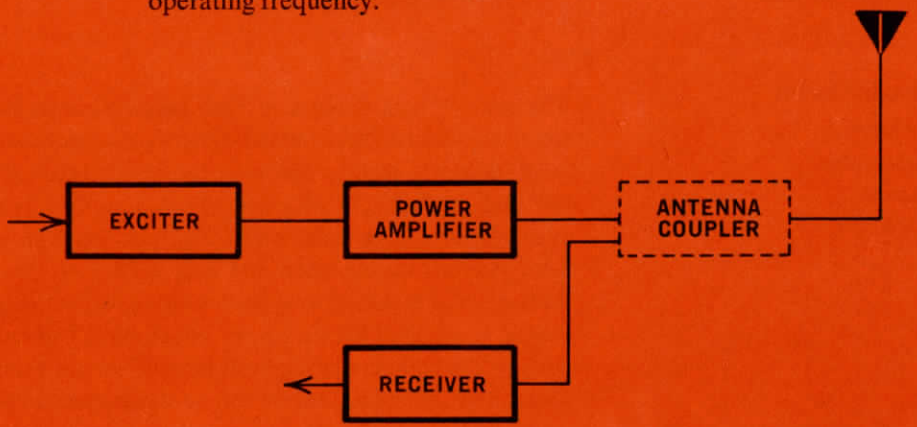
Antennas

Ground communication has posed many antenna problems, especially in the HF range where high gain antennas were inherently narrow in bandwidth. Recent development programs at Collins have led to a complete line of logarithmic periodic antennas covering the HF band. The radiation pattern and impedance of these antennas are relatively independent of frequency over wide bandwidths. The antennas shown on the following pages represent a major advance in the field and are especially effective in communication circuits requiring changes in operating frequency.



237B-1 Rotatable-Unidirectional HF Antenna

Features	Applications
Broadband Performance	*Fixed Station*
Unidirectional Operation	*Long Range*
Easily Erected	
Minimum Space	

The Collins 237B-1 is a rotatable-unidirectional HF antenna covering the 6.5-40.0 mc frequency range. The antenna provides a horizontally-polarized unidirectional beam 60° wide with a peak forward gain of 14 db. It is rated up to 50 kw PEP RF levels with less than 2:1 VSWR when terminating a 50 ohm coaxial transmission line. The array is mounted on a 90 ft. (27.4 meter) rotatable center pole supported by two side towers and a guying system. An impedance matching balun is self-contained in the radiating array structure to provide a 50 ohm coaxial input. A 50 ohm transmission line extends down inside the center pole through the rotating joint and elbow, and terminates in a 3⅛″ EIA flange below the rotator. The motor supplied with the 143A-1 or 143A-1A Azimuth Control is installed internally in the rotator. The control is mounted on a standard 19″ rack.

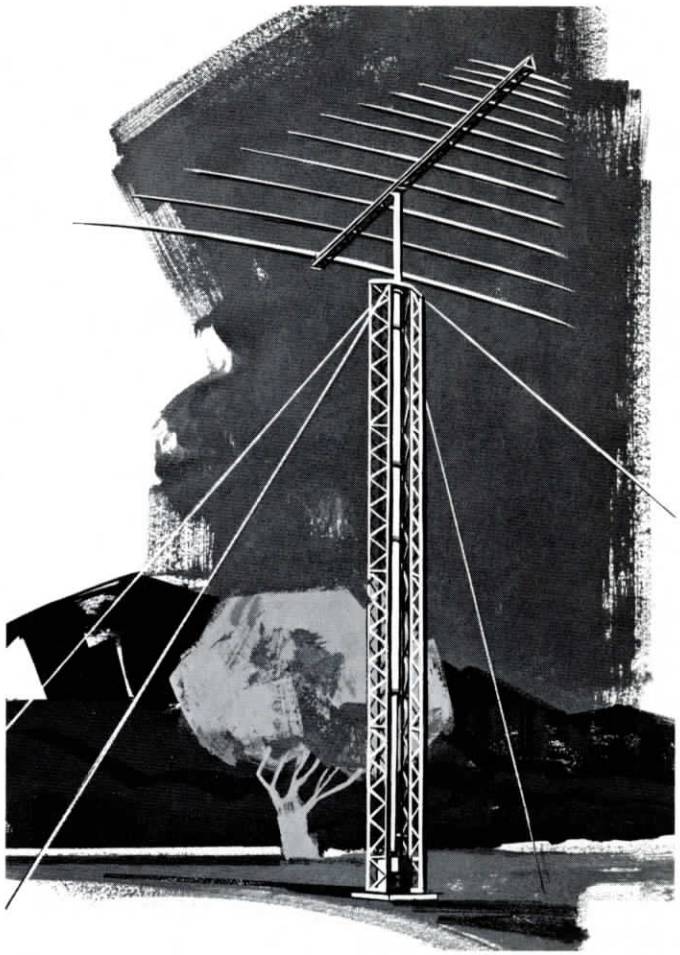
The high performance characteristics, comparable to a four element Yagi, make the 237B-1 well suited for use in long range military and commercial communication networks.

