XFORM | 4:1

User Manual

REZ™
ANTENNA SYSTEMS

RezAntenna.com | support@RezAntenna.com

IMPORTANT!

READ ALL WARNINGS BEFORE USING THIS PRODUCT.

WARNING: ELECTRICAL SHOCK HAZARD

DO NOT USE NEAR POWER LINES. CONTACT WITH POWER LINES CAN CAUSE AN ELECTRICAL SHOCK. SERIOUS INJURY OR DEATH MAY OCCUR.

WARNING: TIPPING HAZARD

KEEP A WIDE RADIUS AROUND THE ANTENNA CLEAR OF PEOPLE AND OBJECTS. IF THE ANTENNA IS IMPROPERLY DEPLOYED OR IS USED IN WINDY CONDITIONS IT CAN TIP OVER. THIS CAN CAUSE SEVERE INJURY, AND OR PROPERTY DAMAGE.

WARNING: FIRE HAZARD

DO NOT EXCEED THE POWER LIMITS LISTED IN THE SPECIFICATIONS TABLE ON PAGE 1 OF THIS MANUAL. EXCEEDING THE POWER LIMITS CAN RESULT IN A FIRE. EXCEEDING THE POWER LIMITS WILL VOID YOUR WARRANTY.

WARNING: RF EXPOSURE

NEVER OPERATE THIS ANTENNA IN A WAY THAT COULD EXPOSE INDIVIDUALS TO HIGH LEVELS OF RF EXPOSURE, ESPECIALLY ABOVE 10 WATTS OR ABOVE 14 MHZ. NEVER USE THIS ANTENNA NEAR RF SENSITIVE MEDICAL DEVICES, SUCH AS PACEMAKERS.

TABLE OF CONTENTS

REZ ANTENNA SYSTEMS SCOUT XFORM 4:1

REZ-SXF-41

Thank you for purchasing your REZ Antenna Systems XFORM 4:1. This manual will familiarize you with how to set up, operate, and perform basic maintenance on your antenna. We take great pride in the build quality of our products, but should you have any issues or questions, please email us at support@rezantenna.com.

We hope you enjoy your new antenna for many years to come!

OVERVIEW & SPECIFICATIONS

The Scout XFORM series brings a new approach to portable HF antenna versatility. By utilizing the Scout feed point the XFORM allows transformer units to be swapped based on the needs of the operator. This means with one system you can create random length verticals such as the Rybakov antenna, end fed half wave antennas, random length wire antennas, delta loop antennas and more.

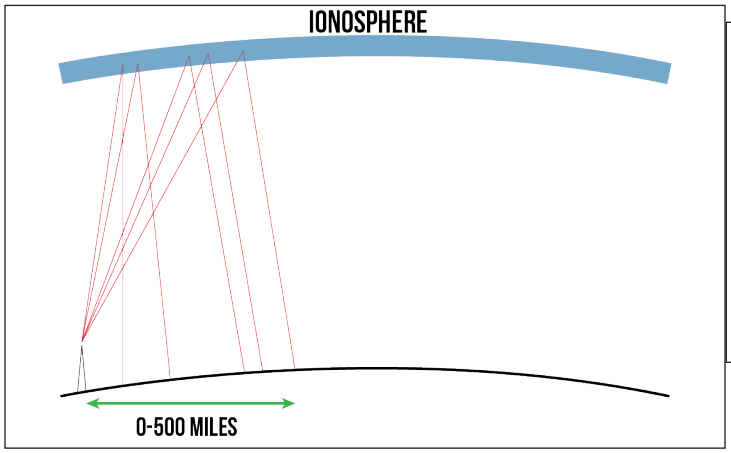
XFORM 4:1 SPECIFICATIONS	
Length	5.4”
Max Dia.	2.25”
Material	Anodized 6061 Aluminum, Acetal Polymer
Hardware	Stainless Steel
Transformation	50 ohms - 200 ohms
Power Limits	200 Watts SSB, 100 Watts CW, 75 Watts Digital (50% Duty Cycle)

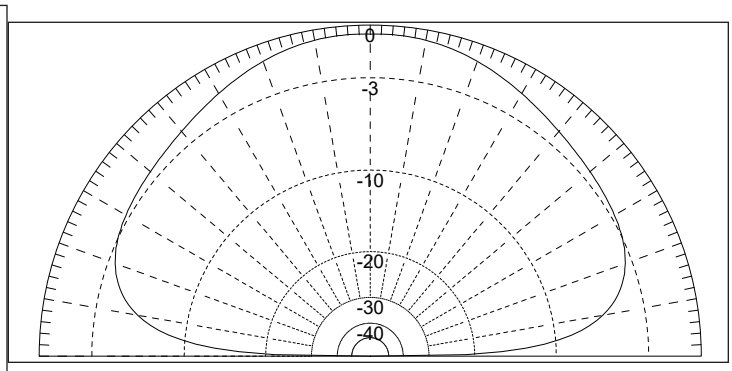
ANTENNA CONFIGURATIONS FOR COMMUNICATIONS OBJECTIVES

Different antenna setups emphasize different parts of the radiation pattern, which determines the distances and angles at which your signal is strongest. By choosing the right configuration, you can match your operating style to your communication goals.

