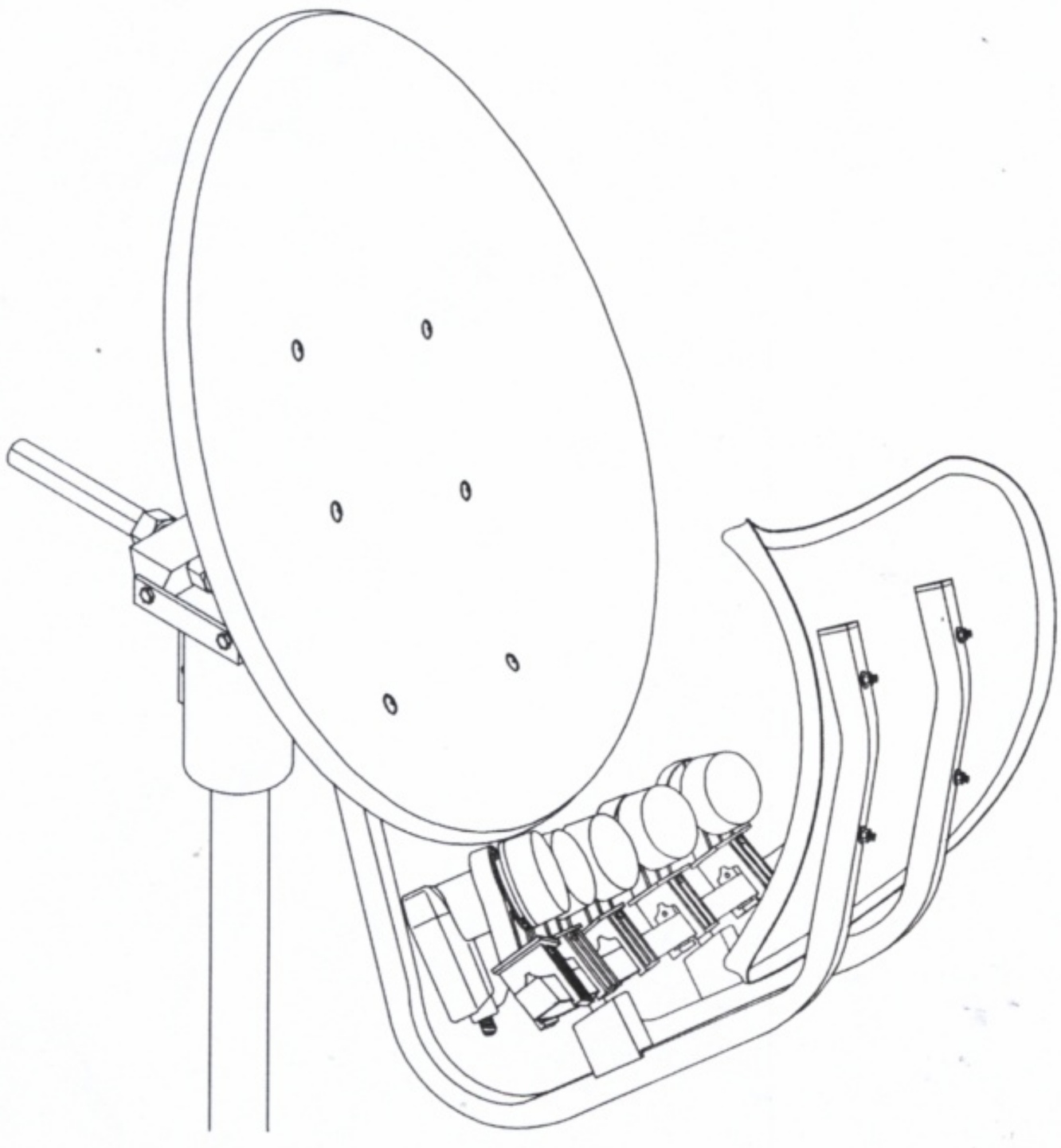
Installation Manual
for Toroidal 90 Multi-beam satellite antenna



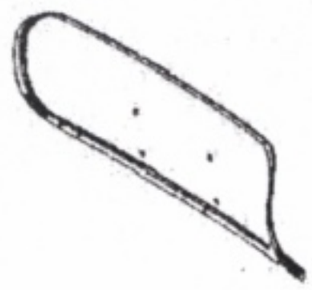
It was developed using a toroidal formula, while other existing satellite antenna apply parabolic formuila.
Signals are reflected twice through the main reflector and a sub reflector, forming
a focal line created by focal points along the bottom of the main reflector, making the TOROIDAL
function as a multi-beam antenna that receives broadcast & communication satellites at the same time.

Parts List

T90

A1 : Main Reflector (1ea)

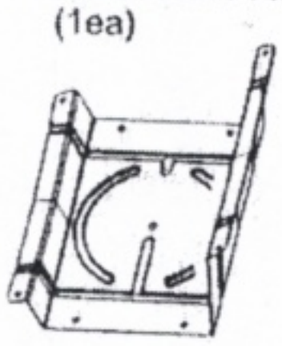
A2 : Sub Reflector (1ea)



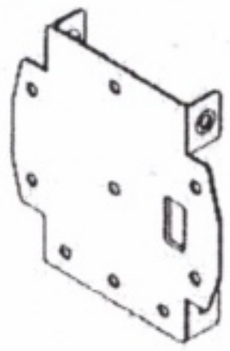
A3 : Support Arm (2ea)

A4 : LNBF Guide (1ea)

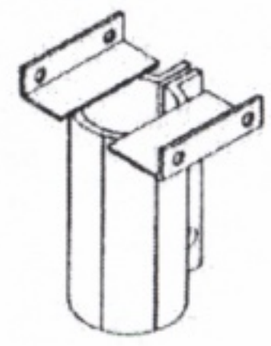
A5 : Back Mount Tilt (1ea)



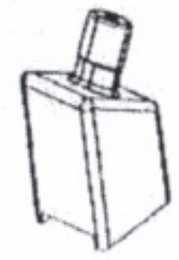
A6 : Back Mount Elevation (1ea)



A7 : Weaving Tube (1ea)

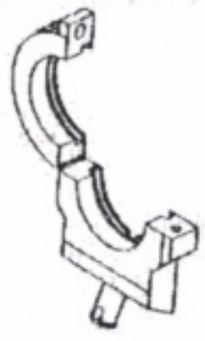


A8 : LNBf Guide Seat (2ea)

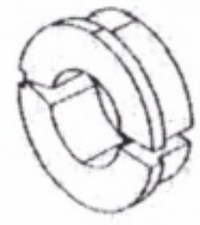


A9 : Holder Supporter (5ea)

A10 : LNBf Ku Band Holder (5ea)



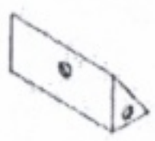
A11 : LNBf Ku Band Adapter (5ea)



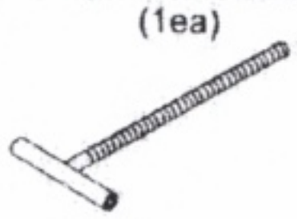
A12 : Support Arm Cap (4ea)

A13 : BKT (2ea)

A14 : BKT (1ea)



A15 : M16 T-Bolt (1ea)



B1 : M6*12 (6ea)

B2 : M6*35 (4ea)

B3 : M6*35 (4ea)

B4 : M6*37 (2ea)

B5 : M5*15 (2ea)

B6 : M5*15 (15ea)

B7 : M8*15 (1ea)

B8 : M8*15 (6ea)

B9 : M10*140 (2ea)

B10 : M10*20 (2ea)

B11 : M6 NUT (18ea)

B12 : M8 NUT (7ea)

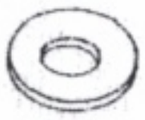
B13 : M10 NUT (4ea)

B14 : M16 NUT (2ea)

B15 : M10 SPRING WASHER (4ea)

B16 : M10 WASHER (6ea)