RUGGED CONSTRUCTION

The 237B-1 array and rotatable center pole are supported by two parallel 80 ft. (24.4 meter) triangular side towers and four guy cables. The motor, its control circuit, the gear reducer and rotary joint are located at ground level for easy maintenance. By opening the top split bearing, the mast and array can be lowered for maintenance. All exposed surfaces are protected by either heavy galvanizing or anodizing. The 237B-1 will withstand winds up to 120 mph (193 kmh).

SPACE REQUIREMENTS

In addition to eliminating the requirement for several antennas at a communication facility, the 237B-1 requires a square plot of only 115 ft. (35 meters) per side or 0.31 acre.



OBSTRUCTION LIGHT KIT

Two 111 watt, 115 v nonflashing beacon lights are provided for on the antenna array. A slip ring assembly mounted at the top bearing allows rotation of the light. A photo-electric switch facilitates operation in unattended installations.

FIELD ERECTION TACKLE KIT

A hand operated winch, winch line, tag lines and associated mounting hardware for lowering the center pole and boom without the use of heavy equipment are included.

Accessories

143A-1,-1A AZIMUTH ROTATION CONTROL

These rotation controls, when used with the 237B-1 antenna, provide remote selection of 30° increments of azimuth. Included with the 143A-1 or 143A-1A are the ½ hp motor and motor control which mount in the rotator. Also included is the control panel for installation at the remote operating position. A 16-conductor control cable is required between the antenna rotator and the remote control panel. Conductor size of #20 AWG can be used for separations up to 2,500 ft. (760 meters). The 143A-1 operates from a 60 cps source and the 143A-1A from 50 cps.

Specifications

FREQUENCY RANGE: 6.5-40.0 mc.

POLARIZATION: Horizontal.

IMPEDANCE: 50 ohms.

VSWR: Less than 2:1 with respect to 50 ohms.

POWER HANDLING CAPABILITY: 50 kw peak; 25 kw average.

AZIMUTH BEAMWIDTH: 60° independent of frequency.

VERTICAL BEAMWIDTH: Varies with operating frequency.

PEAK GAIN: 14 db over isotropic; independent of operating frequency.

Specifications *(continued)*

FRONT-TO-BACK RATIO: 18 db average.

INPUT RF CONNECTOR: 3⅛" coaxial flange, coaxial bullet supplied.

OVER-ALL HEIGHT: 105 ft. (32 meters).

BOOM LENGTH: 61 ft. (18.6 meters).

LONGEST ELEMENT: 80 ft. (24.4 meters).

TOTAL WEIGHT: 13,800 lbs. (6,250 kg).

AZIMUTH ROTATION: 360° reversible.

WIND AND ICE LOADING: 120 mph (193 kmh) wind, no ice; 80 mph (129 kmh) wind, ¼" (6.35 mm) radial ice.

INSTALLATION AREA REQUIRED: 0.31 acre (1,225 sq. meters).

PACKAGED FOR SHIPMENT (export): Weight — 14,500 lbs. (6.590 kg): volume — 870 cu. ft. (24.6 cu. meters).

