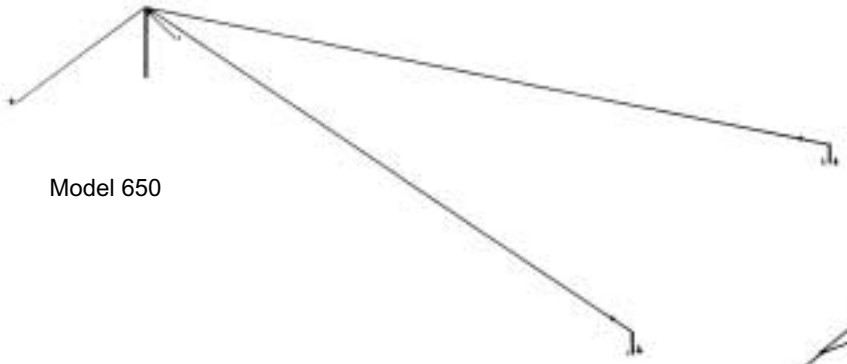
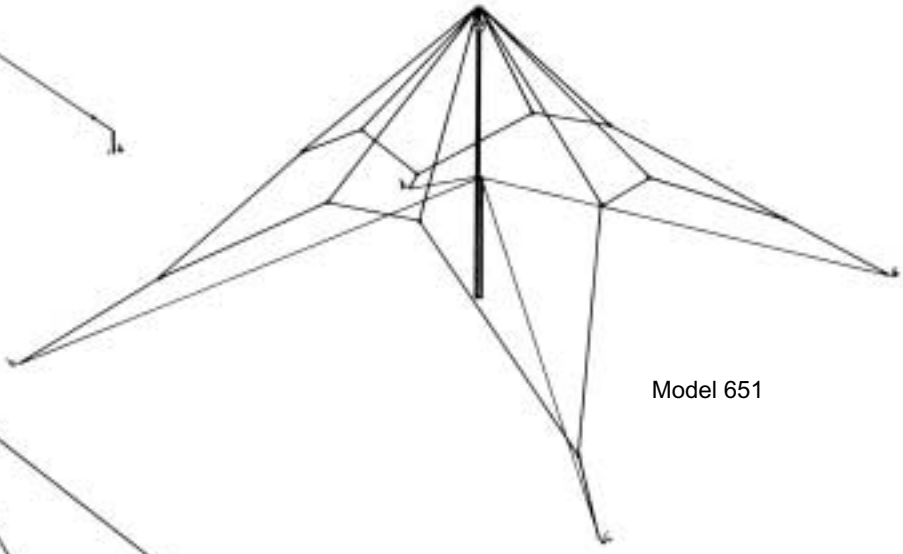
TCI
A Dielectric Company