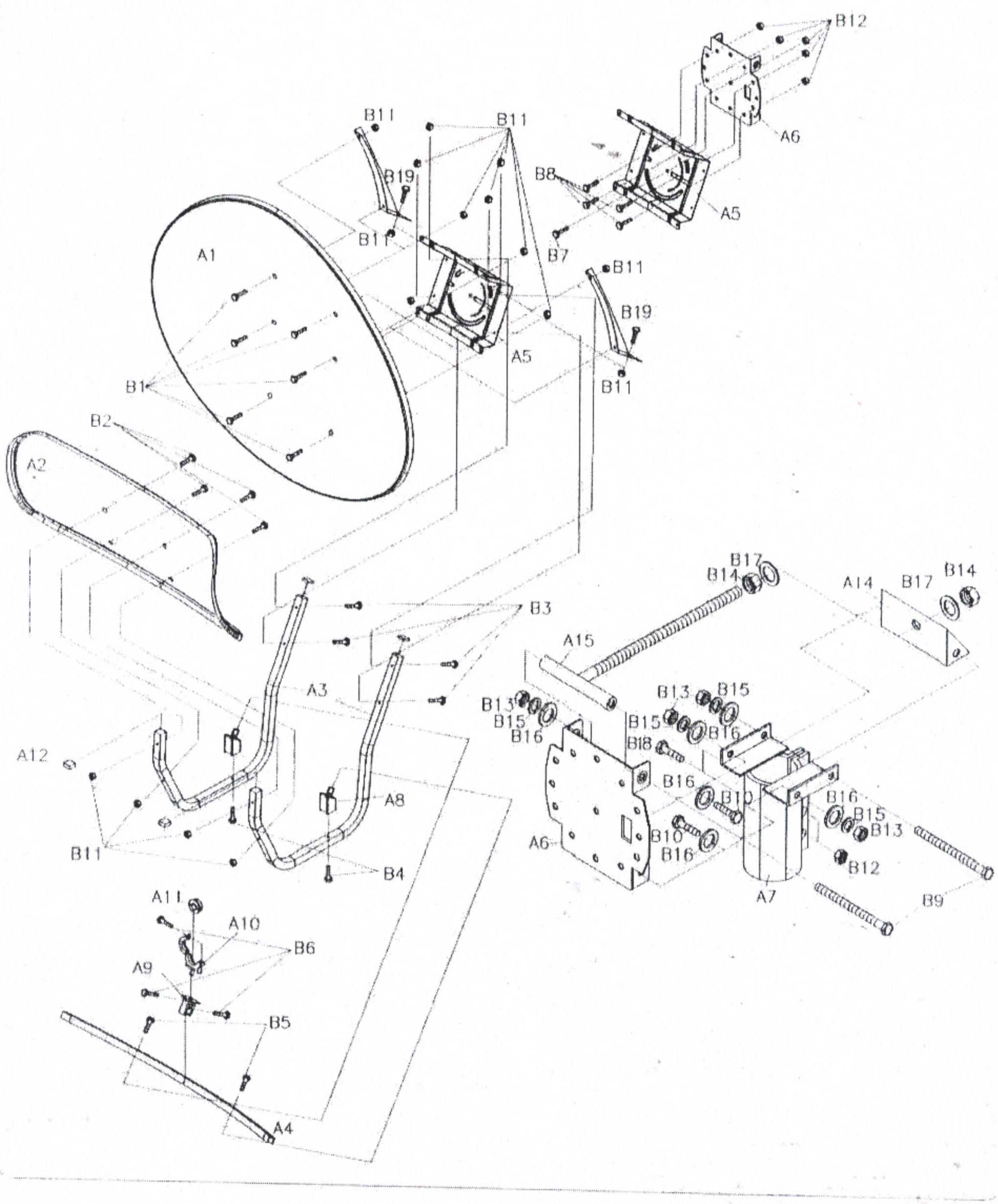
B17 : M16 WASHER (2ea)



B18 : M6*25 (2ea)

B19 : M6* 12 (2ea)

Assembly Diagram T90



Finding Angles for Your Location T90

The above chart illustrates the satellites that you can receive with T90.

1. Cut out the paper scale provided in this page and cut off the center-piece along the dotted line. Note that this paper scale has measurement from 0 to 20 to both ends. this coincidee with measurement imprinted on the LNBf guide (see parts list).

2. Select satellites that you want to receive. When you place the paper scale over satellite line on the chart, the satellites you want to receive must be visible through the cut-off area of the scale as shown on the exalple to the right.

3. Now you are ready to determine your center-satellite. The nearest satellite from 0 point on the scale is your center-satellite (B satellite on the example).

4. From the zero point on the scale, record your azimuth & elevation angles on the table provided below.

5. Use any angle measurement device, measure skew angle from the table. On the example, skew angle is *105 degree.

Angle	Elevation	Skew	Azimuth
Your Setting	22.0	91.8	176.1
Example	42	*105	154

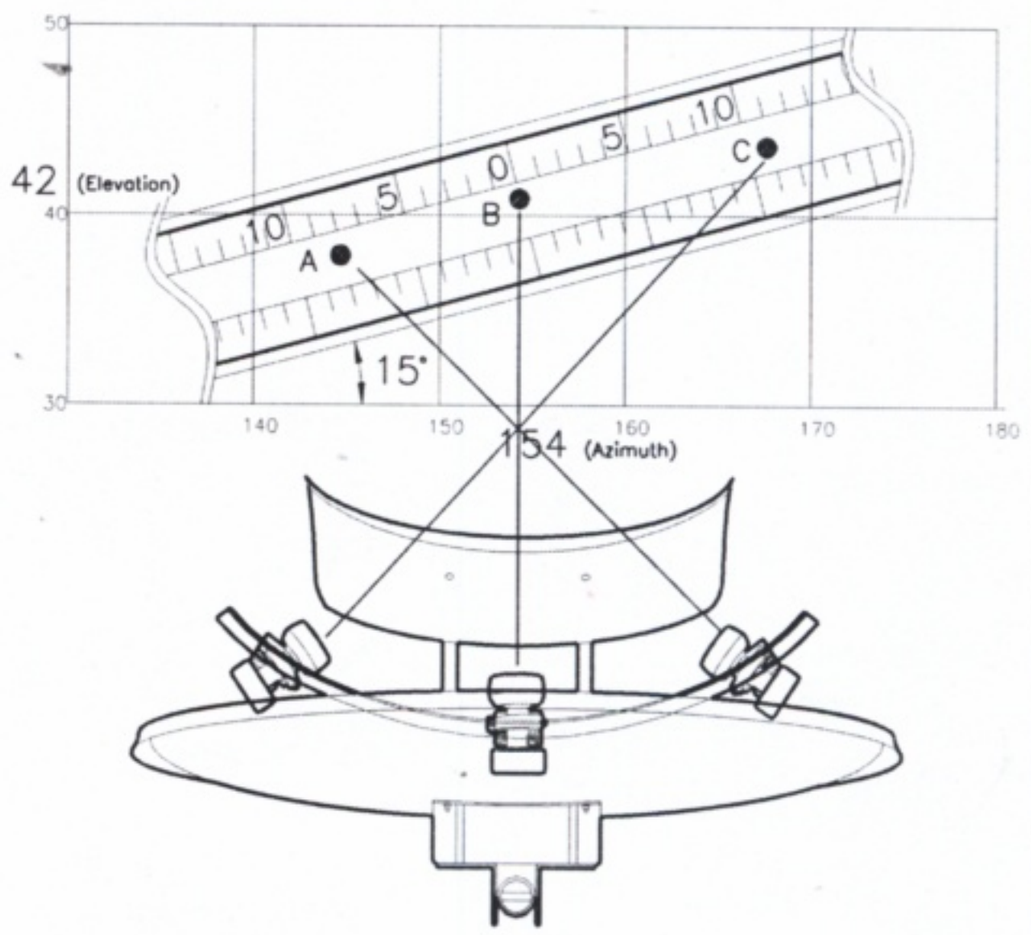
*Note : 105 = 15 + 90(Horizontal)

6. Now you are ready to find position for LNBfs on the guide (Refer to page 6 for more information). Note how LNBf guide is positioned on the illustrated example.

Satellite	28.2E	19.2E	13.0E	5.0E	0.8W
Your setting	L16.4	L6.3	R0.7	R9.8	R16.3
Example	L8	0	R11		

7. Your angles are estimated numbers using the chart above. Due to nature of multi dish, you will need to do the fine tuning as illustrated in Step 4 in page 7.