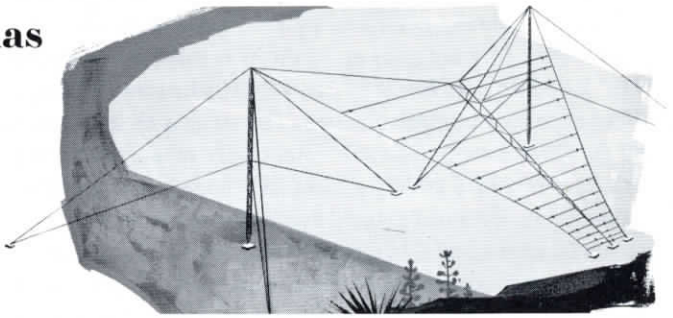
237C-1,-2 Unidirectional HF Antennas

Features

Broadband Performance
Unidirectional Operation
Constant Gain
Frequency Independent
Rugged Construction

Applications

Fixed Station
Short to Medium Range



The Collins 237C-1,-2 are unidirectional, log-periodic antennas for use in the 3-30 mc and 4-30 mc frequency ranges. Horizontal polarization makes them especially suited for reliable point-to-point communication over short to medium path lengths. They provide horizontally-polarized unidirectional beams 70° wide with a forward gain of 11 db. The antennas are power rated at 10 kw with low VSWR when terminating a 50 ohm coaxial line. Vertical radiation pattern is constant over the frequency range.

SIMPLIFIED CONSTRUCTION

The Alumoweld radiating elements are supported by Dacron catenaries from triangular guyed, galvanized steel towers. The vertex of the antenna feed point is secured at ground level to three concrete reinforced anchors. The antennas will withstand environmental conditions of 120 mph (193.08 kmh) winds with no ice or 50 mph (80.45 kmh) winds with one inch of radial ice.

SPACE REQUIREMENTS

Two towers support the 237C-2 array, and three are used with the 237C-1 because of the wider antenna span required for 3 mc operation.

Accessories

OBSTRUCTION LIGHT KIT

Kit consists of dual-lamp, nonflashing beacon with tower mounting hardware. Photocell switch control permits unattended operation. Power source of 115 v ac, 50 or 60 cps, is required at tower base for long life, 111 watt lamps.

GROUND SCREEN KIT

The ground screen is a 16-foot square section of copper mesh and 36 copper wire radials. Ends of the radials attach to the copper mesh and radiate at 10° intervals in a circular pattern. Center of the ground system is located directly under the feedpoint of the antenna.

FERRITE IMPEDANCE TRANSFORMER KIT

Transformers are available for receiving or transmitting with mounting hardware and feed straps to match the 237C-1 and 237C-2 arrays to the 50 ohm transmission line.

SUPPORT TOWER, GUY AND ANCHOR KIT

Disassembled steel towers, all assembly hardware, base shoes, guy strand and fittings, anchor rods and attachment points for the array are included in the kit.

Specifications

FREQUENCY RANGE: 237C-1 — 3-30 mc; 237C-2 — 4-30 mc.

VSWR: 2:1 nominal; 2.5:1 peak.

POLARIZATION: Horizontal.

GAIN: 11.8 db over isotropic.

POWER CAPABILITY: 10 kw peak or average.

INPUT IMPEDANCE: 50 ohms unbalanced.

AZIMUTH BEAMWIDTH: Nominally 70°.

VERTICAL BEAMWIDTH: Upper half-power point nominally 68°; lower half-power point nominally 18°.

WIND AND ICE LOADING: 120 mph (193 kmh) wind, no ice; 80 mph (129 kmh) wind, ¼ inch (6.35 mm) radial ice.