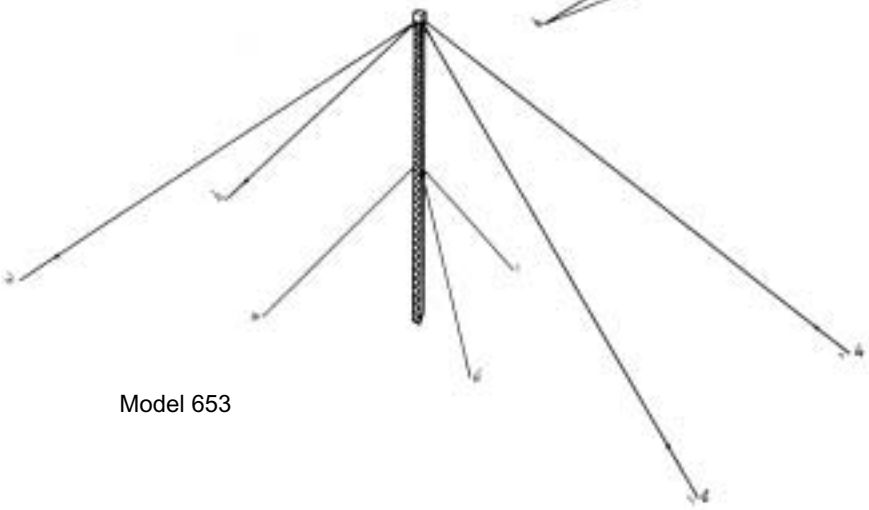
SERIES
650
Tactical Antennas



Model 650



Model 651



Model 653

The 650 series of tactical antennas is designed to provide the communicator with a group of antennas covering the full 2–30 MHz band to meet most tactical range requirements. The three basic designs, illustrated above, are all available in transportable form, sharing the same strong but lightweight fittings and aluminum masts. The “fixed” or “F” version is intended for permanent or semi-permanent installation on concrete foundations and is, therefore, equipped with a galvanized steel mast and heavier Alumoweld wire radiators and guy wires. Transportable versions employ phosphor bronze wire for curtain, catenaries and layout ground wires, and polypropylene rope for mast guys. Great care has been taken to design these antennas not only for optimum performance consistent with their size and intended application, but also for ease in handling and installation. No tuners are required for these antennas; resistive terminations are employed to improve broadband impedance matching.

- **2 to 30 MHz band**
- **No tuning units**
- **Easy and rapid installation**
- **Rugged construction**
- **Transportable (T) and Fixed (F) versions**

650T and F

Commonly terms the "sloping 'V'," this antenna is intended for longer range communications and is the largest of the 650 series. It covers the full 2–30 MHz band. Design studies show that the optimum angle at the apex of the 'V' for maximum gain and low TOA is approximately 30 degrees with a 500 ft length for radiator wires. The corresponding dimensions and gain/TOA are shown in the tables. Typical radiation patterns are also shown. Loading resistors are used at the ends of the V to give a unidirectional radiation pattern. Efficiency is below 10% at 4 MHz and is a maximum of 40% from 27 MHz–30 MHz.

The Model 650 is supplied in transportable form with a lightweight 50 ft aluminum mast in 10 ft sections. A fixed version, Model 650F, is also available with galvanized steel mast and Alumoweld guys.

651T (MIL AS-3791/G) and F

The antenna is intended for ground wave and sky wave communications with omnidirectional cover; the application for sky wave communications is over short-to-medium ranges.