NEAR VERTICAL INCIDENCE SKYWAVE (NVIS)

Objective: Reliable short-to-medium range communication (≈ 0–500 miles)



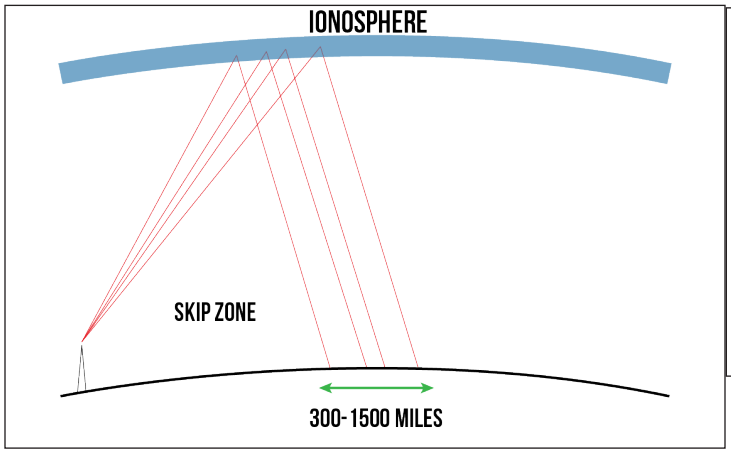


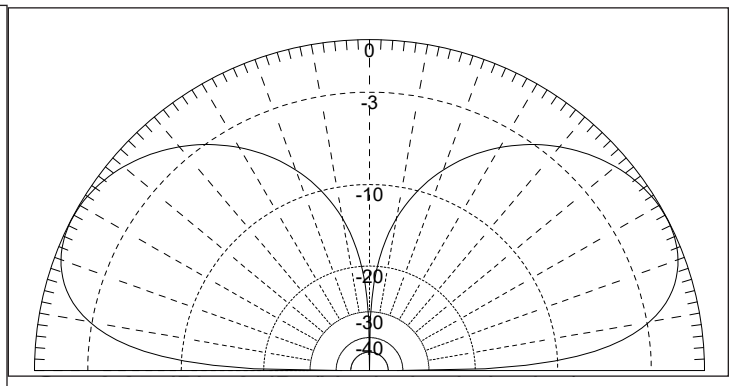
Example elevation plot of an NVIS antenna.

- **How it works:** The antenna is set up to launch signals nearly straight up. These bounce off the ionosphere and return close to the station.
- **Typical configuration:** Horizontal antennas (like dipoles or loops) at low heights — usually less than ½ wavelength above ground (20–30 feet on 40m).
- **Why choose NVIS:** Ideal for emergency communications, regional nets, and covering your state or nearby states.

MEDIUM RANGE/GENERAL PURPOSE

Balanced coverage for regional and interstate contacts (≈ 300–1500 miles)



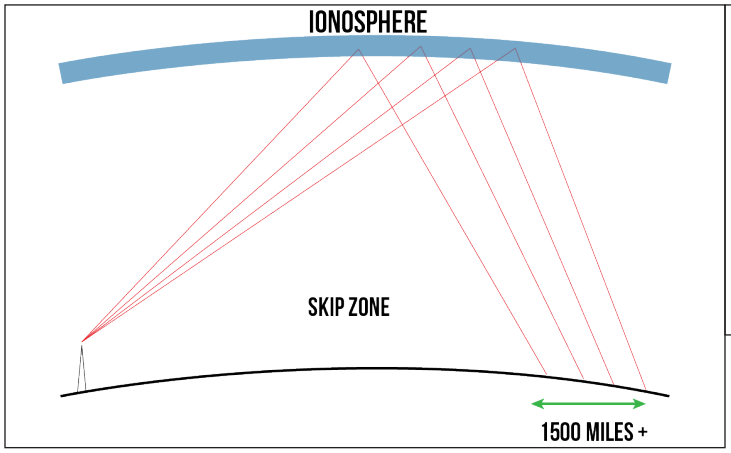


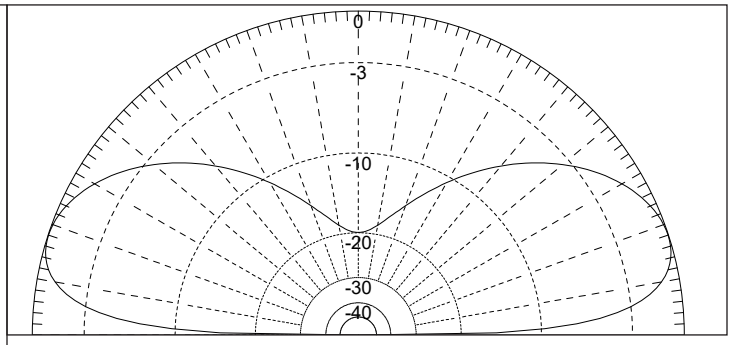
Example elevation plot of a general purpose antenna.

- **How it works:** Antennas radiate at moderate takeoff angles, giving you dependable contacts across a wider footprint.
- **Typical configuration:** Verticals with radials, sloping wires, or dipoles at moderate height (½ wavelength or more).
- **Why choose medium-angle setups:** Great for Parks on the Air (POTA), casual operating, and reliable QSOs without focusing too tightly on local or DX-only.

LONG DISTANCE (DX)

Maximize worldwide communication (1500+ miles)





Example elevation plot of a DX antenna.

- **How it works:** Antennas focus energy at low takeoff angles (below ~20°). These shallow signals refract off the ionosphere and travel the longest distances. A good DX antenna will have good gain in the 5° to 8° portion of the radiation pattern.
- **Typical configuration:** Verticals with good ground or elevated radials, phased vertical arrays, or horizontal antennas at 1–2 wavelengths high.
- **Why choose DX configs:** Best for chasing rare stations, contesting, and international contacts.

THE REALITIES OF PORTABLE OPERATION

In practice, ***no single antenna is perfect for every job***. A vertical loop might give you a good mix of medium-range and DX capability, while a low horizontal wire will shine for NVIS. Even the same configuration will have a different radiation pattern based on frequency. By experimenting with configuration and height, you can tailor your station to your specific communication objectives.

Portable operators make unique trade-offs that fixed stations rarely face. Every deployment begins with balancing size, weight, and simplicity against absolute performance.

A base station can afford to chase that final dB of gain or endlessly fine-tune antenna height, spacing, or orientation. In the field, we don't always have that luxury. Trees, terrain, available supports, park rules, and time on site all shape our choices.