	237C-1	*237C-2*
Height (over-all)	140 ft. 42.67 meters	120 ft. 36.58 meters
Tower spacing required	234 ft. 71.32 meters	207 ft. 63.09 meters
Installation area required	363 x 286 ft. 110.64x87.17 meters	330 x 265 ft. 100.58x80.77 meters

237N-1C,-2C Unidirectional HF Antennas

Features	Applications
Broadband Performance	*Fixed Station*
Rugged Construction	*Long Range*
Unidirectional Operation	*Short Range*

The 237N-1C and 237N-2C log-periodic antennas cover wide frequency ranges of 2-30 mc and 4-30 mc, respectively. The antennas provide a vertically-polarized unidirectional pattern with a gain of 5 db over a resonant quarter wave monopole in the same environment. The antennas are rated at 10 kw PEP and average and provide a VSWR of less than 2:1 with respect to 50 ohms.

The antennas are well suited for directional groundwave communication. The low angle radiation is ideal for long range circuits, particularly if the antenna is installed near the ocean.

RUGGED CONSTRUCTION

The shunt excited radiating elements are suspended between a catenary and the ground screen to provide a grounded structure. The catenary connects between a rear steel tower and short wooden pole.

The antennas will withstand winds up to 120 mph (193.08 kmh) with no ice or 50 mph (80.5 kmh) with 1 inch of radial ice.

Accessories

GALVANIZED STEEL SUPPORT TOWER AND GUY KIT

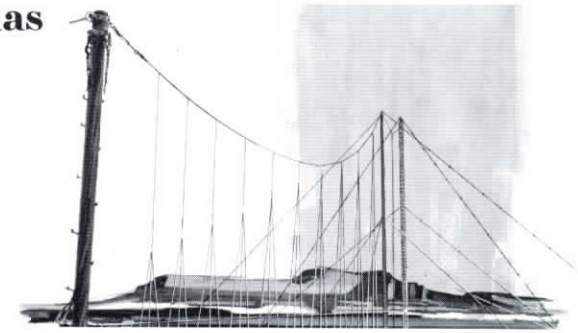
The kit consists of disassembled, triangular, galvanized steel towers, all assembly hardware, base shoes, guy strand and fittings, anchor rods and attachment points for the antenna.

OBSTRUCTION LIGHT KIT

A dual-lamp, nonflashing beacon is supplied with all tower mounting hardware. Photocell switch control permits unattended operation. Power source of 115 v ac, 50 or 60 cps, required at tower base for long-life, 111 watt lamps.

FERRITE TRANSFORMER KIT

Transformers are available for receiving or transmitting.



Mounting hardware and feed straps are supplied. Transformers mount at the short end of the array on pads or posts.

GROUND SCREEN KIT

The ground screen includes copper wire and installation hardware for each antenna.

Specifications

FREQUENCY RANGE: 237N-1C — 2-30 mc.
237N-2C — 4-30 mc.

VSWR: 2:1.

POWER CAPABILITY: 10 kw peak or average.

INPUT IMPEDANCE: 50 ohms unbalanced.

AZIMUTH BEAMWIDTH: 110°.

VERTICAL BEAMWIDTH: Upper half-power point approximately 38°*, lower half-power point 5°*. (*Depends on soil conductivity.)

GAIN: 5 db over resonant ¼ wave monopole test antenna in same environment.

POLARIZATION: Vertical.

SPACE REQUIREMENTS:

	237N-1C	*237N-2C*
Rear tower height	150 ft. 45.72 meters	80 ft. 24.4 meters
Center pole height	80 ft. 24.4 meters	
Forward pole height	20 ft. 6.1 meters	20 ft. 6.1 meters
Ground screen dimensions (over-all)	275 x 609 ft. 83.8 x 185.6 meters	135 x 346 ft. 41.1 x 105.5 meters

(Poles are not furnished with the antennas.)

437C-1A,-2A,-3A Broadband Monopole Antennas

Features	Applications
Broadband Performance	*Fixed Station*
Omnidirectional Radiation	*Short Range*
Rugged Construction	*Long Range*
Prefabricated Components	

The 437C-1A,-2A,-3A Antennas are vertically polarized and each has a 10:1 frequency coverage. Continuous operation over the frequency range is accomplished without switching. All guys are broken with insulators. A static drain coil and spark gap provide lightning protection.

The VSWR is well below 2:1 over 90% of the frequency range with respect to 50 ohms. Peak VSWR of 3:1 can occur at some frequencies.