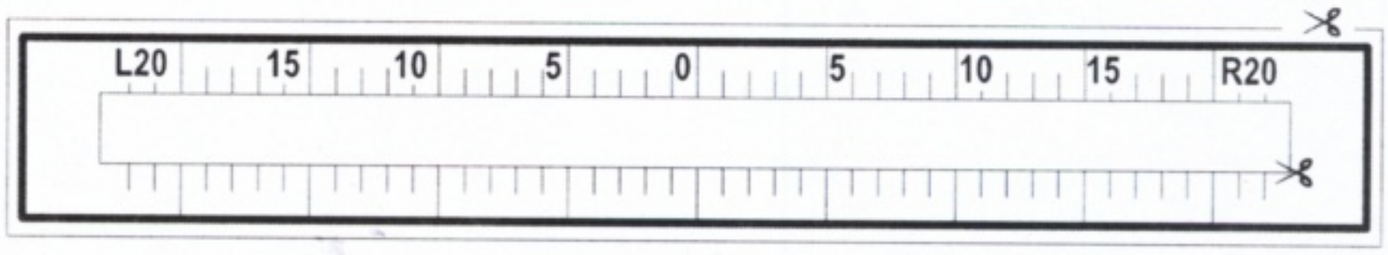
<<Example>>

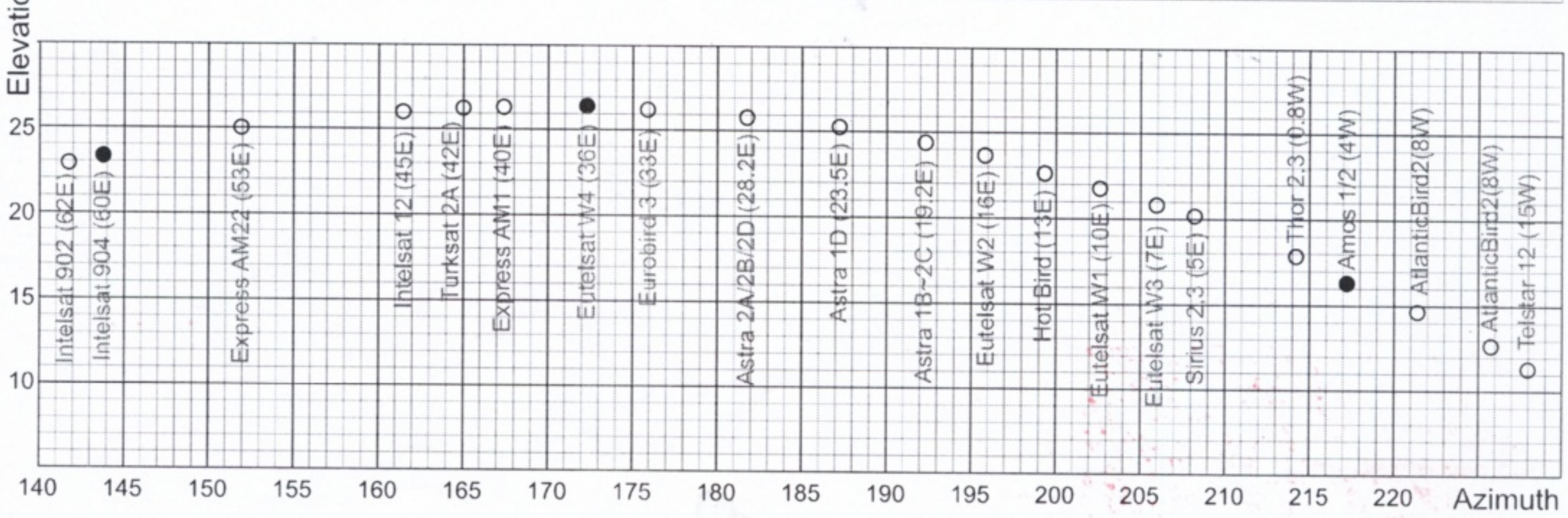


Moscow, Russia

Receivable Satellites by T55 : ●
Receivable Satellites by T90 : ● ○

Cut off the scale and use to fine Elevation, Skew & Azimuth angles.





St. Petersburg, Russia

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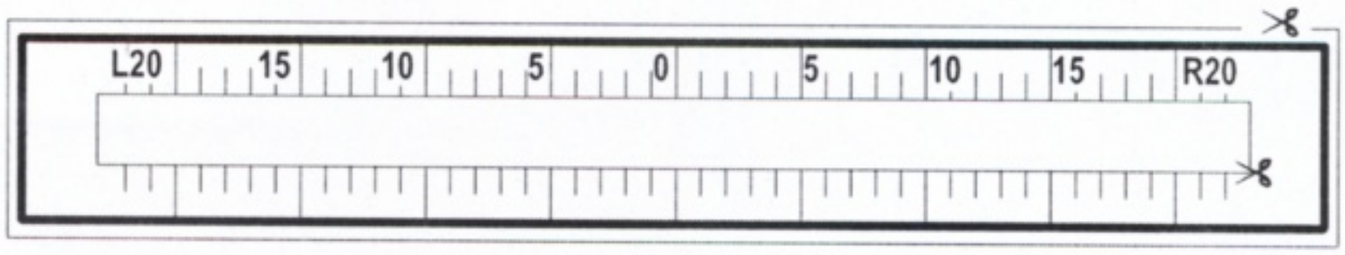
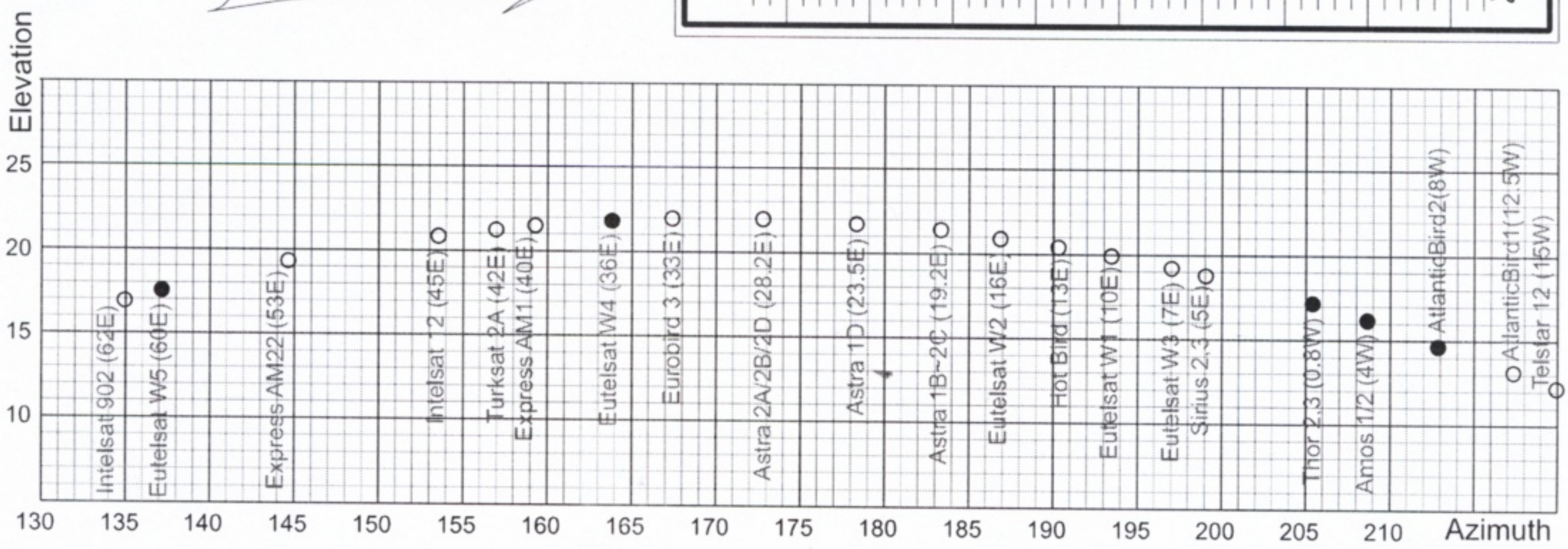
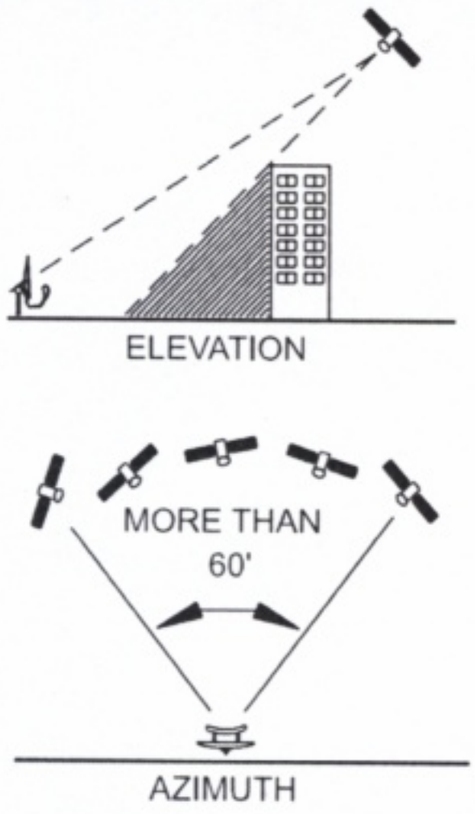




Mounting Location T90



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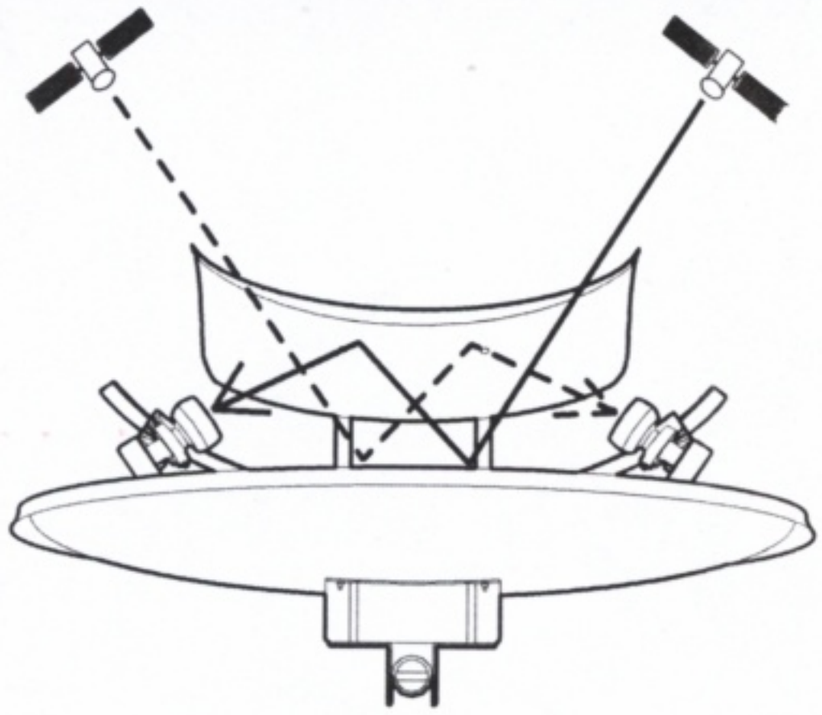
Position of LNBf with Satellite Location



1. A given signal from a satellite is reflected by the Main-reflector directly, then reflected again on the sub-reflector.
   Finally the signal reaches the LNBf.