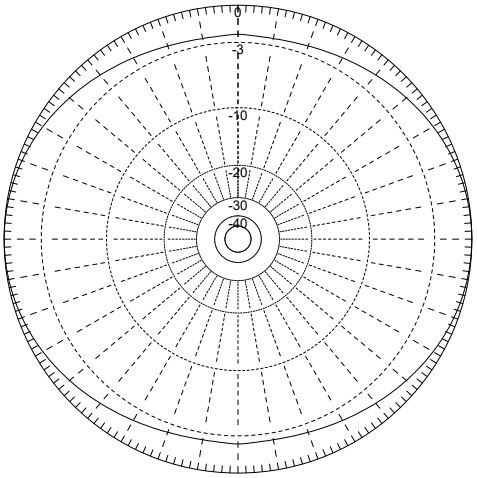
Sometimes "good enough right now" will outperform "perfect but not deployed." A slightly compromised pattern or a few ohms of mismatch is often a small price to pay for fast setup, low carry weight, and reliable operation in changing environments. Understanding these trade-offs—and how propagation shifts with height, frequency, and configuration—lets you select and deploy the right antenna for the mission at hand, whether that's NVIS coverage, regional contacts, or pushing a signal deep into the DX bands.

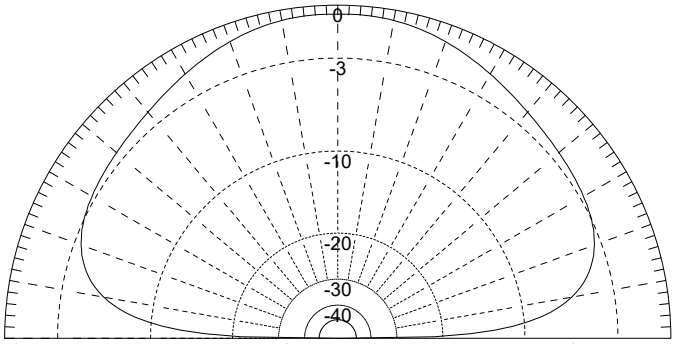
Field operation is all about making smart choices with the resources you have. To help you do that, the next section explains how to read radiation plots so you can quickly understand how each deployment affects coverage and performance.

RADIATION PLOTS: WHAT THEY ARE AND HOW TO READ THEM

Radiation pattern plots show how an antenna focuses its energy. Think of them as a "footprint" of where your signal is strongest.

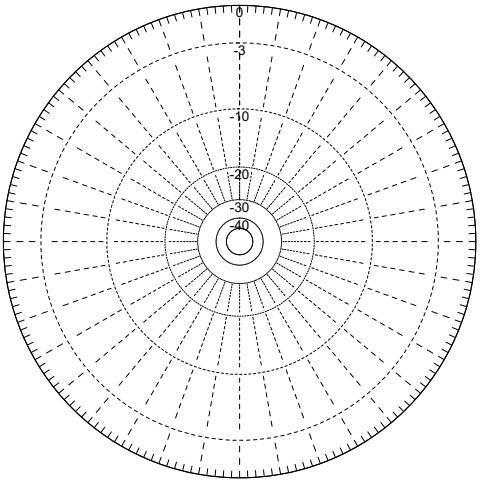
HIGH ANGLE (NVIS)

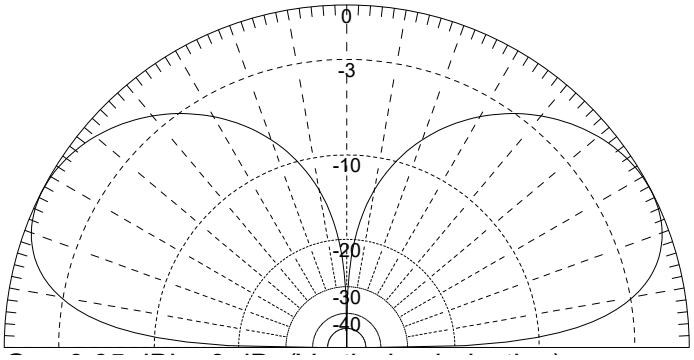




Most of the energy goes nearly straight up. On the pattern, you'll see a wide lobe pointed upward. These signals return close to your station (0–500 miles).

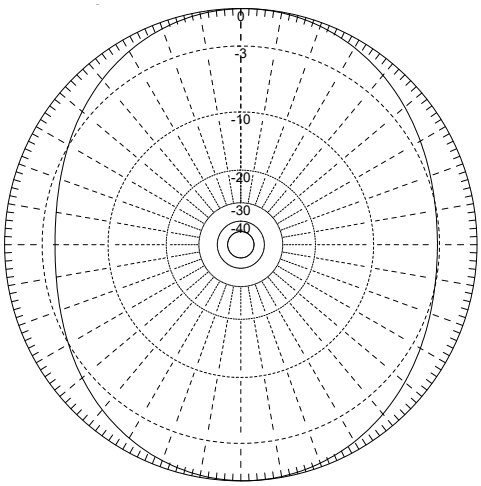
MEDIUM ANGLE

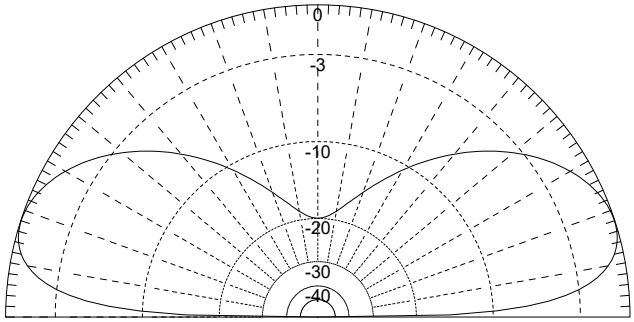




The main lobe tilts at a moderate angle. This corresponds to regional and interstate coverage (≈300–1500 miles).