The 437C antennas, using a galvanized steel pad rather than a concrete footing for the support tower, can be erected in 15 man hours. The galvanized steel tower with high strength Alumoweld radiating wires withstands winds of up to 120 mph (193 kmh).

SPACE REQUIREMENTS

The antennas are similar in mechanical configuration, varying only in size.

Accessories

SUPPORT TOWER KIT

The kit consists of a high strength steel tower with assembly hardware and array attachment points. Basic length of each section is 10 ft. (3.048 meters).

GROUND SCREEN OR COUNTERPOISE KIT

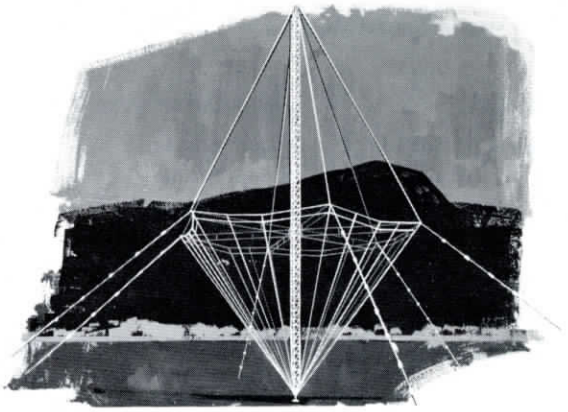
The kit includes soft copper wire for 36 radials supplied in proper lengths with ground stakes and clamps. The ground screen can be trenched, surface mounted or suspended, depending on soil conditions.

FIELD ERECTION KIT

The kit includes an "A" frame, lifting guy, hand winch, and tag lines to erect the antenna without need of crane or winch truck. Hardware common to all three antennas is supplied.

OBSTRUCTION LIGHT KIT

The kit consists of a dual-lamp, nonflashing beacon with photocell control for unattended operation. It includes RF isolation coils for 115 v ac, 50 or 60 cps, power required at tower base for 111 watt, long-life lamps. Kit is common to all three antennas.



Specifications

FREQUENCY RANGE: 437C-1A — 2-20 mc. 437C-2A — 2.5-25.0 mc. 437C-3A — 3-30 mc.

POLARIZATION: Vertical.

AZIMUTH COVERAGE: Omnidirectional.

GAIN: Comparable to ¼ wavelength monopole.

INPUT IMPEDANCE: 50 ohms unbalanced.

VSWR: 2.5:1 nominal; 3:1 peak.

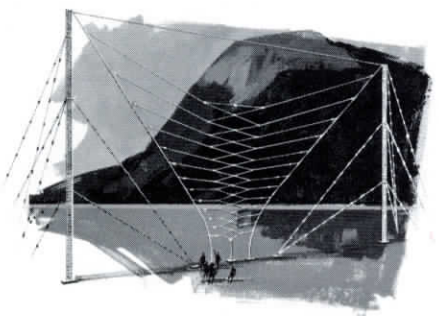
POWER CAPABILITY: 50 kw PEP or average.

WIND AND ICE LOADING: 120 mph (193.08 kmh) with no ice; 50 mph (80.45 kmh) with 1 inch radial ice.

SPACE REQUIREMENTS:

	437C-1A	*437C-2A*	*437C-3A*
Antenna height	108 ft. 32.9 meters	88 ft. 26.8 meters	68 ft. 20.7 meters
Ground screen diameter	240 ft. 73.15 meters	210 ft. 64 meters	160 ft. 48.8 meters

437G-2A Broadband Dipole Antenna



Features	Applications
Broadband Operation	*Fixed Station*
Skywave Propagation	*Short Range*
Horizontal Polarization	*Medium Range*
	Ground-to-Air

The 437G-2A Broadband Dipole Antenna utilizes modified log-periodic principles for HF skywave propagation over short and medium path lengths in the 2.5-30.0 mc frequency range. It overcomes limitations of groundwave communication over short distances by utilizing high angle skywave propagation at the lower frequencies. Maximum radiation in the vertical plane occurs at lower take-off angles as the frequency is increased to accommodate propagation over longer paths. Horizontal polarization minimizes ground losses and does not require a ground screen, simplifying installation.