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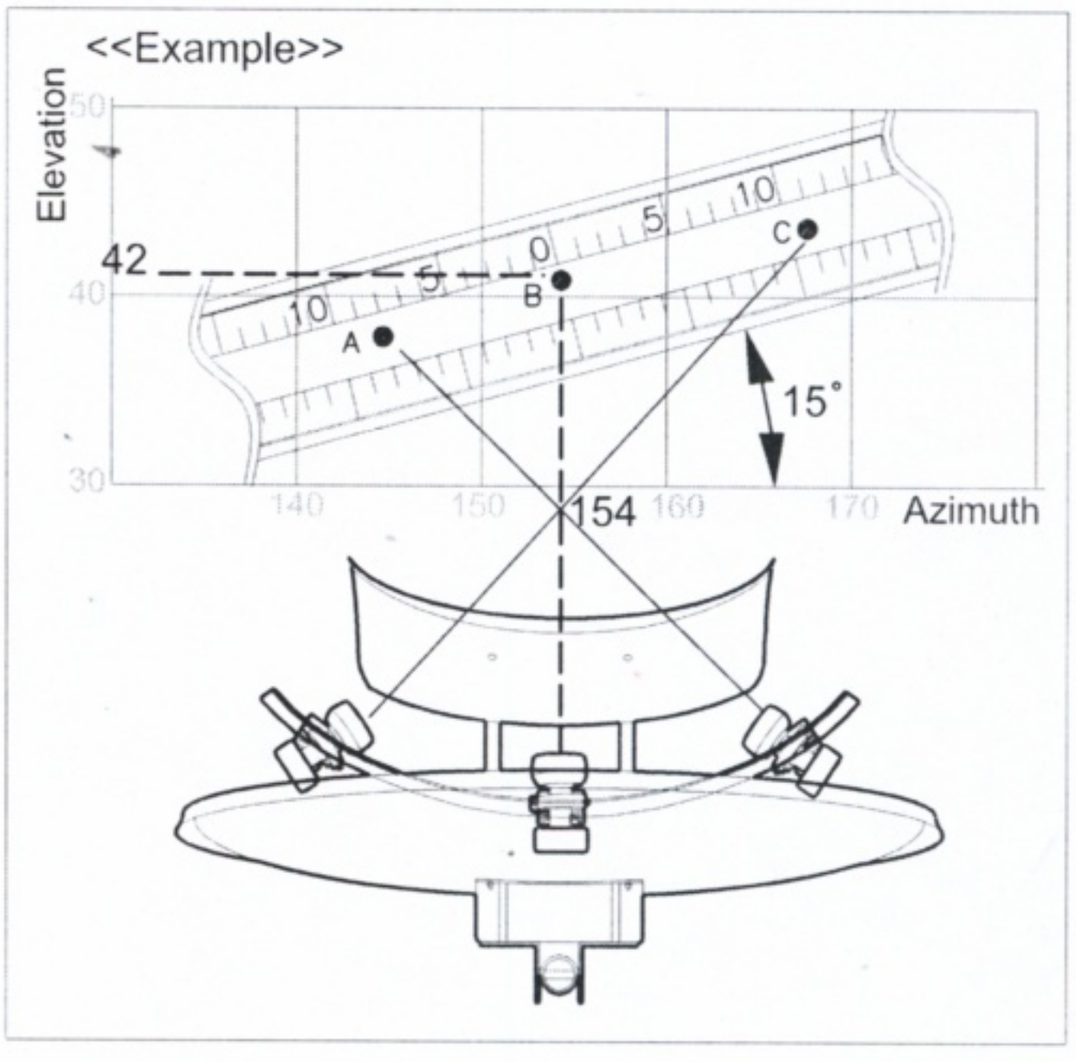
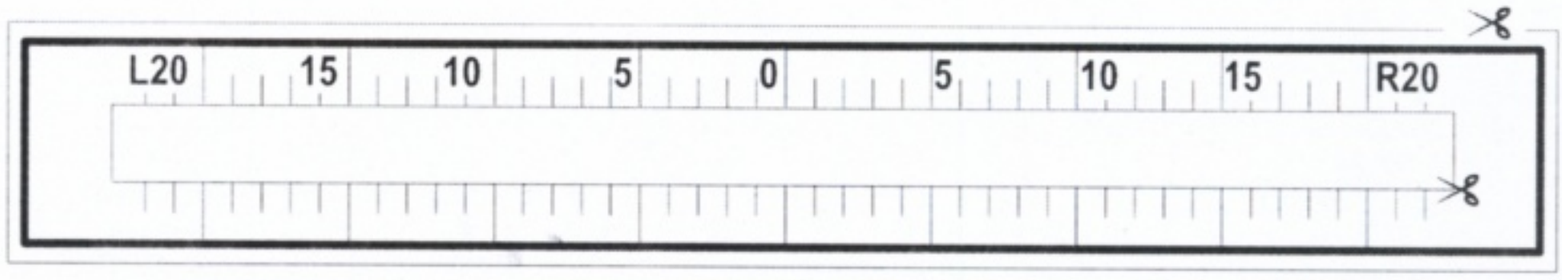
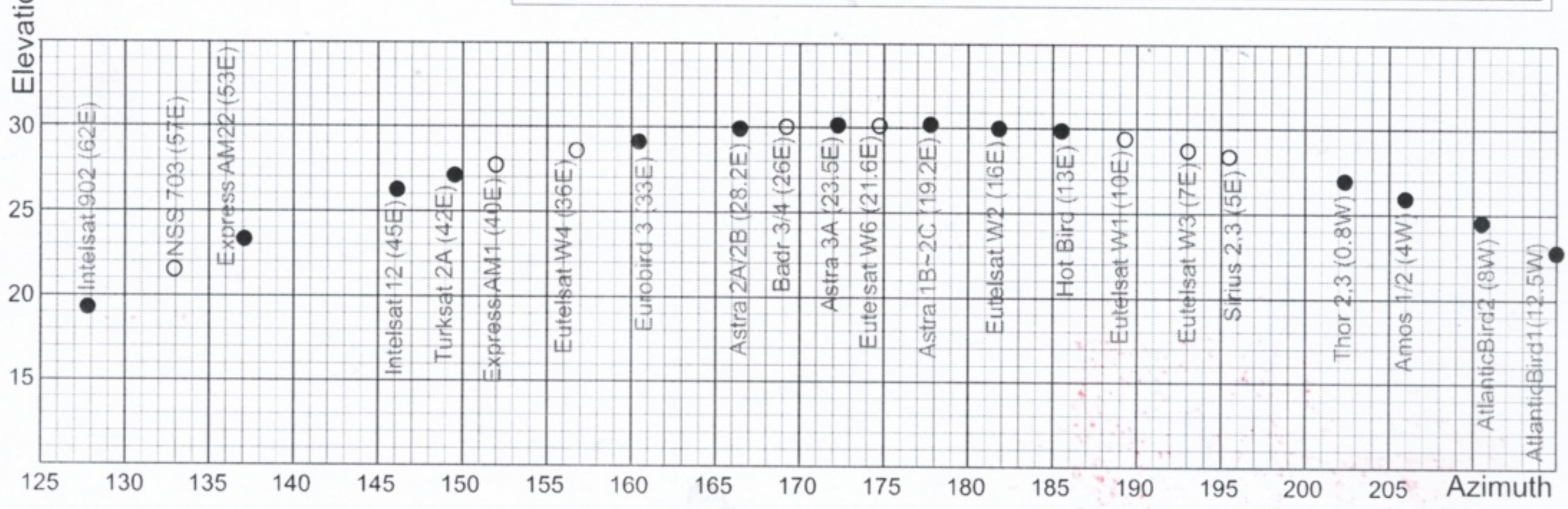


Warsaw, Poland

Receivable Satellites by T55 : ●
Receivable Satellites by T90 : ● ○

Cut off the scale and use to fine Elevation, Skew & Azimuth angles.

