

**INSTRUCTION MANUAL
for
HALF-WAVE TUNED DIPOLE
ANTENNA KIT**

**Model: AD-100 V2.0
30 MHz to 1 GHz**



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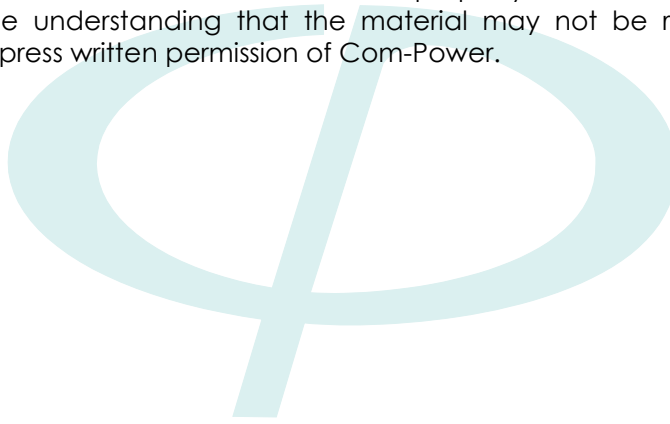
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1.0 Introduction

This manual includes product specifications, safety precautions, warranty information, guidelines, and usage instructions for the dipole set.

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SECTION 1 - INTRODUCTION

2.0 Products Available from Com-Power



Antennas



Antenna Kits



Absorbing Clamps



**Coupling/Decoupling
Networks (CDN)**



Comb Generators



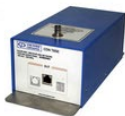
Current Probes



**Emissions Test
Systems**



**Conducted Immunity
Test Systems**



**Impedance Stabilization
Networks (ISN)**



**Line Impedance Stabilization
Networks (LISN)**



Antenna Masts



**Near-Field
Probe Sets**



Preamplifiers



Power Amplifiers



Spectrum Analyzers



**Product Safety Test
Equipment**



Transient Limiters



Turntables



Antenna Tripods



**Telecom Test
Systems**

www.com-power.com

SECTION 2 – PRODUCTS AVAILABLE FROM COM-POWER

3.0 Product Information

3.1 Incoming Inspection

Please check the contents of the shipment against the package inventory in section 3.2 to ensure that you have received all applicable items.

If the product or any accessories are damaged in transit, or if the package contents are incomplete, contact Com-Power or your Com-Power distributor.

3.2 Package Inventory

AD-100 V2.0 HALF-WAVE TUNED DIPOLE ANTENNA KIT, 30-1000 MHz with carrying case

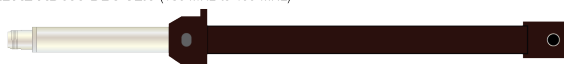
ABAL-AD100-DB1 V2.0 (30 MHz to 65 MHz)



ABAL-AD100-DB2 V2.0 (65 MHz to 180 MHz)



ABAL-AD100-DB3 V2.0 (180 MHz to 400 MHz)



ABAL-AD100-DB4 V2.0 (400 MHz to 1 GHz)



ATC-22M-AD ANTENNA TRIPOD CLAMP-22 mm ROD



AMA-22MR ANTENNA MAST ADAPTER-22 mm ROD (*optional*)



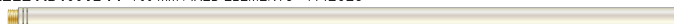
CASE-AD100 V2.0 CARRYING CASE (*not pictured*)

AELE-AD100-KIT V2.0 ANTENNA ELEMENT KIT

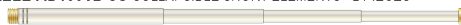
AELE-AD100V2-F3 300 mm FIXED ELEMENTS - 2 *PIECES*



AELE-AD100V2-F7 700 mm FIXED ELEMENTS - 4 *PIECES*



AELE-AD100V2-CS COLLAPSIBLE SHORT ELEMENTS - 2 *PIECES*



AELE-AD100V2-CL COLLAPSIBLE LONG ELEMENTS - 2 *PIECES*



Figure 1 – Product Inventory

3.3 Product Specifications

Technical

Product	Half-wave Tuned Dipole Antenna Kit
Model	AD-100 V2.0
Frequency Range	30 MHz to 1 GHz
Maximum Input Power	25 Watts (continuous)
Polarization	Linear
Input/Output Impedance	50Ω (nominal)
Antenna Factors	-1.3 to 29.1 dB/m (nominal - see Table 2)
Isotropic Gain	≈1 dBi (nominal – see Table 2)
VSWR	<2.0 (average 1.5):1 (nominal)

RF Connectors

Antenna Connectors	N-type (female)
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Mechanical

