.

12. Dismount the **radio arm** from its transit position, on the back of the antenna support arm. The radio arm is held in its transit location with a single wing nut and washer. Replace the washer and wing nut for later use. Install the radio arm by inserting the open slotted lower end of the arm (Figure 5) over the bolt in the end of the antenna support arm. Slide the radio arm over this receiving bolt at a shallow angle. The radio arm simply slides over this bolt. Note how the hole in the radio arm will then align with the lower dish dowel stud at the base of the antenna as the radio arm is raised into place.

13. Remove the **side arms** from their transit storage location on the back of the antenna. These two arms are simply held in place by friction and have no transit retention hardware. Install the radio side arms by slightly loosening the wing nuts on each side of the lower dish segment. Similarly, the radio arm has two wing nuts which will accept the other end of the radio arms. Lift up the end of the radio arm, which will cause the lower dowel stud in the dish to engage the alignment hole in the radio arm. Complete the side arm installation by dropping each arm over its respective wing nut studs. Finger tighten the wing nuts.

14. Install the **radio** (with horn and bracket) by removing the two wing nuts and flat washers on the radio arm. Lower the radio and bracket over the two captive hex bolts. Secure with washers and wing nuts. Check the polarization of the radio. Connect the radio to its power supply and receiving/transmitting electronics.

15. **Determine look angles** based upon your location and the location of the intended satellite.

16. Orient the dish in the **azimuth** direction with the Silva compass by performing the following steps.

a) Adjust the compass for the proper magnetic declination for the geographic location from which you will be operating. (Refer to Sections E and H of the Silva compass manual for details).

b) Turn the dial of the compass so that the desired azimuth look angle (Bearing) aligns with the Index pointer white arrow on the compass. Refer to the Figure on the inside cover of the Silva Type 15 Instruction Manual and Figure 12.

c) Place the compass on top of the dish, over the black line which has been etched into the top edge of the upper dish segment as shown in Figure 2, View A-A. Place the compass on the top of the dish such that you can see this black line through the central "window" of the compass. Align the index pointer and luminous point of the compass with this black line as shown in Figure 13. Note that the index point (and mirror) should be towards the "look" direction of the reflector.

If the dish has been tilted back at a steep angle during coarse elevation adjustment it becomes difficult to place the compass on top of the dish since the compass itself needs to be fairly level in order to operate accurately. In this case you may either temporarily elevate the dish back to a vertical position or you may utilize the sighting mirror and line feature of the compass as described in the compass manual.

d) Turn the dish in azimuth until the magnetic needle of the compass aligns with the orienting arrow. As you turn the dish the magnetic needle will continue to point to magnetic north. By turning the dish you can "slide" the orienting arrow underneath the magnetic needle until the orienting arrow "brackets" the magnetic needle.

This procedure should point the dish fairly closely in azimuth. The next step will sharpen the elevation adjustment. Depending upon how level the ground is, elevation adjustments may disturb the azimuth setting. In which case, it will be necessary to revisit step 16.

17. Perform fine **elevation** adjustments by rotating the entire elevation adjustment assembly clockwise or counter-clockwise. Using a spectrum analyzer, or other means, observe the received signal strength. Adjust the elevation and azimuth setting to maximize signal strength. The azimuth orientation may be locked in place by gently tightening the six thumb screws on the base of the trunion. These need only be tightened by hand in order to secure the azimuth orientation.