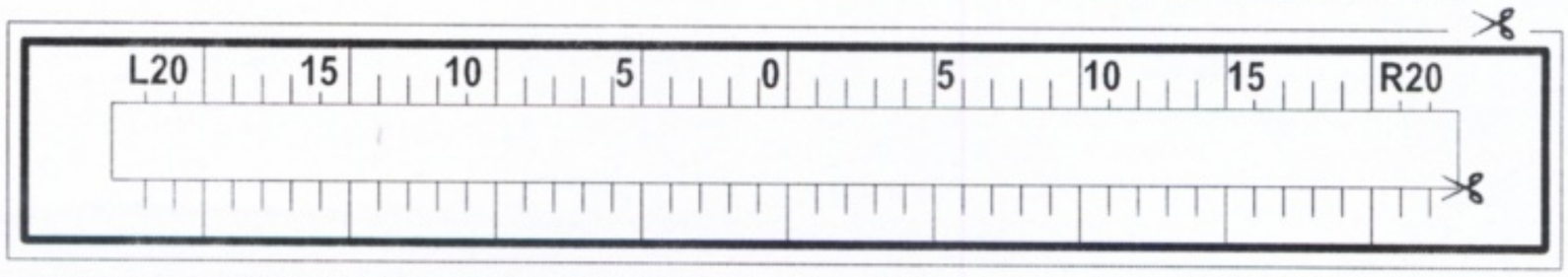


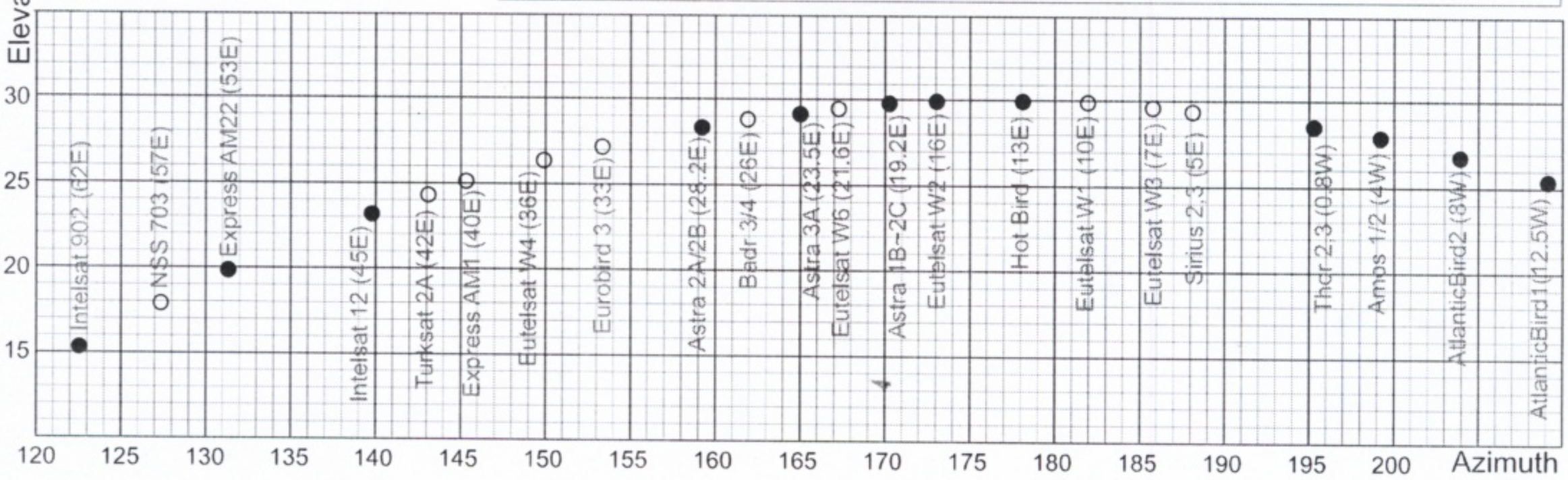


Receivable Satellites by T55 : ●
Receivable Satellites by T90 : ● ○

Berlin, Germany

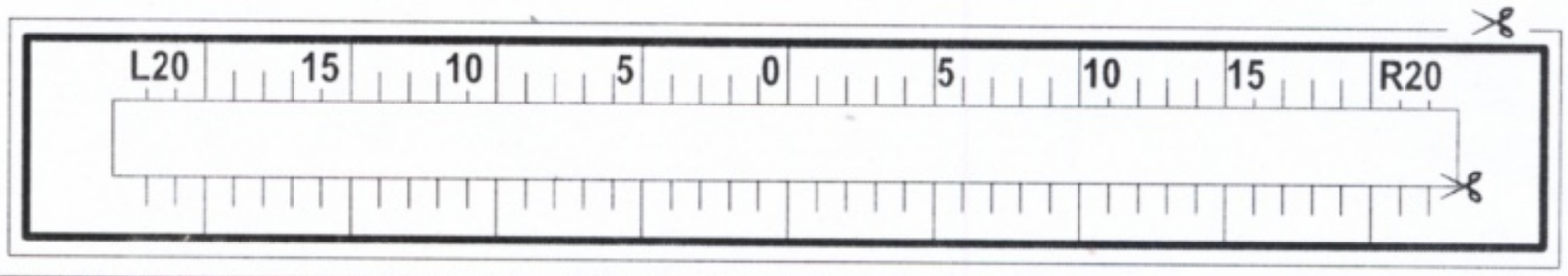
Cut off the scale and use to fine
Elevation, Skew & Azimuth angles.

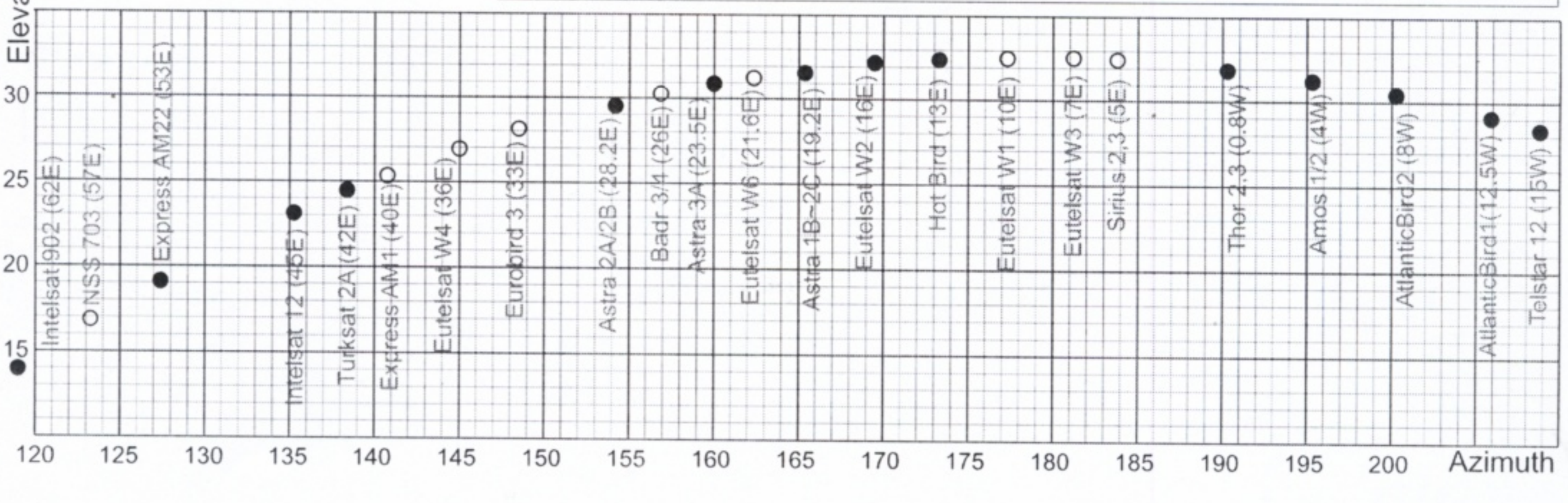




Frankfurt, Germany

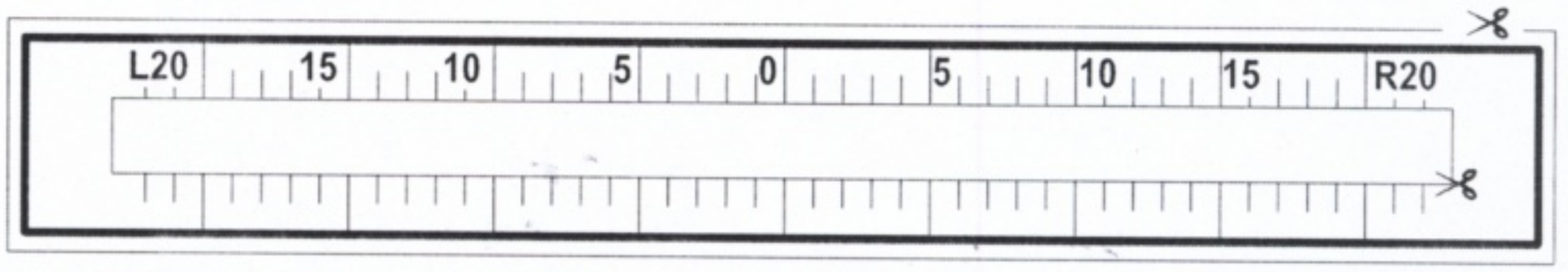
Cut off the scale and use to fine
Elevation, Skew & Azimuth angles.