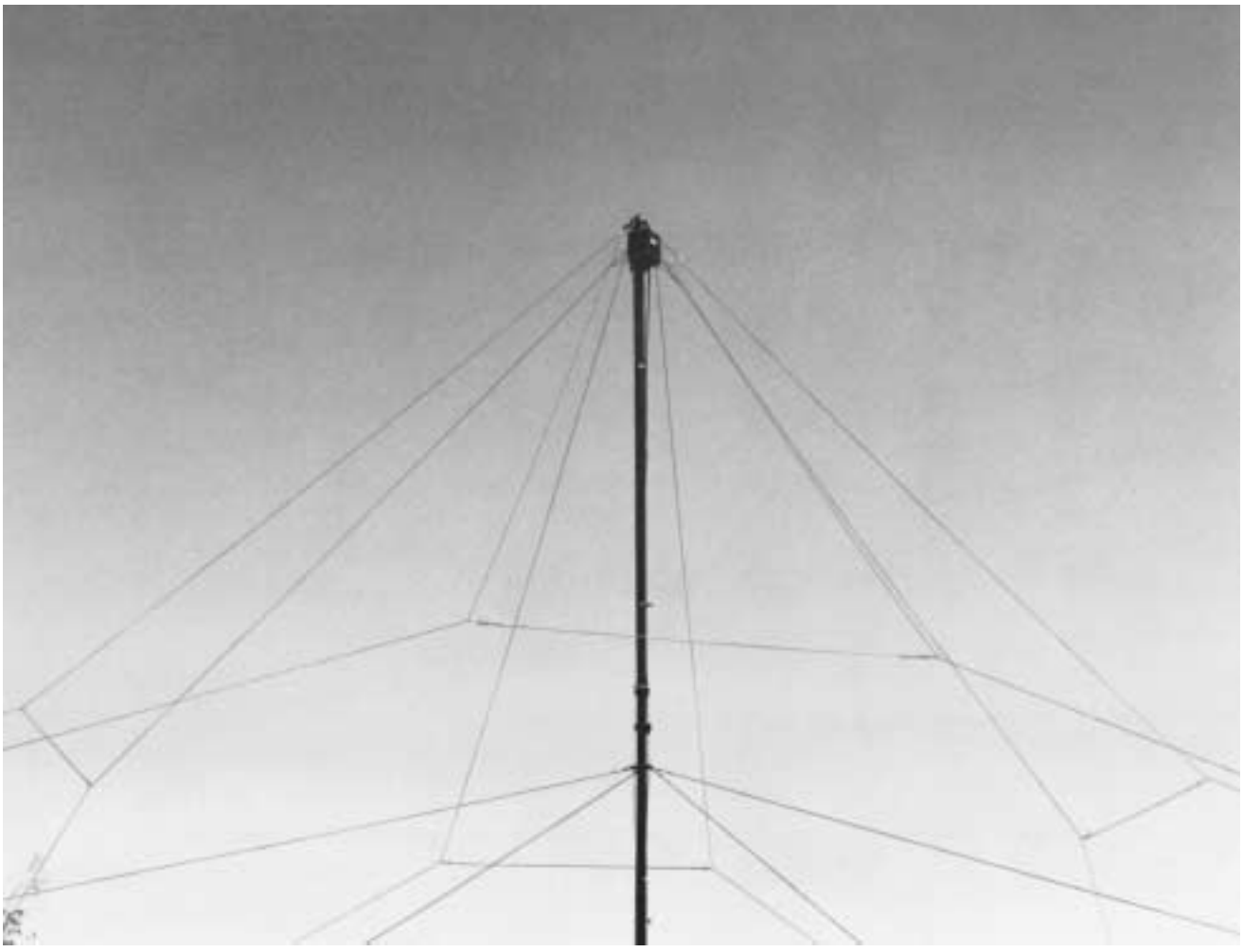
The radiating element consists of two fan-delta curtains supported on a common tubular aluminum mast and placed at 90° to each other. Each delta is driven by its own balun which, in tune, is driven by a power divider and 90° hybrid network. A lightweight aluminum tilt-up mast permits fast erection.

A special feature of the Model 651 is the care taken to provide EMP protection in accordance with the requirements of DRCPM-8223. This protection is given by good grounding, the use of pulse arrestors across the balanced terminals of the matching units, and a robust design able to withstand high voltages with a margin of safety.

These features and the construction materials make the antenna fully suitable for military and emergency type applications.

653T and F

In transportable and fixed versions, the 653 is a four-wire broad band dipole 2–30 MHz with omnidirectional coverage. It is designed for short-medium range sky wave communications with power handling up to 1 kW Avg./2 kW PEP. To provide a good impedance match over 2–30 MHz, the antenna employs resistive terminations at each corner. The fixed version has a galvanized steel mast height of 40 ft; the transportable version 653T employs a 20 ft, lightweight, aluminum mast with special fittings of ease of erection and movement as described at the introduction 650 series. Efficiency of the 653F is 13% at 4 MHz rising to 28% at 10 MHz.



Model 651T fully erected. Balun transformer is mounted at top of the mast.

Specifications

Model 650T & F

Polarization ..... Horizontal
Impedance ..... 50 ohms nominal
VSWR ..... 2.5:1 maximum
Frequency ..... 2–30 MHz
Power Handling ..... See Box
Mast Height ..... 50 ft (15.2m)
Environmental ..... 100 mi/h (160 km/h) no ice
Performance
Erection Time 650T ..... 2 hours, 4 men
Take-off Angle .....