Figure 12. Dialing Azimuth Bearing into Compass

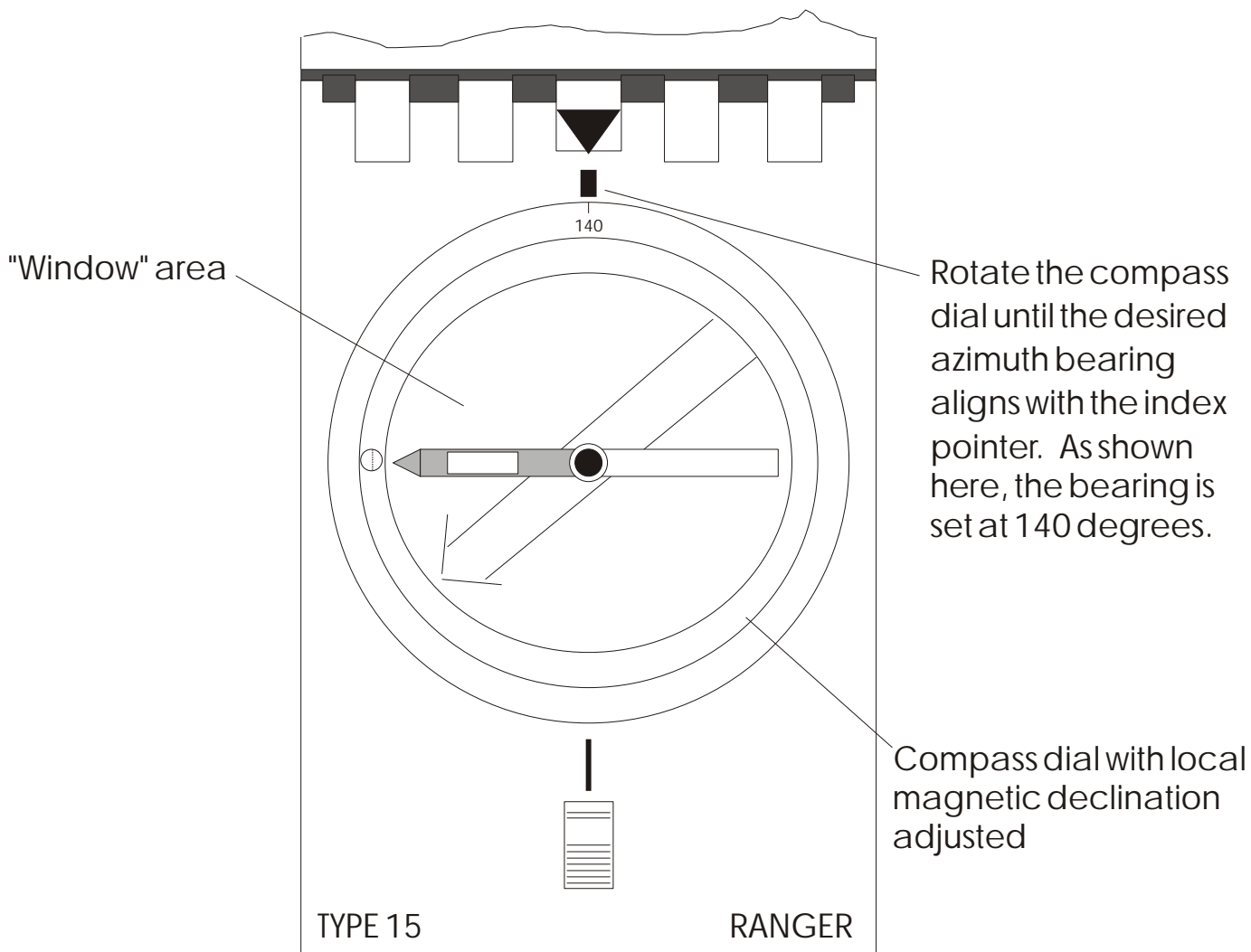
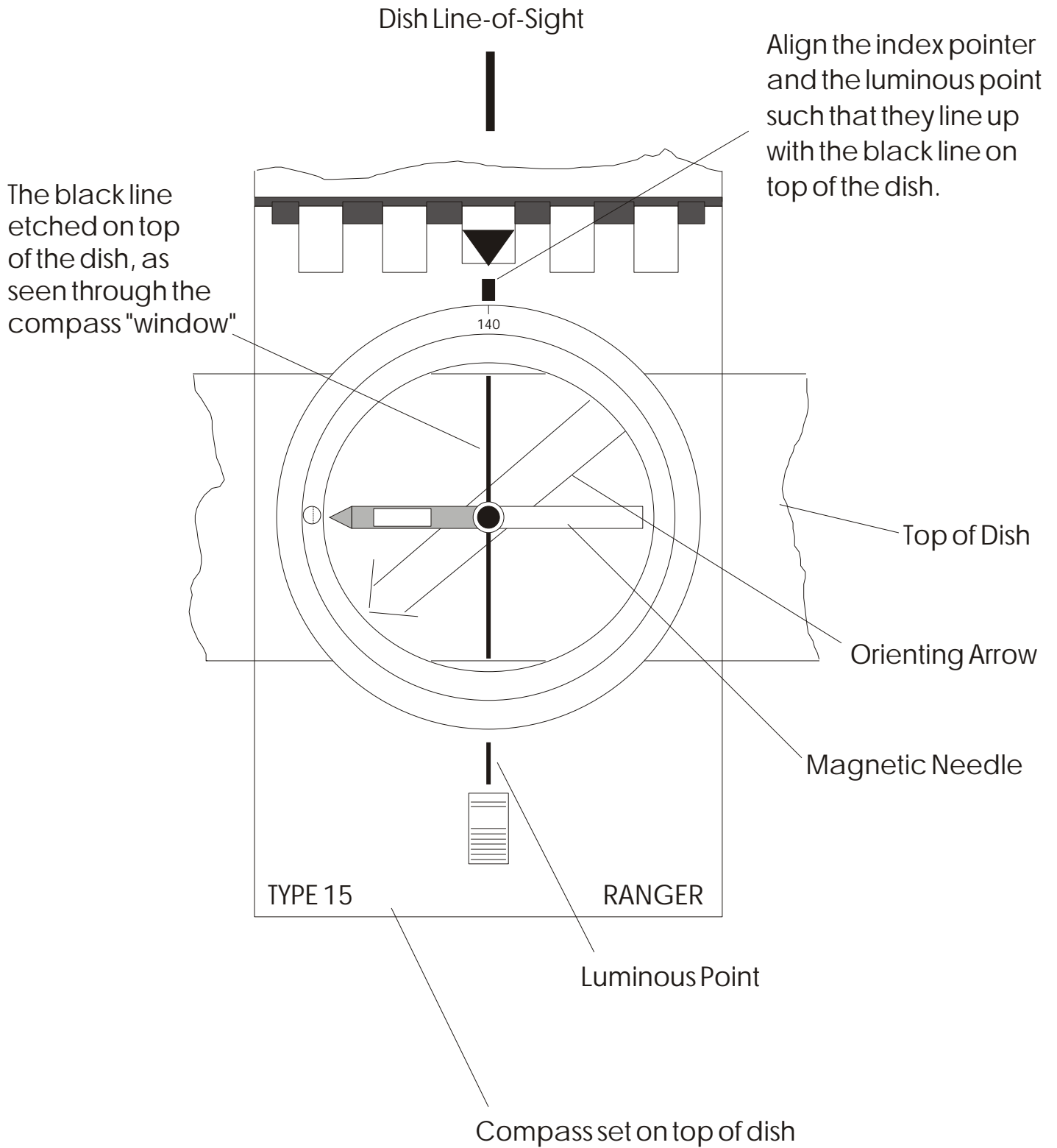