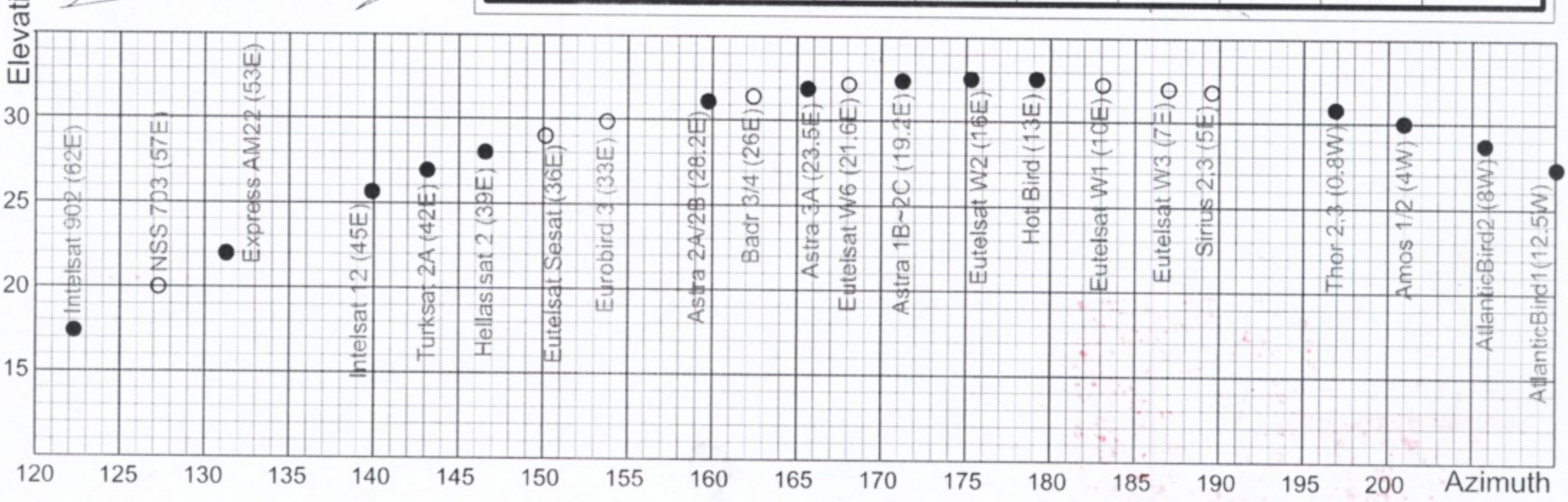




Prague, Czech

Cut off the scale and use to fine
Elevation, Skew & Azimuth angles.

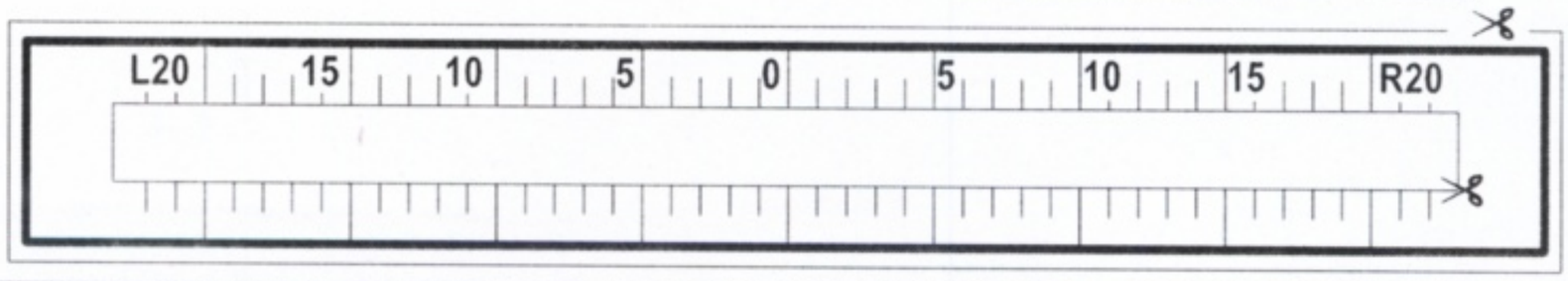


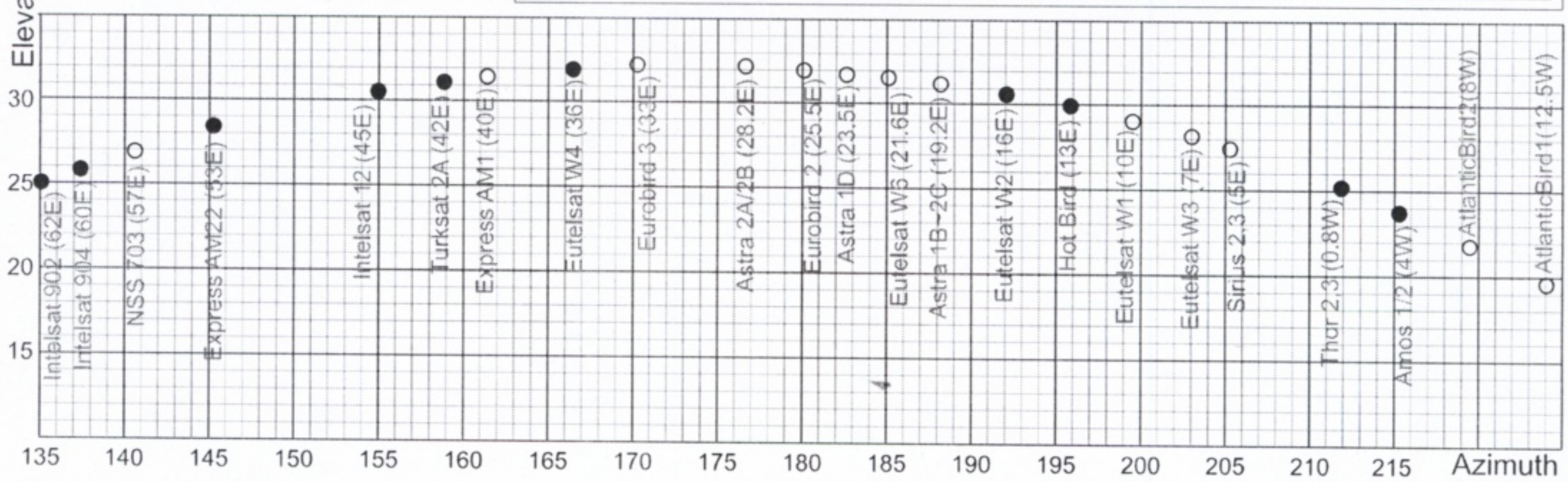


Receivable Satellites by T55 : ●
Receivable Satellites by T90 : ● ○

Kiev, Ukraine

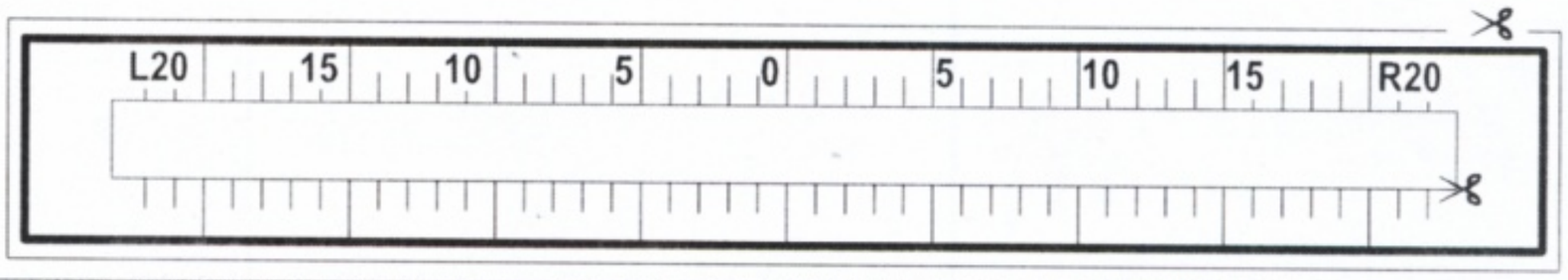
Cut off the scale and use to fine Elevation, Skew & Azimuth angles.