LOW ANGLE (DX)

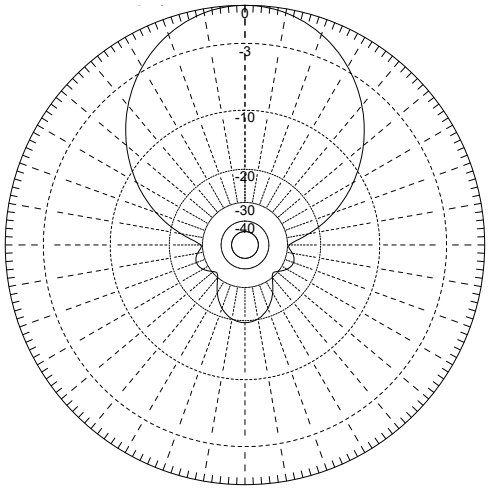




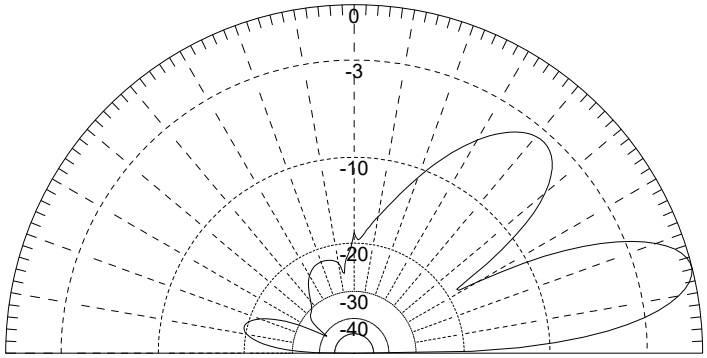
The pattern shows a narrow lobe close to the horizon. These shallow signals travel the farthest (1500+ miles), making long-distance or intercontinental contacts possible.

WHEN LOOKING AT A PLOT:

AZIMUTH PLOT



ELEVATION PLOT



These sample plots reflect a 3 element 20 meter Yagi over real ground at a 20m height.

- Horizontal axis (azimuth plot) shows direction around the antenna (like a compass view).
- Vertical axis (elevation plot) shows takeoff angle (up vs. horizon).
- The larger the lobe, the stronger the radiation in that direction.

ASSEMBLY, CONFIGURATIONS & OPERATION

Although there are many different possible configurations with the XFORM 4:1, this manual will outline the most popular configurations.

The scope of this manual is to give you basic configuration knowledge. It will cover what accessories are needed to achieve the desired configuration.

Over the next few pages you will learn how to deploy the XFORM as a vertical Rybakov antenna and a delta loop antenna. Each style of deployment has it's advantage depending on the desired outcome of your operation. As the operator, you will decide which balance of speed, performance and ease of use best fits your needs. Note that in order to use these configurations, you will need an internal antenna tuner or wide range tuner such as an LDG AT-100Pro II or similar.

ASSEMBLING THE XFORM TO THE SCOUT XF

To use the XFORM matching unit, you must first attach the Scout XF base to the lower portion of the XFORM.

1. Holding the XFORM body stationary, carefully thread the Scout XF on to the XFORM. Before applying torque, take care to ensure that the threads have engaged properly and are not cross threaded.
2. Tighten the XFORM body until there is no gap between the Scout XF and the XFORM's bottom aluminum ring. You will feel some drag on the connection as the O-ring compresses against the body of the Scout XF. Keep tightening until the O-ring compresses and there is metal to metal contact. This connection forms the electrical connection for the ground side of the system and is essential for proper operation.

ASSEMBLY, CONFIGURATIONS & OPERATION

USE WITH LEGACY (NON XF) SCOUT BASES

To use the XFORM matching unit with a legacy Scout, you must make a jumper to facilitate the ground connection.

1. Assemble your jumper using 14 AWG stranded hookup wire and 4mm banana plugs. Silicone jacketed wire is recommended for it's flexibility. Any wire smaller than 14 AWG is not reccomended.
2. Insert the jumper between the radial ports on the Scout and the jumper jack on the XFORM as shown.
3. This jumper now facilitates the ground connection rather than using the body of the Scout XF.

CHOOSING THE RIGHT ACCESSORIES FOR YOUR DEPLOYMENT NEEDS

The XFORM 4:1 is a flexible antenna system that can be deployed many ways. Your operating style and desired configuration will dictate what accessories you will need to complete your antenna system. The XFORM is offered in several different kit configurations, or you may purchase the required accessories separately.

XFORM | 4:1

CONFIGURATION QUICK REFERENCE GUIDE

PAIR THE XFORM 4:1 WITH THE FOLLOWING TO ACHEIVE THE LISTED CONFIGURATION

CONFIGURATION	REQUIRED ACCESSORIES	
DELTA LOOP	• SCOUT XF BASE • REZ MULTI MOUNT ADAPTER • (2) [Z]-17 TELESCOPING WHIPS • G SPIKE, CAMERA TRIPOD, OR SURVEYOR ADAPTER	• CM7 COMMON MODE CHOKE • REZ DELTA LOOP WIRE KIT • INTERNAL OR EXTERNAL TUNER (BAND DEPENDENT)
RYBAKOV	• SCOUT XF BASE • [Z]-25 TELESCOPIC WHIP • GROUND SPIKE, CAMERA TRIPOD, OR SURVEYOR ADAPTER	• [Z]QD RADIAL KIT • CM7 COMMON MODE CHOKE • INTERNAL OR EXTERNAL TUNER (BAND DEPEDENT)

ASSEMBLY, CONFIGURATIONS & OPERATION

CHOOSING THE RIGHT DEPLOYMENT FOR YOUR COMMUNICATIONS GOALS

Antenna performance varies significantly with both deployment type and height above ground, especially at lower frequencies such as 7 MHz. Operators focused on regional or NVIS communications will benefit from the Delta Loop when placed close to ground level, where high-angle radiation dominates.

If DX or long-range contacts are the objective, raising the loop or switching to a Rybakov-style vertical will lower the takeoff angle (TOA) and improve low-angle gain—especially on 14–28 MHz.

By adjusting the configuration and height to match current band conditions and mission requirements, the XFORM 4:1 can be optimized for everything from short-range reliability to long-haul performance.