Freq.	TOA
2 MHz	48°
4 MHz	33°
10 MHz	18°
16 MHz	14°
28 MHz	8°

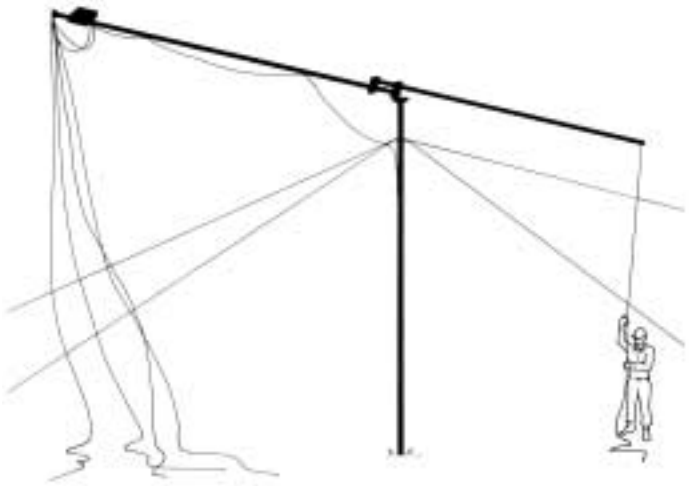
Model 651T (MIL AS-3791/G) & F

Polarization ..... Vertical, Horizontal Component
Impedance ..... 50 ohms nominal
VSWR ..... 1.5:1 maximum
Frequency ..... 2–30 MHz
Power Handling ..... 400 Watts Avg/PEP
Mast Height ..... 27.5 ft (8.4m)
Environmental ..... 100 mi/h (160 km/h) no ice
Performance ..... 60 mi/h (96 km/h) 1/2" radial ice
Erection Time 651T ..... 1 hour, 4 men

Model 653T & F

Polarization ..... Horizontal, Vertical Component
Impedance ..... 50 ohms nominal
VSWR ..... 2.5:1 maximum
Frequency ..... 2–30 MHz
Power Handling ..... 1 kW Avg/PEP
Mast Height ..... 653F 40 ft (12.2m)
653T 20 ft (6.1m)
Environmental ..... 100 mi/h (160 km/h) no ice
Performance ..... 60 mi/h (96 km/h) 1/2" radial ice
Erection Time 651T ..... 1 hour, 4 men

Model 651T
Detail of twin mast center hinge, locked in fully erect position.



Model 651T Erection Procedure.
Note that the bottom sections of the tubular mast are fully guyed and secure before the upper hinged mast and radiators are pulled into position.

Power

Model Number Transportable	Model Number Fixed	Power Average	Power PEP	Connector
650T-1-02	650F-1-02	Receive		Type N Female
650T-1-06	650F-1-06	1 kW	2 kW	Type N Female
650T-1-03	650F-1-03	10 kW	10 kW	1 5/8" EIA Female
651T-1-35	651F-1-35	400 Watt	400 Watt	Type N Female
653T-1-06	653F-1-06	1 kW	2 kW	Type N Female

Directive Gain (dBi) and Efficiency (dB)

Frequency		650T & F	651T & F	653T	653F
2 MHz	Directive Gain	8.3	4.5	5.0	5.1
	Efficiency	–22.0	–22.8	–34.5	–19.6
4 MHz	Directive Gain	10.6	3.5	5.2	4.7
	Efficiency	–15.6	–15.0	–21.7	–8.9
10 MHz	Directive Gain	14.3	7.2	6.3	6.6
	Efficiency	–9.1	–6.6	–9.4	–5.6
16 MHz	Directive Gain	15.6	6.6	6.0	8.5
	Efficiency	–6.6	–3.8	–7.3	–4.4
28 MHz	Directive Gain	15.5	8.4	6.7	8.6
	Efficiency	–3.9	–3.1	–4.7	–3.6