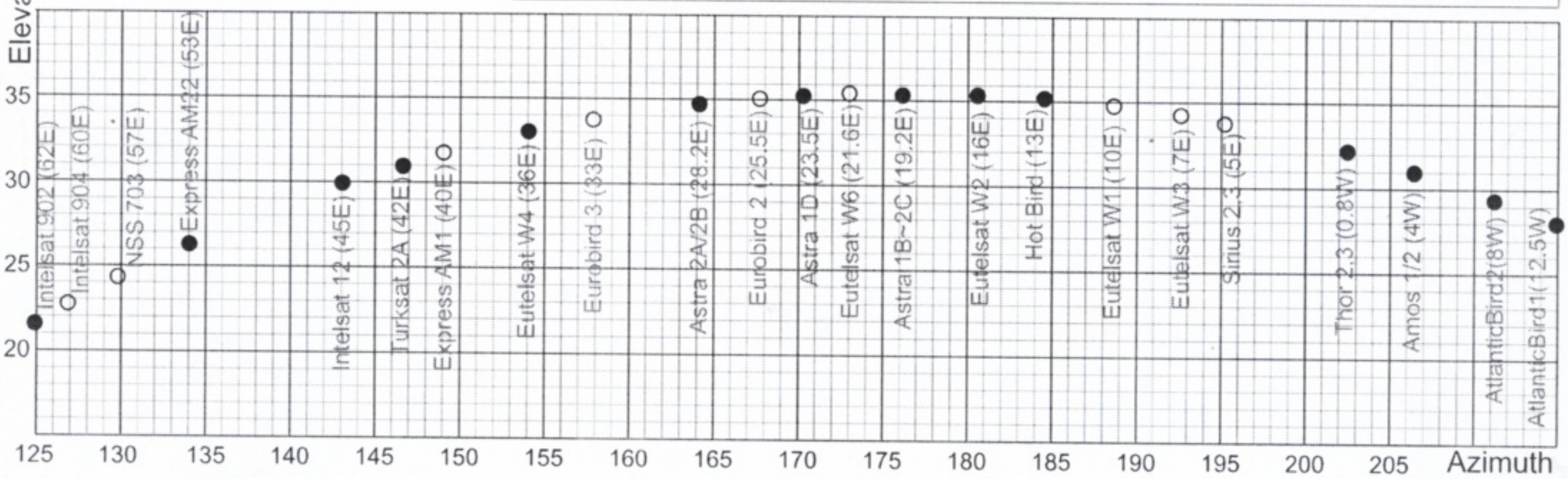




Budapest, Hungary

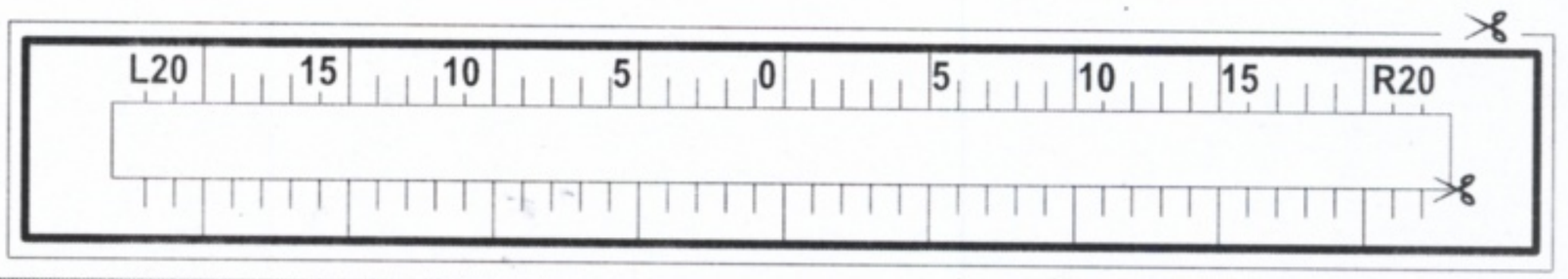
Cut off the scale and use to fine Elevation, Skew & Azimuth angles.

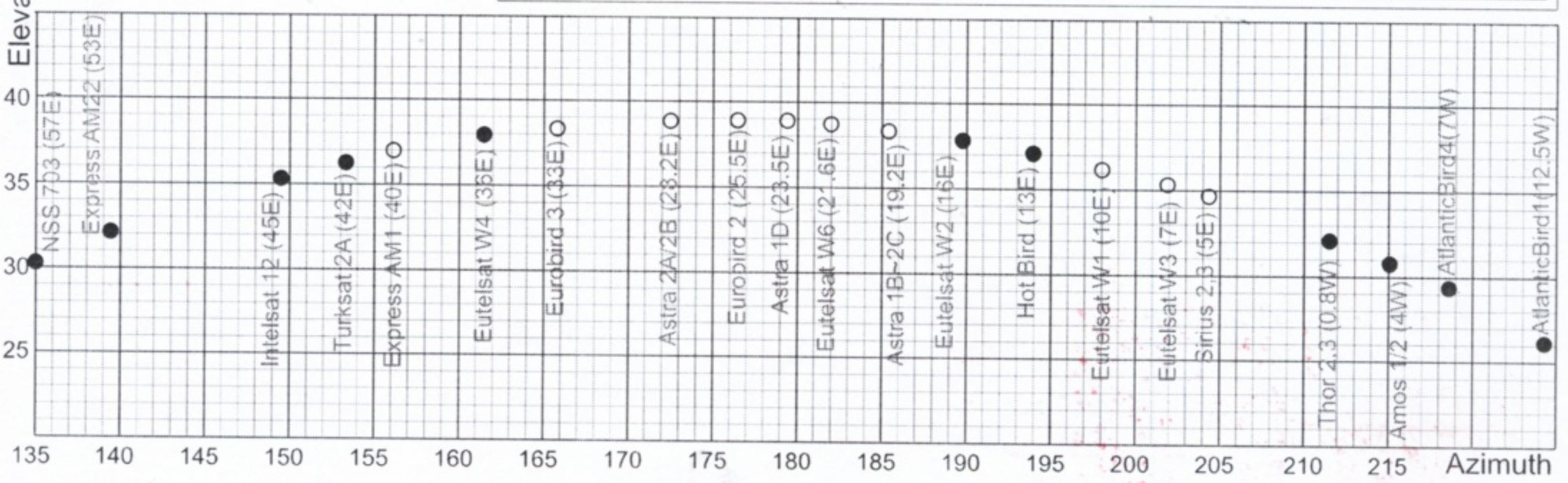




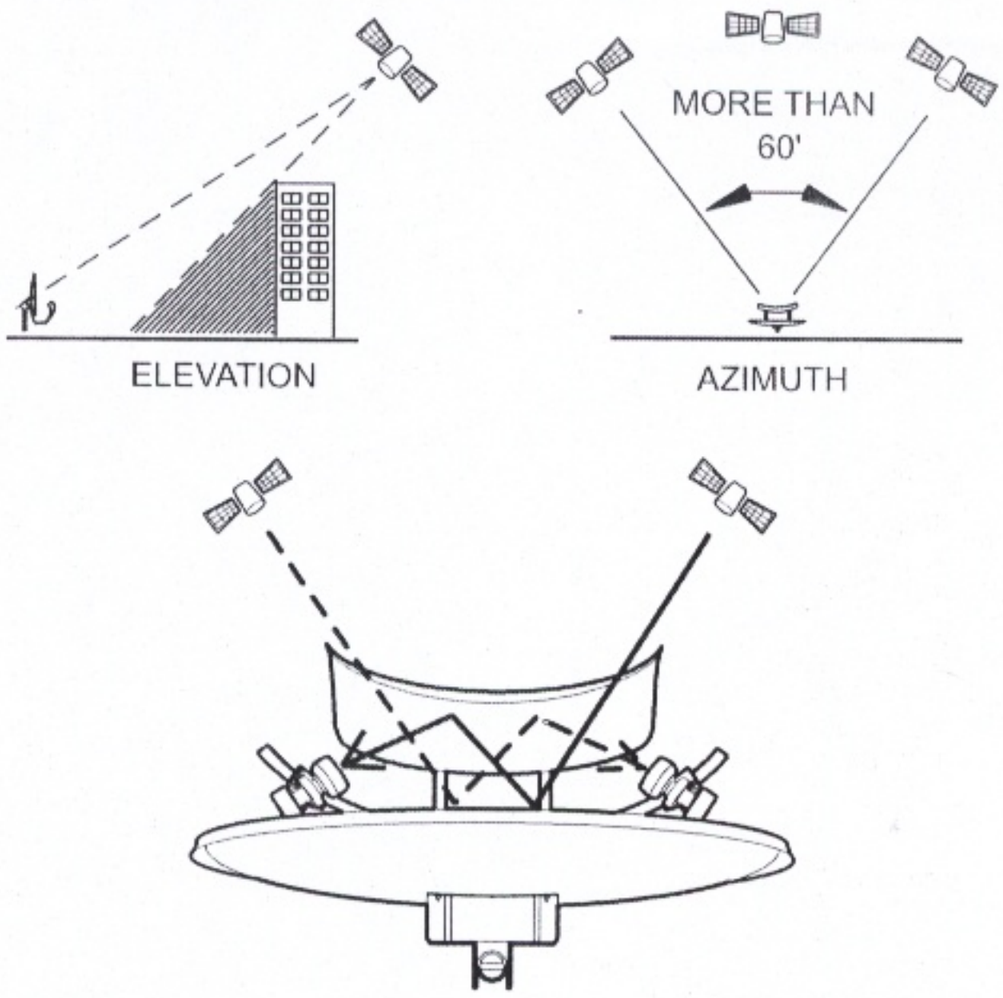
Bucarest, Romania

Cut off the scale and use to fine Elevation, Skew & Azimuth angles.