Figure 13. Aligning the Compass with Dish L-O-S

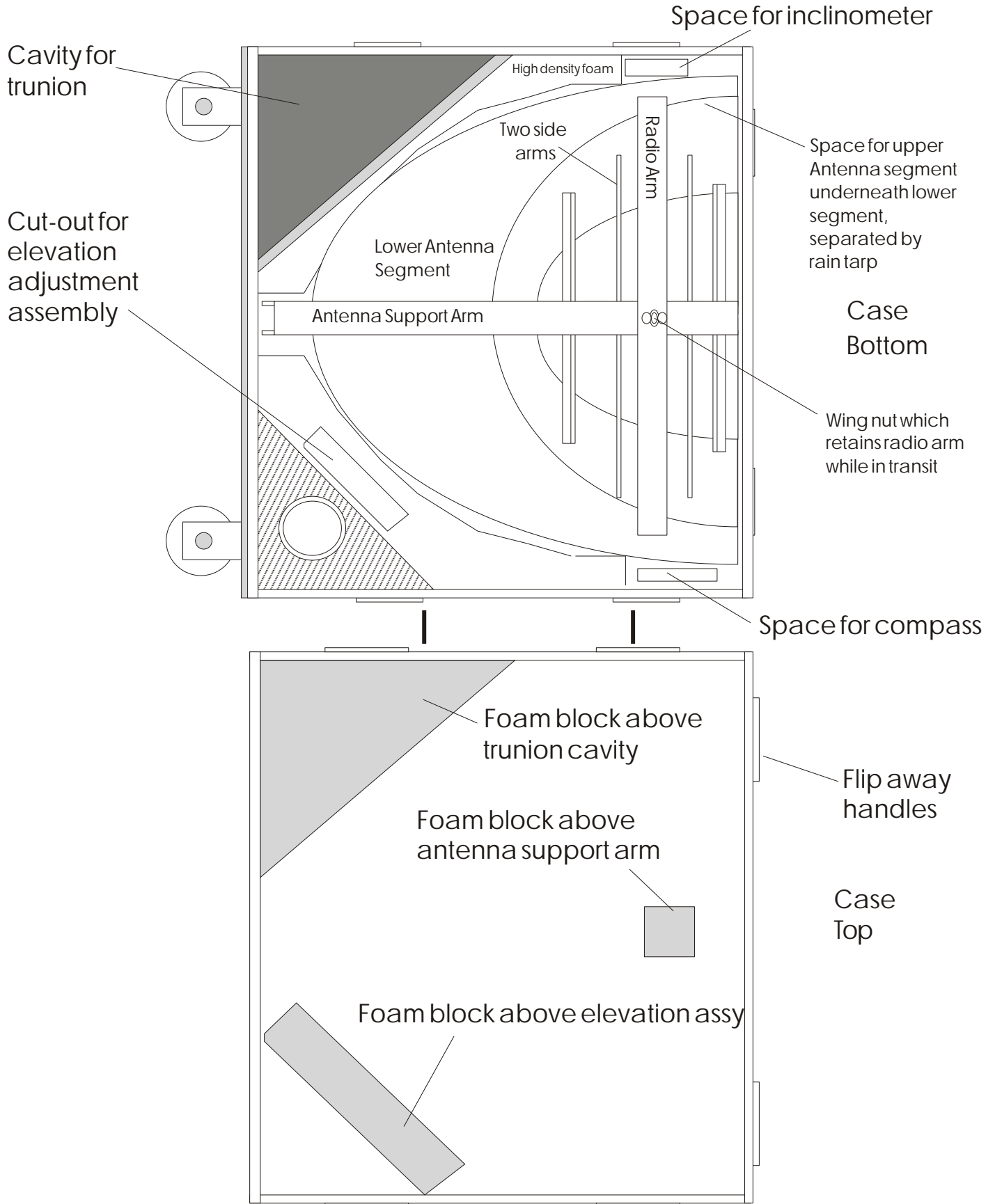


4.0 Directions for Repackaging:

The unit is easily disassembled by reversing the above procedures and returning all components to their original locations in the transit case as shown in Figure 14.