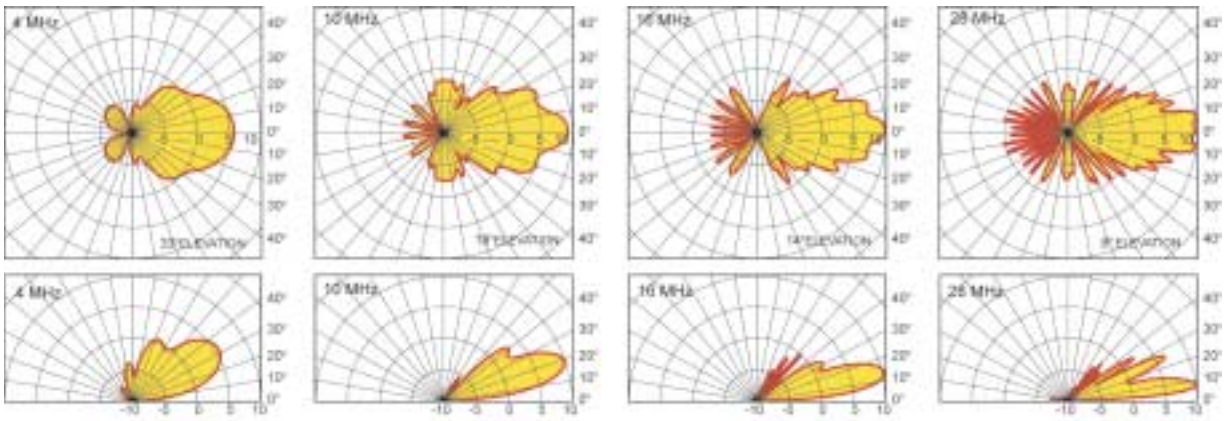
Size

Model Numbers Transportable	Model Numbers Fixed	Height	Length	Width
650T-1-N	650F-1-N	50 ft (15.2 m)	560 ft (170 m)	259 ft (80 m)*
651T-1-N	651F-1-N	27.5 ft (8.4 m)	76 ft (23 m)	76 ft (23 m)
	653F-1-N	40 ft (12.2 m)	110 ft (33.5 m)	40 ft (12.2 m)
653T-1-N		20 ft (6.1 m)	44 ft (13.4 m)	44 ft (13.4 m)