Mounting Location T90



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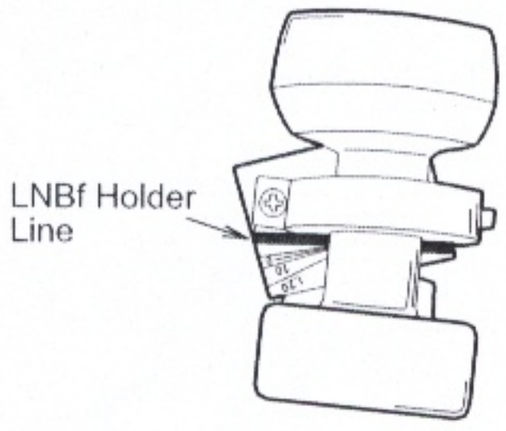
Aiming TOROIDAL 90 for satellites

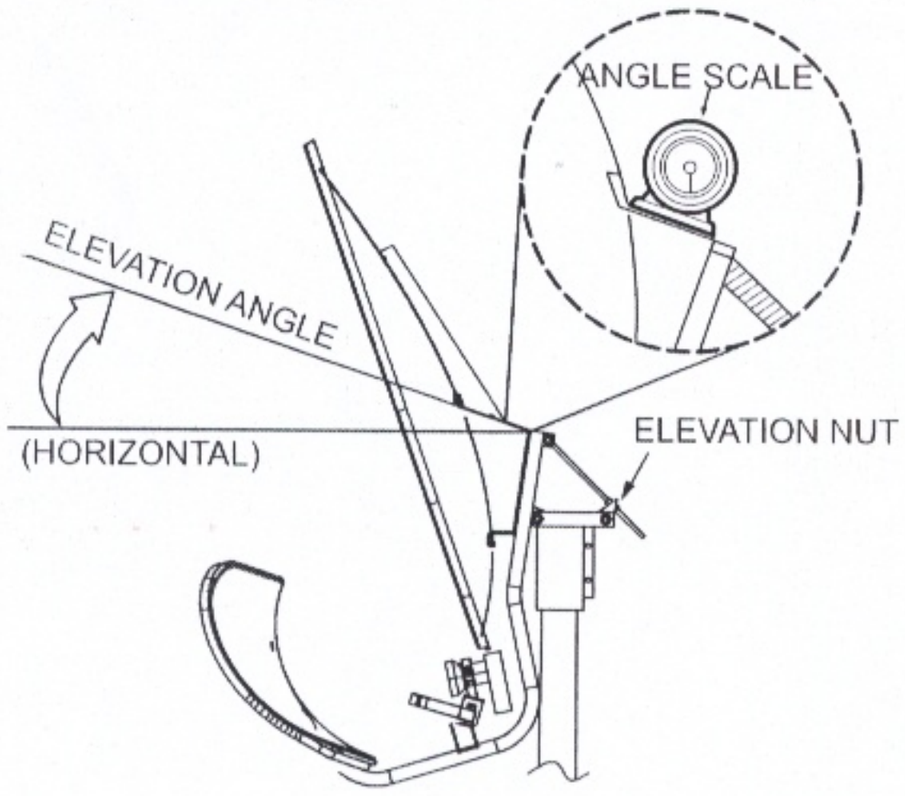
Step 1. LNBf and LNBf Holder Installation



1. See LNBf position data on page 4~6, align **LNBf Holder Line** with the corresponding scale on the holder supporter, and then tighten those 2 pieces.

2. Fix the upper assembled LNBf body on guide (See LNBf position data on page 4~6)

Step 2. Elevation Angle setting

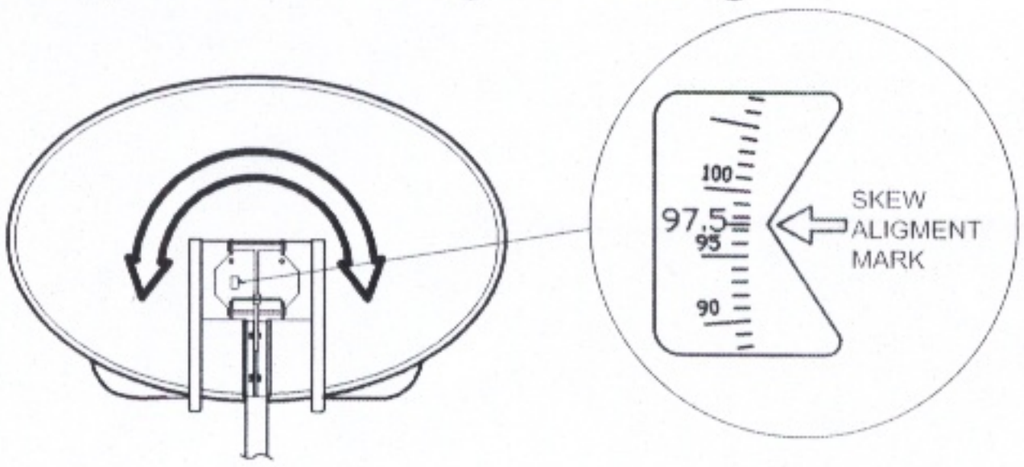


1. InsatII the pole mount vertically at exact right angles to the ground.
   This step is very important.

2. Adjust the elevation angle (See elevation angle data on page 4~6) then, tighten the elevation nut.
   (If pole mount is not precisely vertical,
   none of the adjustments will work properly)

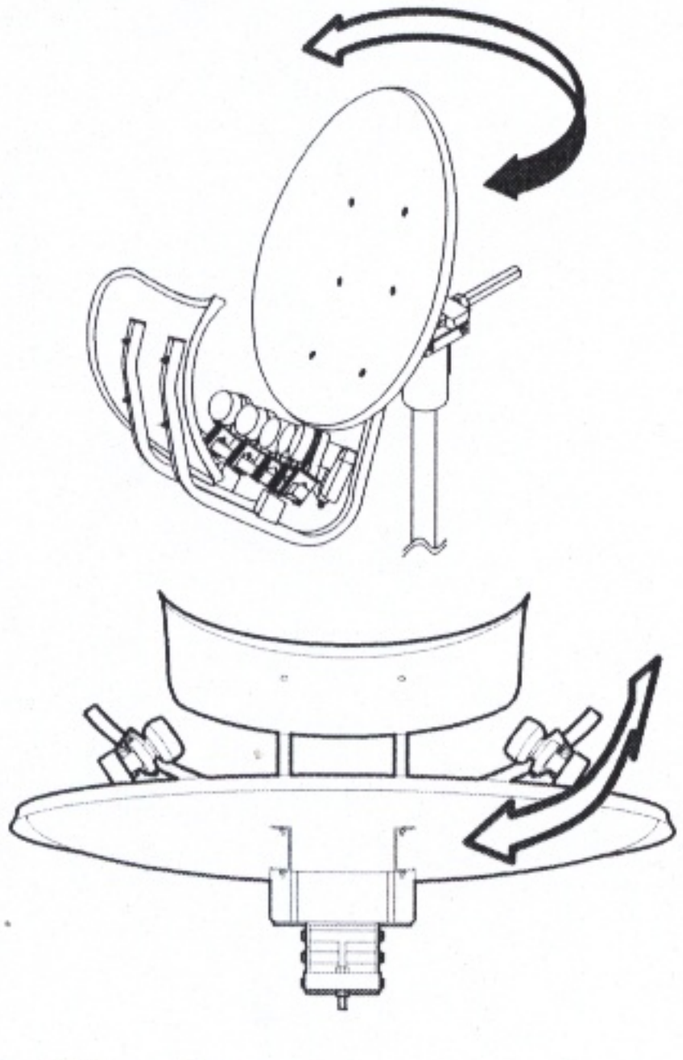
3. When the pole mount's not been installed vertically at right angles, put an angle scale on the back mount, and try Step 2-2 again.

Step 3. Skew angle setting



1. Adjust the skew angle (See skew data on page 4), then tighten the skew nut.

Step 4. Azimuth angle setting



1. See azimuth data on page 4. Turn the dish horizontally until your receiver shows the greatest signal strenght for the satellite corresponding to the center-installed LNBf and then tighten the dish.

2. Now you have a strong signal for the center-installed satellite, adjust other LNBfs to get the greastest signal strength.

3. Even after Step 4-1 & 4-2, you are satisfied with signal strength, please adjust the Elevation angle setting within about 1 degree to upward or downward. Then, repeat Step 4-1 & 4-2.

4. Tighten LNBf holders when all LNBf maintain a satisfactory signal.

Specifications

Model		TOROIDAL 90
Main Reflector	Height	96.7 cm (38.1 in)
	Width	108.6 cm (42.8 in)
Sub Reflector	Height	36.1 cm (14.2 in)
	Width	83.6 cm (32.9 in)
Net Weight		14.1 kg (31.0 lbs)
Operating Frequency		10.7 ~ 12.75 GHz
Polarization		Linear & Circular
Multi Satellite Azimuth Range		+/- 30 deg
Multi Satellite Arc Range		+/- 20 deg
LNB Installation		1 ~ 14 pcs
Antenna Gain (at 12.5 GHz)		39.7dB (+/- 0.45dB)
Recommended Satellite Spacing		4.5 deg
Efficiency		60 ~ 75 %
Refector Material		Galvanized Steel
Finish Coating		Polyester Power Coating
Operating temperature		-30C to +60C (-26F to +140F)
Relative Humidity		0 ~ 90%
Wind Loading	Operational	80 km/h (50 mph)
	Survival	200 km/h (125 mph)
Acceptable Pole Diameter		60 mm