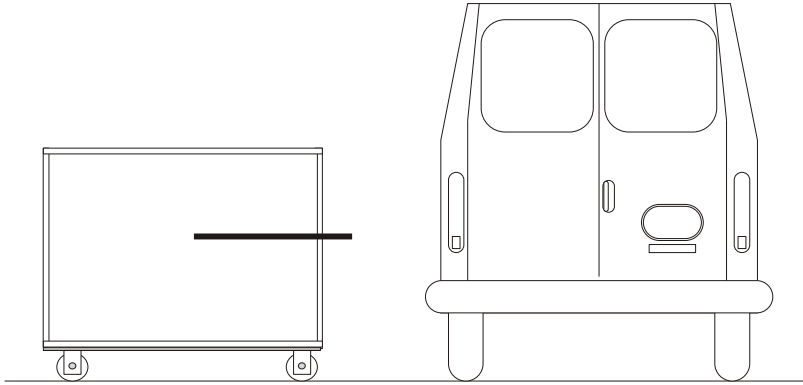
1. **Remove the radio** and place in its transit case.
2. **Detach the upper dish** segment and place it in the transit case, centered and against the side foam wall, as shown in Figure 14.
3. Place the folded **rain tarp** on top of the upper dish to act as a cushion against the lower segment which will be placed on top of the upper segment.
4. Loosen the four wing nuts which attach the side arms. Remove the **side arms and radio arm**. Set all three pieces aside temporarily.
5. Remove the **elevation adjustment assembly**. Disconnect the elevation assembly upper wing nut and unthread the entire assembly noting that it utilizes left handed threads. Collapse the elevation assembly to its minimum length and place it in the appropriate slot in the transit case.
6. Loosen the large nut which retains the lower dish and lift the dish out of the trunion forks. Place the **lower dish** segment into the case. Exercise caution so that the wing nuts on the side of the dish do not tear the transit case foam.
7. The two **side arms** are returned to their **transit slots** on the back of the dish and the **radio arm** is **secured** to the back of the antenna support arm using the wing nut and washer.
8. Loosen the six thumbscrews on the **trunion** and lift it straight off the trunion post. Place the trunion in the provided cavity.
9. The **compass and inclinometer** fit easily into the spaces adjacent to the dish.
10. Replace the transit **case cover**, ensuring that it is oriented properly. Secure all six latches. Return the entire case to its **upright** position when desired.
11. Roll the case to your **transport vehicle** and prepare to load it into the vehicle. The six handles make vehicle loading fairly easy with two persons. To reduce the amount of effort required to load the transit case into a vehicle the case may be flipped and rolled into a vehicle as shown in Figures 15 and 16.

Figure 14. Repacking the 1292B Transit Case

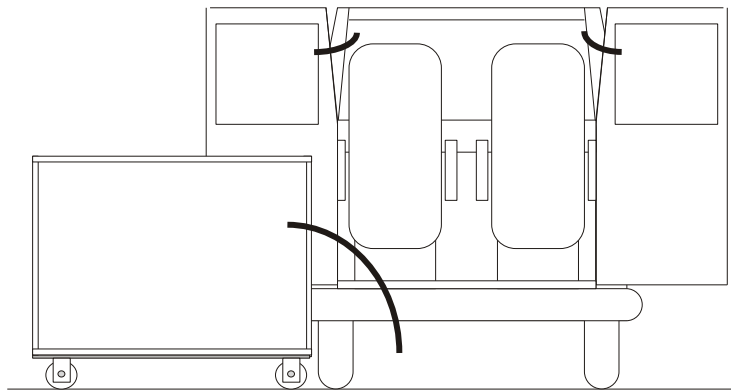


(Top viewed as if the case top was transparent)

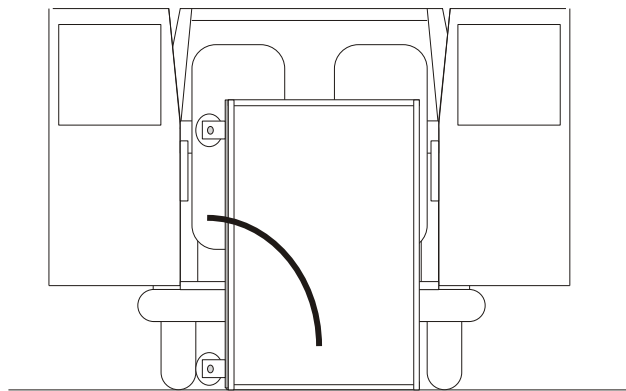
Figure 15. Positioning the Transit Case for Loading