Deployment	7 MHz Behavior	14–28 MHz Behavior	Range
Rybakov Vertical	Mid-angle TOA; moderate DX; best for regional + some long-haul	Strong low-angle DX capability	Regional + DX
Delta Loop (1 m Height)	High-angle NVIS; weak low-angle radiation	Mid-high angles; still mostly regional	Local–Regional
Delta Loop – Elevated	Mid-angle improved; usable low-angle DX	Lower TOA; strong bidirectional DX	Regional + Strong DX

EXPERIMENTER CONFIGURATIONS (UNTESTED CONCEPTS)

For those who enjoy tinkering, the configurations below offer fun, untested ways to put the XFORM 4:1 to work. Performance will depend on your setup, but experimenting with these ideas can be surprisingly rewarding.

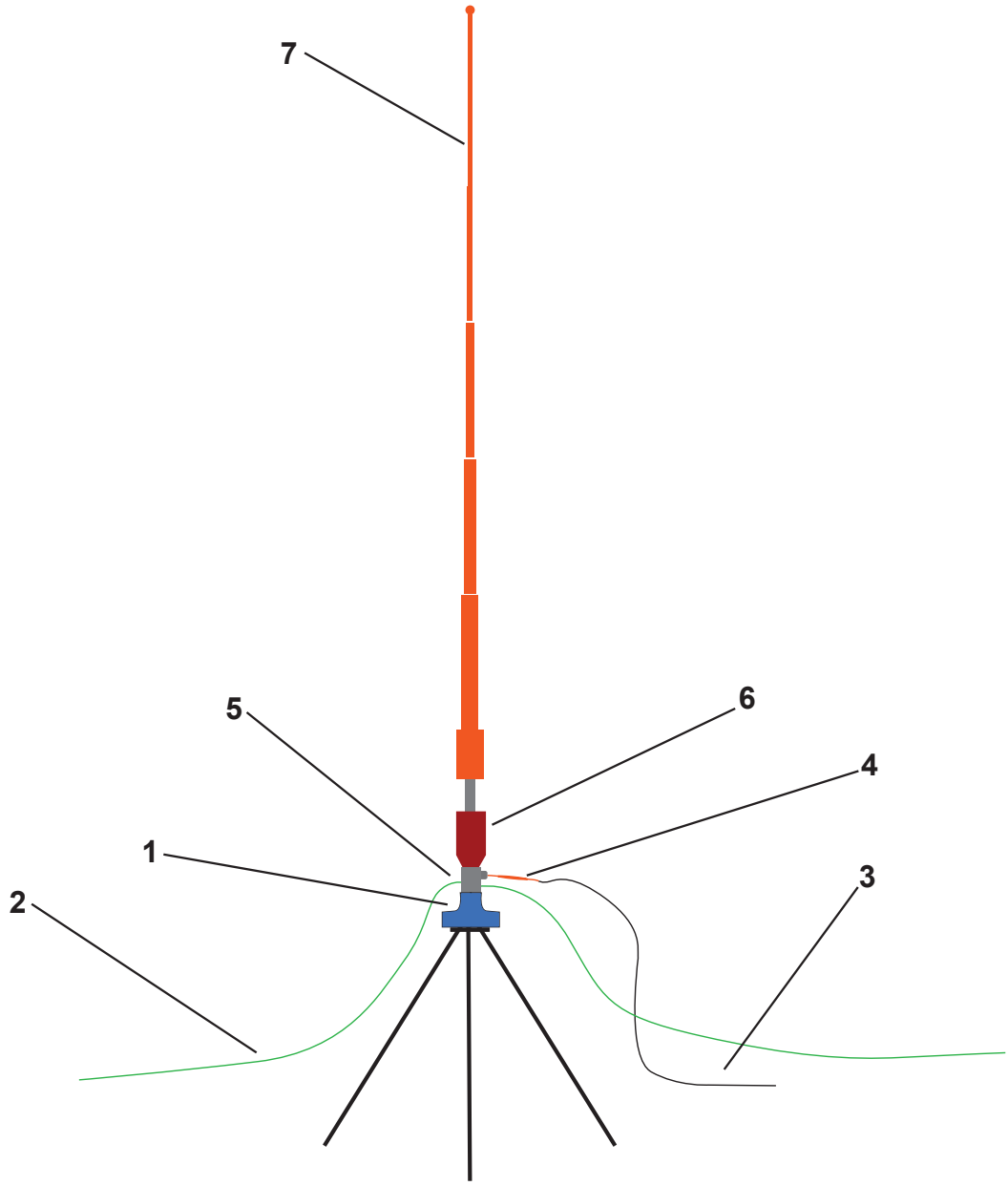
There are plenty of great articles written about these antennas. We encourage you to research them and have fun experimenting but remember: never exceed the XFORM's power ratings and always ensure SWR is low before transmitting. Operating with excessive mismatch or power can damage the unun or its housing.

XFORM 4:1 – "Experimenter" Antenna Configurations (Untested Concepts)

Configuration	Layout / Size	4:1 Matching Notes	Likely Behavior / Use
Center-Fed Double Delta	Two triangular loops forming a bow-tie/hourglass. Center feed between inner apex points. Span ~40–80 ft.	Center feed can present a few hundred ohms. 4:1 at feedpoint + tuner + choke recommended.	Broadside directional behavior. Good for experimenting with pattern control.
Off-Center End-Fed Wire (35–60 ft)	Wire fed 10–25% from one end. Works as sloper, inverted-L, or horizontal depending on supports.	Off-center feed often 150–300Ω. Use 4:1 with short counterpoise and tuner.	Compact multiband option. NVIS/regional on lower bands, DX on 20m+.
Full-Wave Loop (Offset-Fed)	1λ loop with feedpoint placed 10–20% off a corner/side to raise impedance.	Offset feed typically 180–300Ω. Works well with 4:1 + tuner + choke.	Lower noise than end-fed wires. Some directional behavior on upper bands.