RUGGED CONSTRUCTION

The antenna is constructed of Copperweld radiating elements suspended in a shoe-lace manner between Dacron catenaries. The array is supported by two galvanized steel towers and will withstand winds up to 120 mph (193.08 kmh).

SPACE REQUIREMENTS

The two 100 ft. (30.5 meter) towers are located 204 ft. (62.2 meters) apart. Installation area necessary is 360 ft. (109.7 meters) by 160 ft. (48.8 meters).

Accessories

OBSTRUCTION LIGHT KIT

The kit consists of a dual-lamp, nonflashing beacon with tower mounting hardware. Photocell switch control permits unattended operation. Requires 115 v ac, 50 or 60 cps, at the tower base to power the 111 watt, long-life lamps.

FERRITE BALUN

A receiving or transmitting ferrite balun to match the 437G-2A array to a 50 ohm coaxial cable is supplied with pole mounting hardware (mounting pole not included).

TOWER AND GUY KIT

This kit includes two 100 ft. (30.48 meter) steel towers with assembly hardware, anchors and array attachment points. Basic length of each galvanized tower section is 10 ft. (3.048 meters). Guys complete with strain insulators are prefabricated in sections.

Specifications

FREQUENCY RANGE: 2.5-30.0 mc.

POLARIZATION: Horizontal.

AZIMUTH BEAMWIDTH: Comparable to ½ wave dipole at the same effective height.

GAIN: Comparable to ½ wave dipole.

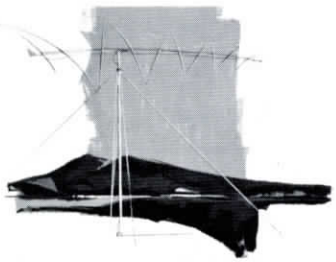
INPUT IMPEDANCE: 50 ohms unbalanced.

VSWR: 2.5:1 nominal; 3:1 maximum.

POWER CAPABILITY: 10 kw average or peak.

WIND AND ICE LOAD: 120 mph (193.08 kms) with no ice; 60 mph (96.54 kms) with 1 inch radial ice.

637B-1A Transportable Rotatable HF Antenna



Features	Applications
Broadband Performance	*Transportable System*
Unidirectional Operation	*Medium Range*
Rapid Installation	*Long Range*
Rotatable	

The 637B-1A is a horizontally-polarized, rotatable log-periodic, unidirectional antenna that provides highly efficient operation over the 6.5-30.0 mc frequency range. It is designed specifically for use with transportable HF communication systems over a wide range of path distances.

A horizontally-polarized, unidirectional beam 65° wide has a peak forward gain of 12 db. The 637B-1A is rated at 10 kw with a low VSWR. A 50 ft. (15.24 meter) mast supports the array. The shunt-fed antenna and mast are at ground potential and require no additional lightning protection.

EASILY ERECTED

Lightweight, high strength materials are used to achieve an antenna that is easily assembled and erected by nonskilled technicians. It can be placed in service by two men in approximately three hours. A versatile power unit is used for driving anchors, raising antenna, and rotating antenna array following erection.

SPACE REQUIREMENTS

Storage volume is only 100 cu. ft. (2.83 cu. meters). Installation area is 90 ft. (27.43 meters) by 135 ft. (41.15 meters).

Specifications

FREQUENCY RANGE: 6.50-30.0 mc.

AZIMUTHAL BEAMWIDTH: 65°.

VERTICAL BEAMWIDTH: Varies with frequency.

VSWR: 2:1 nominal; 2.5:1 peak.

INPUT IMPEDANCE: 50 ohms unbalanced.

FORWARD GAIN: 12 db.

POWER CAPABILITIES: 10 kw PEP or average.

EXTERNAL POWER REQUIREMENTS: 115 v ac, 50-60 cps, single phase, 750 watts.

AZIMUTH ROTATION: ±180°.

WIND LOAD: 60 mph (96.54 kmh), no ice.