1. Roll the case to the back of the vehicle.

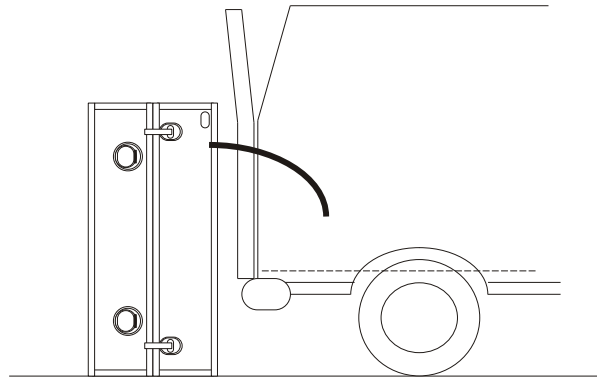


2. Open the doors fully and prepare to roll the case into a position where it will be centered within the cargo space when flipped on its side.

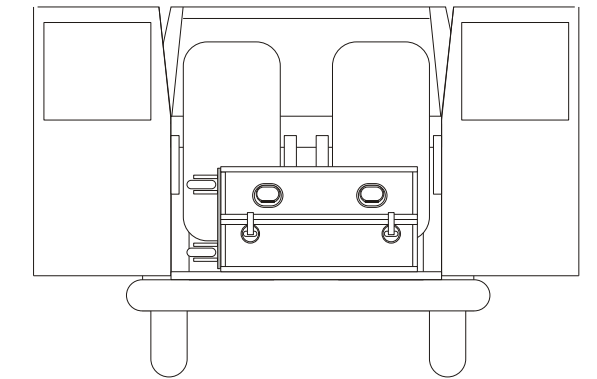


3. Flip (roll) on the case on to its side. Remove wheels if required.

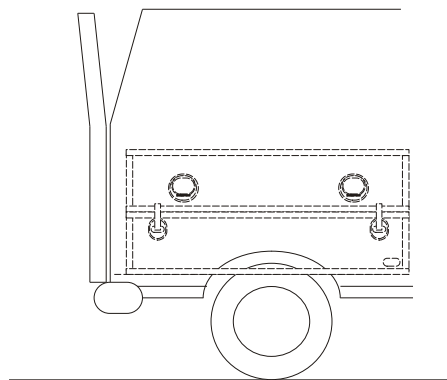
Figure 16. Loading the Transit Case into a Vehicle



4. Prepare to roll the case into the vehicle on to the cargo floor.



5. Flip/roll the case into the vehicle on to the cargo floor



6. The case inside the vehicle

5.0 Specifications and Configuration:

Parameter	Specification
Case height, with casters	44"
Case height. without casters	39"
Case length	53.25 "
Case width	15.25 "
Case weight, full loaded	192 pounds
Case weight, unloaded	130 pounds
Antenna type	1.2 Meter Rx/Tx offset antenna, Series 1124, by Prodellin
Antenna offset angle	22.3 degrees
Intended radio	SSE Technologies
Feed Horn	51 degree

As-Built configuration:

Part	Part Number	Revision
Transit Case	1292210	-
Trunion	1292120	A
Reflector Dish	1292130	A
Antenna Support	1292140	A
Elevation Adjustment Assembly	1292150	A
Radio Arm	1292160	A
Side Arms (2)	1292170	-
Compass	Silva 15CL	-
Inclinometer	Empire # 36	-
Rain Tarp	N/A	-
User Manual	UM1292B2 - (Rev B)	4 Apr 94