CONFIGURATIONS

RYBAKOV VERTICAL



PRODUCT KEY / DESCRIPTION		
1	Surveyor Tripod Adapter	REZ-STA
2	Radials	3 x 33' Radials (REZ-ZQD-RK)
3	Coax	RG8x, RG316, etc.
4	Common Mode Choke	REZ-CM7 Inline CM Choke
5	Scout XF	REZ-SCOUT-XF
6	XFORM 4:1 UNUN	REZ-SXF-41
7	25' Telescopic Whip	REZ-Z25SS

CONFIGURATIONS

ASSEMBLING THE RYBAKOV VERTICAL

The Rybakov antenna is a non-resonant, random-length vertical radiator fed through an impedance transformer. In this configuration, the XFORM 4:1 UNUN helps match the [Z]-25 telescopic whip to the feedline, while radials provide the necessary counterpoise.

Because the radiator length is not tuned to any single band, it will present varying impedances across HF. The 4:1 transformer brings those impedances into a range where your antenna tuner (ATU) can achieve a match, making it possible to operate effectively across multiple bands.

You will need the following equipment:

- XFORM 4:1 assembled with Scout XF base. **(FIG. A)**
- Ground Spike, Multi-Mount with Camera Tripod, or a Surveyor Adapter and surveyor's tripod.
- [Z]-25 telescoping whip
- CM7 common mode choke
- A minimum of (3) 33' radials

Assembly Procedure (Rybakov Vertical)

1. Set up and properly secure the support (tripod, spike, etc.) for the base.
2. Thread the ground side stud into your support. The ground side stud is the stud closest to the integrated radial ports. **(FIG. B)**
3. Thread the [Z]-25 telescoping whip into the coupling nut on the XFORM **(FIG. C)**
4. Deploy your radials and plug them into the integrated 4 mm radial ports. **(FIG. D)**
5. Fully extend the [Z]-25 whip.
6. Connect the CM7 to the Scout base.

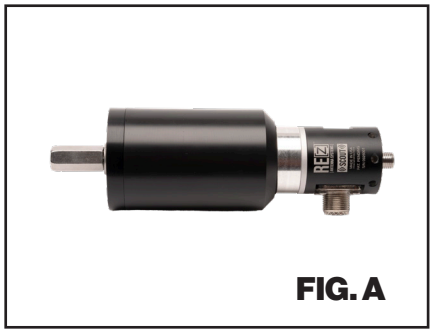


FIG. A

FIG. B

FIG. C

FIG. D

CONFIGURATIONS

OPERATING THE RYBAKOV VERTICAL

Tune:

- Choose your desired band.
- Follow the tuning procedure recommended by your tuner's manufacturer to obtain a low SWR.
- Always begin with low transmit power during tuning.

Operate:

- Once tuned, raise power to your operating level.
- Re-tune each time you change bands.

TIPS AND LIMITATIONS

Random-Length Principle:
The [Z]-25 whip is not resonant on any specific band — it relies on the XFORM 4:1 and your tuner to provide multi-band coverage.

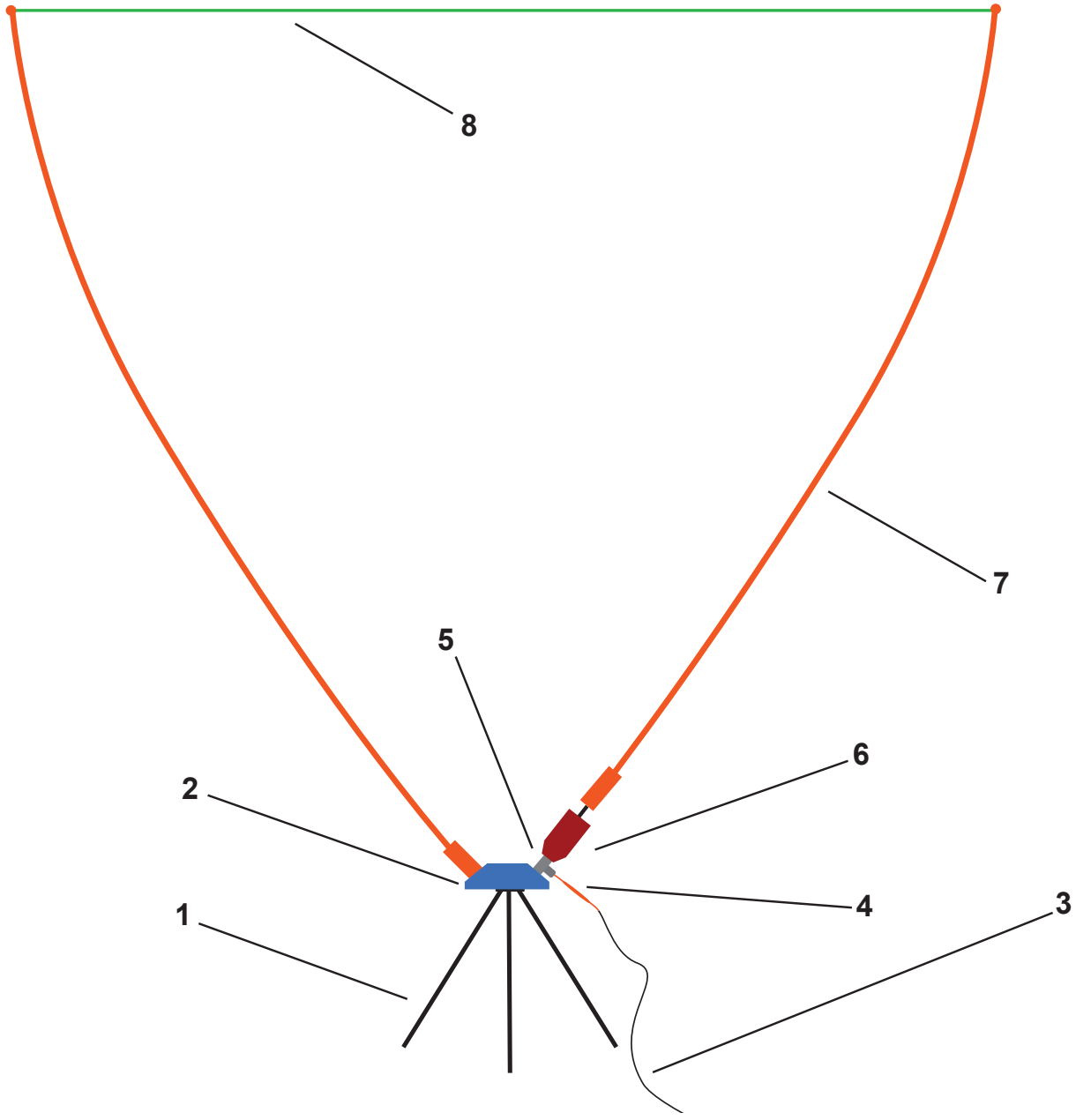
Efficiency:
The antenna will be more efficient on some bands than others. Lower HF bands (40m) may show reduced efficiency compared to higher bands due to radiator length.