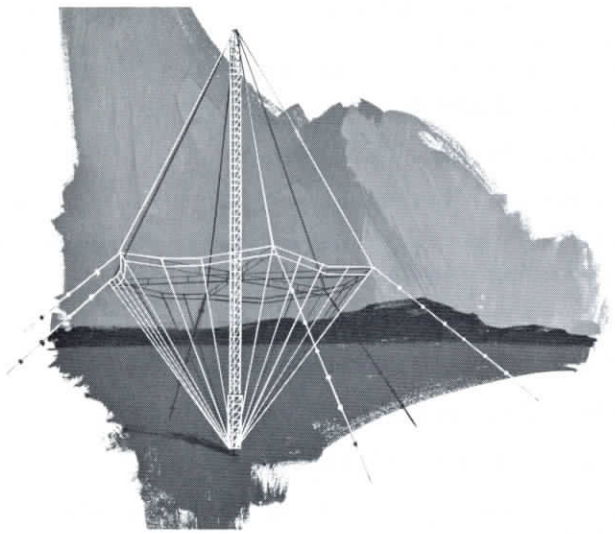
TOTAL WEIGHT: 1200 lbs. (544.32 kg).

STORAGE VOLUME: 100 cu. ft. (2.83 cu. meters).

637C-3 Transportable Broadband HF Antenna

Features	Applications
Broadband Performance	*Transportable System*
Low Angle Radiation	*Short Range*
Rapid Installation	*Long Range*
	Ground-to-Air

The 637C-3 Transportable Broadband HF Antenna is a vertically-polarized monopole antenna, ideally suited for transportable HF communication systems. Low angle radiation patterns provide both short and long range HF communication by groundwave and skywave propagation. The antenna has continuous coverage of the 3-30 mc frequency range



without switching, and handles a VSWR of less than 3:1 and an average power of 10 kw. Standard equipment includes erection kit, ground screen kit, transit frames and cases.

EASILY ERECTED

The 637C-3 consists of a phosphor-bronze wire radiating structure supported by a 70 ft. (21.3 meter) collapsible aluminum tower. A hand winch is supplied with the "A" frame erection kit. The antenna can be assembled and erected from the ground by four men in three hours.

SPACE REQUIREMENTS

Over-all height is 70 ft. (21.3 meters) with a ground screen radius of 80 ft. (24.4 meters). Total weight of the 637C-3 is 450 lbs. (204.1 kg).

Specifications

FREQUENCY RANGE: 3-30 mc.

POLARIZATION: Vertical.

AZIMUTHAL COVERAGE: Omnidirectional.

GAIN: Comparable to ¼ wavelength monopole.

INPUT IMPEDANCE: 50 ohms unbalanced.

VSWR: 2.5:1 nominal; 3:1 peak.

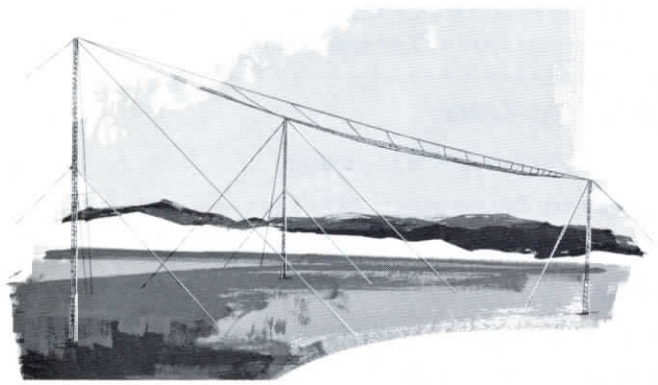
POWER CAPABILITY: 10 kw PEP or average.

WIND LOADING: 60 mph (96.54 kmh) with no ice.

STORAGE SPACE: 26 cu. ft. (0.74 cu. meters).

WEIGHT: 450 lbs. (204.1 kg).

637E-1 Transportable Unidirectional HF Antenna



Features	Applications
Broadband Performance	*Transportable System*
Lightweight Construction	*Short-Medium Range*
	Long Range

The 637E-1 is a horizontally-polarized, log-periodic antenna for use in transportable communication systems operating in the 3-30 mc frequency range. It provides a horizontally-polarized beam 60° wide with forward gain of 11 db. Power rating is 10 kw.