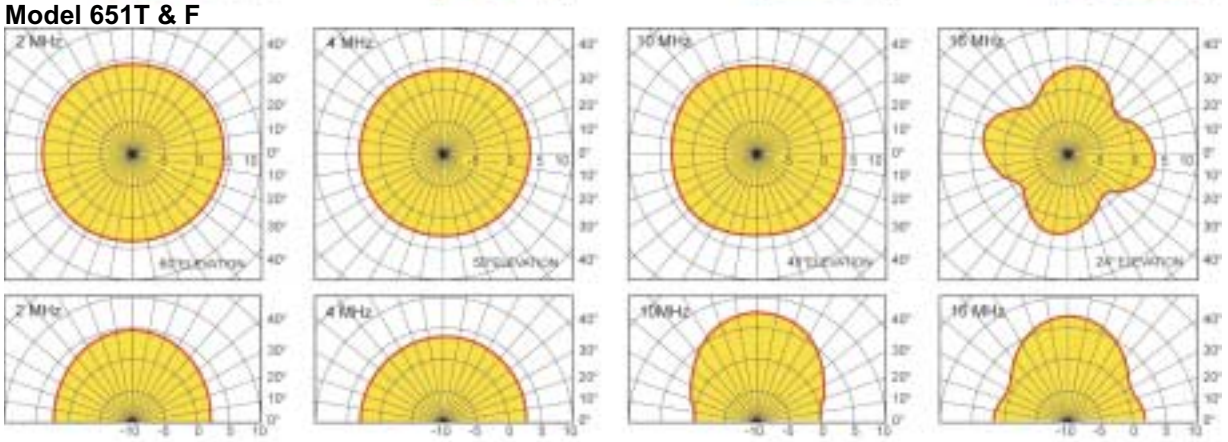
* At 30° Leg Separation

Azimuth and Elevation Patterns Gain in dBi

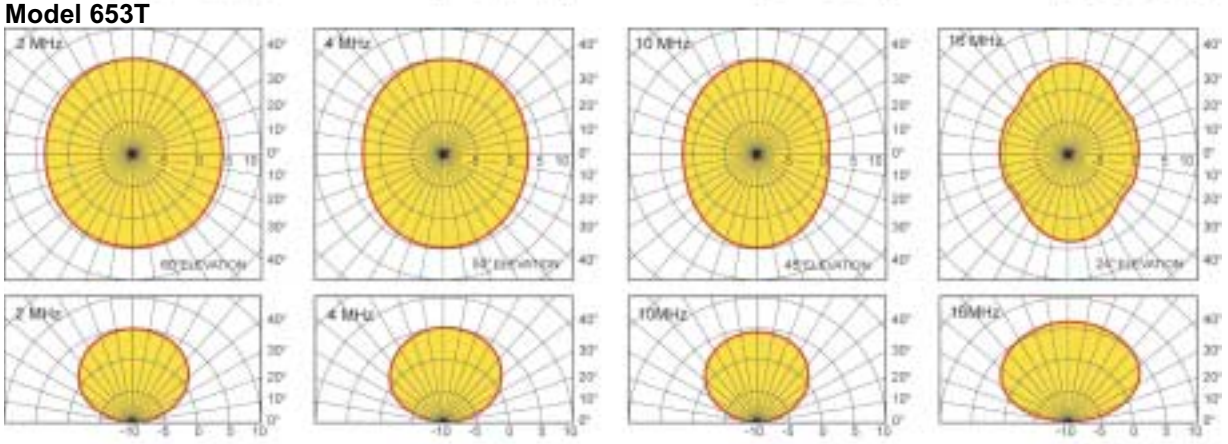
Model 650T & F



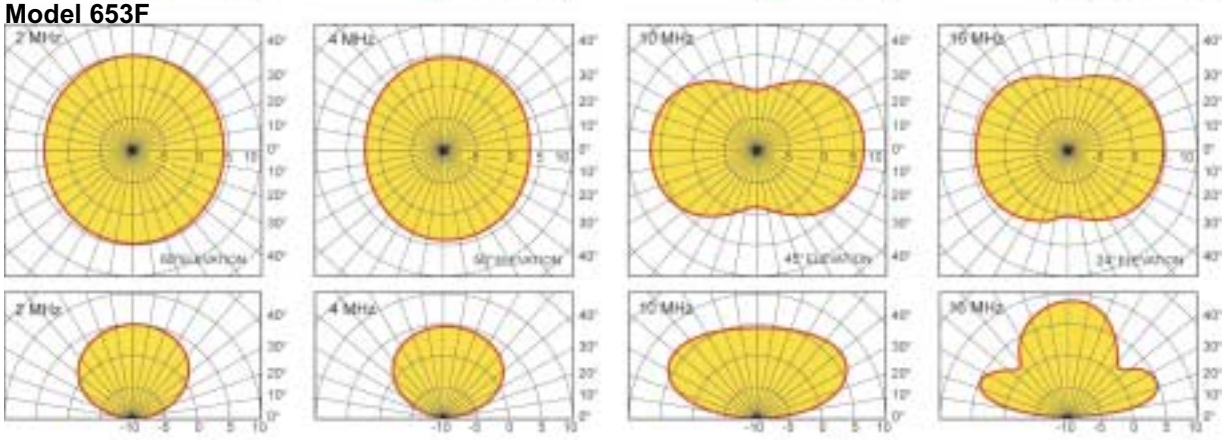
Model 651T & F



Model 653T



Model 653F



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