Tuner Required:
This setup will not perform correctly without an antenna tuner. An external ATU may offer better range and efficiency than some built-in tuners.

Environment:
Height above ground, nearby objects, and radial placement will all affect tuning and performance. Experimentation is encouraged.

CONFIGURATIONS

DELTA LOOP



PRODUCT KEY / DESCRIPTION		
1	Antenna System Support	Tripod, Spike, or Mast
2	Multi-Mount Adapter	REZ-MM
3	Coax	RG8x, RG316, etc.
4	Common Mode Choke	REZ-CM7 Inline CM Choke
5	Scout XF	REZ-SCOUT-XF
6	XFORM 4:1	REZ-XF-41
7	17’ Telescopic Whips	REZ-217SS or REZ-217SSC
8	Delta Loop Wire	REZ-DLWK

CONFIGURATIONS

ASSEMBLING THE DELTA LOOP

The Delta Loop is a triangular antenna supported by two telescopic whips and completed by the REZ Delta Loop Wire Kit. In this configuration, the radiator length is random and not resonant on any specific amateur band. The XFORM 4:1 transformer at the feed point reduces the wide impedance swings presented by the loop into a range where a tuner can match the antenna effectively.

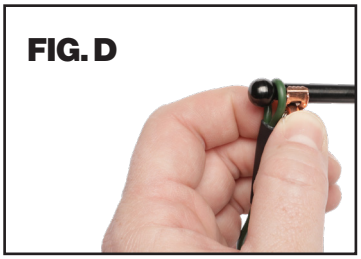
Because the loop is not cut for resonance, a tuner is always required. The CM7 choke is used at the feed point to suppress common-mode currents, ensuring the loop radiates cleanly. This system provides flexible, multiband coverage with good performance in a compact, portable package.

You will need the following equipment:

- XFORM 4:1 assembled with Scout XF base. (FIG. A)
- Ground Spike, Multi-Mount with Camera Tripod, or a Surveyor Adapter and surveyor's tripod
- If elevating the antenna on mast you will need a REZ Universal Mast Mount
- REZ Multi-Mount
- REZ Delta Loop Wire Kit
- (2) [Z]-17SS telescopic whips
- REZ CM7 choke
- Antenna tuner (external or remote recommended)

Assembly Procedure (Delta Loop System)

1. Secure the Multi-Mount to your tripod, mast, or other support using the appropriate threaded hole.
2. Thread the base stud of the Scout Base into one of the angled 3/8-24 holes on the Multi-Mount. **(FIG. A)**
3. Thread one [Z]-17 whip into the angled hole in the Multi-Mount. **(FIG. B)**
4. Thread the second [Z]-17 whip into the top of the XFORM.
5. Unravel the wire from the Delta Loop Wire Kit.
6. Place the loop of wire over the top of one [Z]-17 whip. **(FIG. C)**
7. Clip the contact clip onto the top section tube just below the loop, ensuring the wire sits between the ball tip and clip for security. **(FIG. D)**
8. Repeat this process on the opposite whip.
9. Gradually extend the sections of both whips, alternating back and forth to keep tension balanced.
10. Continue until both whips are fully extended and the top wire is taut between them.
11. Attach the CM7 choke to the Scout Base.
12. Connect coax to the choke, then run coax to your tuner or transceiver.
13. ***Pro-Tip:*** For best efficiency, use a remote tuner at the feedpoint to minimize line loss.



CONFIGURATIONS

OPERATING THE DELTA LOOP

Tune:

- Choose your desired band.
- Follow the tuning procedure recommended by your tuner's manufacturer to obtain a low SWR.
- Always begin with low transmit power during tuning.

Operate:

- Once tuned, raise power to your operating level.
- Re-tune each time you change bands.

TIPS AND LIMITATIONS

Loop Advantage:

Loops typically offer lower noise reception and improved efficiency compared to simple random wires.

Height Matters:

Elevating the loop (via mast or tripod) will improve performance and radiation pattern.

Shape:

A taut, triangular form provides consistent results. Avoid slack or uneven whip extension.

Choke Importance:

The CM7 choke is critical to suppress common-mode current and maintain clean radiation.