The antenna is supported by two 70 ft. (21.3 meter) and one 40 ft. (12.19 meter) triangular aluminum, guyed towers which may be knocked down and stored within their base sections. The three storage frames are each 10 ft. (3.05 meters) by 1½ ft. (0.46 meter) by 1½ ft. (0.46 meter). Two transit cases for the antenna array and accessories are 2 ft. (0.61 meter) by 2 ft. (0.61 meter) by 1½ ft. (0.46 meter). Total weight is 850 lbs. (385.56 kg). Equipment supplied includes erection tools and a ferrite transformer.

PREFABRICATED CONSTRUCTION

The antenna uses color coded hardware to facilitate erection. It can be erected in two hours by five men without need for climbing towers. Anchor installation varies depending on local soil conditions.

SPACE REQUIREMENTS

Installation area necessary is a 240 ft. (73.15 meter) by 250 ft. (76.2 meter) plot. Weight is 850 lbs. (385.56 kg). Storage volume is 60 cu. ft. (1.6999 cu. meters).

Specifications

FREQUENCY RANGE: 3-30 mc.

AZIMUTHAL BEAMWIDTH: 60°.

VERTICAL PATTERN: Varies with frequency.

FORWARD GAIN: 11 db over isotropic.

VSWR: 2:1 nominal; 2.5:1 peak.

INPUT IMPEDANCE: 50 ohms unbalanced.

POWER CAPABILITY: 10 kw peak or average.

WIND LOAD: 70 mph (112.63 kmh) with no ice.

STORAGE VOLUME: 60 cu. ft. (1.699 cu. meters).

WEIGHT: 850 lbs. (385.56 kg).

Comparison of Collins HF Antennas

TYPE NUMBER	DESCRIPTION	FREQUENCY RANGE (mc)	APPLICATION	GAIN** (db)	PEAK ENV. POWER (kw)	POLARIZATION	AZIMUTH BEAMWIDTH	VERTICAL BEAMWIDTH (half power points) UPPER	LOWER	CONSTRUCTION
237B-1	rotatable LP	6.5-40.0	medium-long range, unidirectional	14	50	horizontal	60°	***	***	planar log periodic
237C-1	fixed wire LP	3-30	short-medium range, unidirectional	11.8	10	horizontal	70°	68°	18°	sloping planar log periodic
237C-2	fixed wire LP	4-30	short-medium range, unidirectional	11.8	10	horizontal	70°	68°	18°	sloping planar log periodic
237N-1C	fixed wire LP	2-30	short-long range unidirectional	5*	10	vertical	110°	approx. 38°	approx. 5°	log periodic
237N-2C	fixed wire LP	4-30	short-long range unidirectional	5*	10	vertical	110°	approx. 38°	approx. 5°	log periodic
437C-1A	broadband monopole	2-20	short-long range omnidirectional	****	50	vertical	360°	.....	.....	two base-to-base wire cones
437C-2A	broadband monopole	2.5-25.0	short-long range omnidirectional	****	50	vertical	360°	.....	.....	two base-to-base wire cones
437C-3A	broadband monopole	3-30	short-long range omnidirectional	****	50	vertical	360°	.....	.....	two base-to-base wire cones
437G-2A	fixed wire LP dipole array	2.5-30.0	short-medium range omnidirectional	*****	10	horizontal	*****	***	***	log periodic
637B-1A	transportable rotatable LP	6.5-30.0	medium-long range unidirectional	12	10	horizontal	65°	***	***	log periodic
637C-3	transportable broadband monopole	3-30	short-long range omnidirectional	****	10	vertical	360°	.....	.....	two base-to-base wire cones
637E-1	transportable fixed wire LP	3-30	short-medium-long range unidirectional	11	10	horizontal	60°	***	***	log periodic

*Gain in db above ¼ wave vertical radiator.
**Compared with isotropic radiator.
***Varies with frequency.
****Comparable to ¼ wave monopole.
*****Comparable to ½ wave dipole.