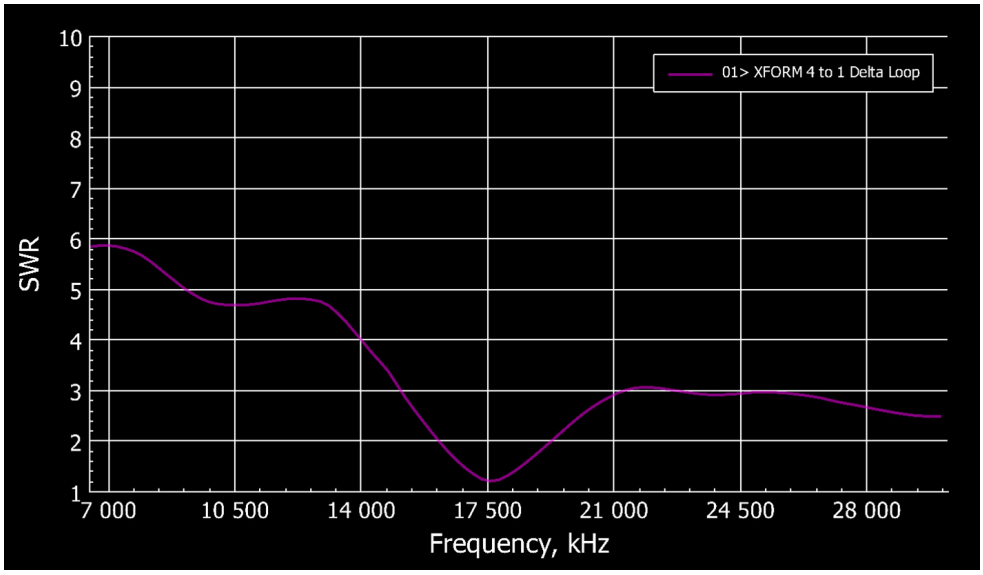
Tuner Required:

Like the Rybakov, this antenna will not function across bands without a tuner.

TECHNICAL REFERENCES

SWR CHARTS

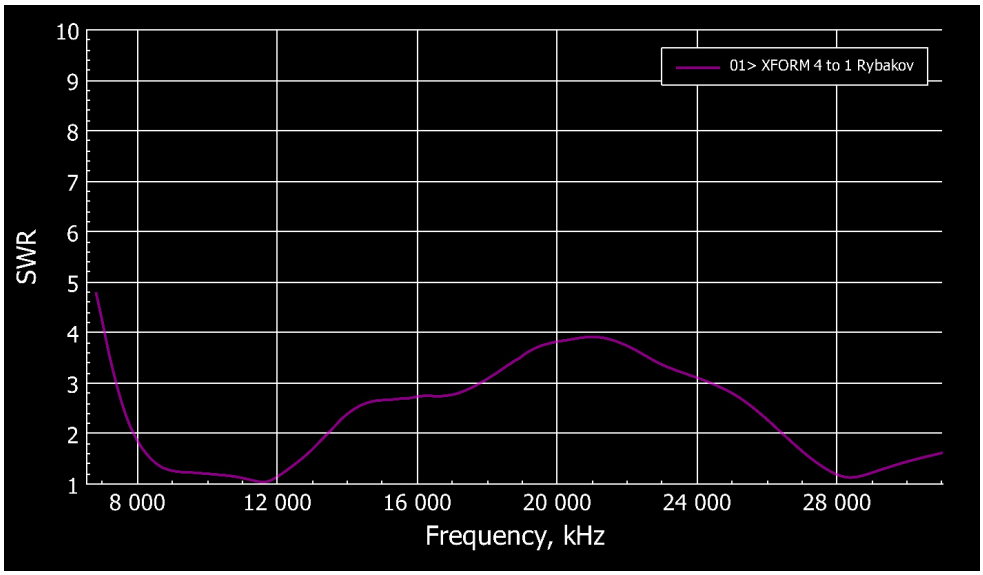
XFORM 4:1 Delta Loop



This chart represents the following antenna configuration:
2x [Z]-17 17' whip, Delta Loop Wire Kit, Multi Mount, CM7 Common Mode Choke, 50 feet RG8X coax, Feed Point at ~30", Isolated from Carbon Fiber Tripod.

Note: The chart below shows the SWR at the feed point of the 4:1 transformer. It's included simply to give you a general idea of the SWRs you can expect and whether your tuner will be able to tune this antenna.

XFORM 4:1 Rybakov Vertical



This chart represents the following antenna configuration:
Ground Spike, Insulating mount, [Z]-25 25' whip, (3) 33' radials, CM7 Choke, 50 feet RG8X coax.

Note: The chart below shows the SWR at the feed point of the 4:1 transformer. It's included simply to give you a general idea of the SWRs you can expect and whether your tuner will be able to tune this antenna.

General Maintenance

The XFORM requires very little maintenance, but following a few basic procedures will keep your antenna operating at peak performance.

After Each Use:

1. When operating in harsh environments, wipe down the unit with a damp cloth followed by a dry microfiber cloth.
2. Clean any dirt/debris from the mounting threads and jumper port.

Occasionally:

1. Inspect the O-ring seal on the lower connecting ring. Look for any tears or signs of wear.
2. Lubricate the O-ring seal on the lower connecting ring with O-ring lubricant.
3. Inspect the inner 3/8-24 mating thread. Look for signs of excessive thread wear. This is considered a wear part and may need to be replaced after 250 mating cycles.

Warranty Information

Each product is covered by a 1 year limited warranty.

REZ ANTENNA SYSTEMS LLC, warranties this product to be free from defects in material or workmanship for a period of one (1) year following the date of purchase, provided that the product is used for amateur radio purposes. This limited warranty does not cover failures due to abuse, accidental damage or when repairs have been made or attempted by anyone other than **REZ ANTENNA SYSTEMS LLC**. A defective product meeting the warranty conditions set forth herein will be replaced or repaired at no charge in the following manner:
Send the product (prepaid) to the **REZ ANTENNA SYSTEMS LLC** Service Center for repair or replacement at **REZ ANTENNA SYSTEMS LLC's** option. Proof of purchase may be required. Information about **REZ ANTENNA SYSTEMS LLC's** service center and warranty instructions can be found at www.rezantenna.com/warranty.

This warranty gives you specific legal rights and you may have other rights which vary from state to state. Should you have any questions, contact the **REZ ANTENNA SYSTEMS LLC** Service Center. This product is not intended for commercial use, and accordingly, such commercial use of this product will void this warranty. All other guarantees, express or implied, are hereby disclaimed.