Overall Weight	19.5 lbs [8.8 kg]
Min. Element Length	2.5 inches [63 mm]
Max. Element Length	109 inches [2777 mm]
Carrying Case Dimensions (W)x(D)x(H)	38.5" x 18" x 7.25" [978 x 457 x 184 mm]
	see Figure 2 for individual balun dimensions

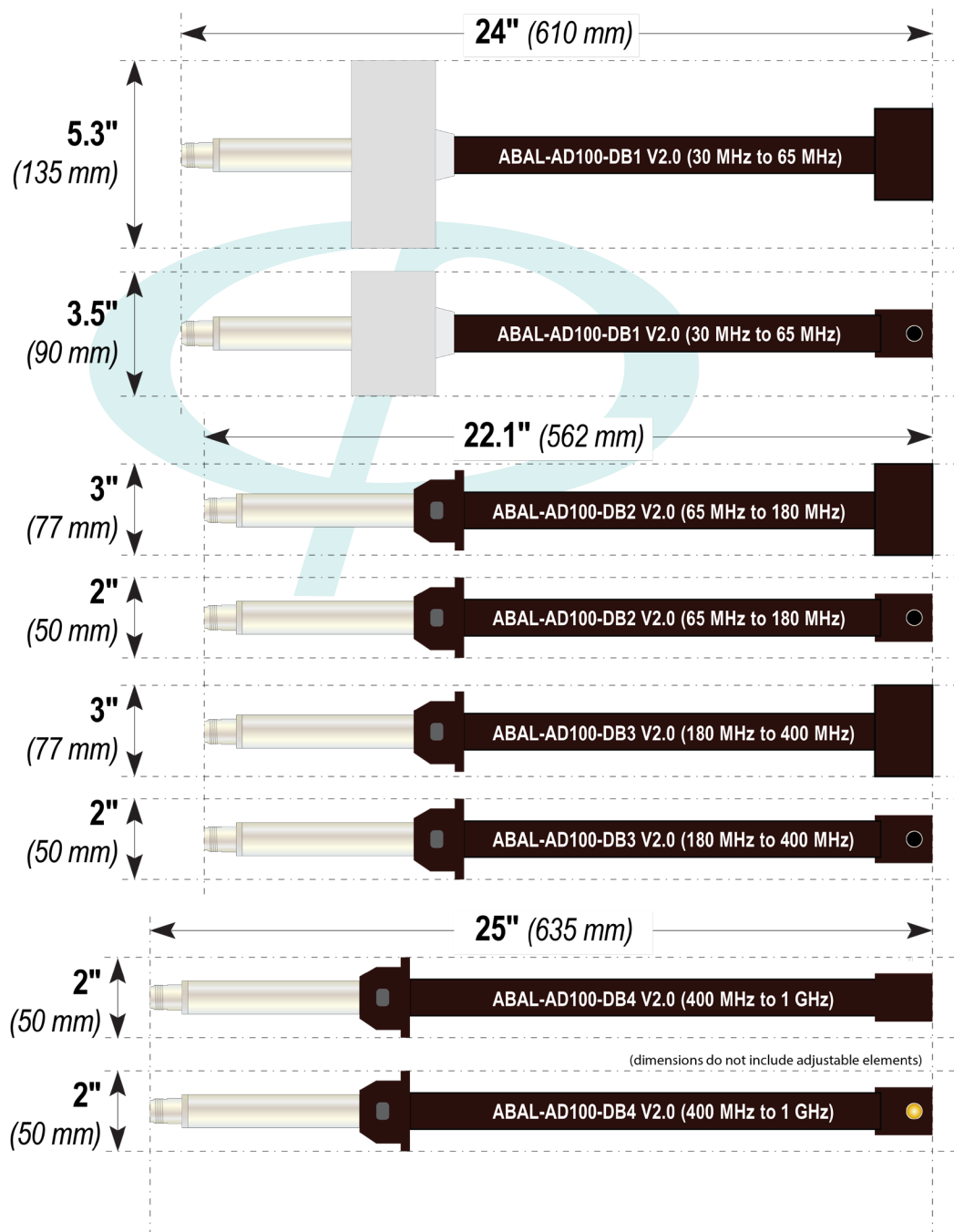


Figure 2 – Product Dimensions

SECTION 3 – PRODUCT INFORMATION

4.0 Operating Instructions

4.1 Dipole Baluns

4.1.1 Selecting the Balun

The AD-100 V2.0 dipole set consists of four individual baluns, each operating over a specific frequency range, as per Table 1:

Table 1 – Balun Selection

DIPOLE BALUN	FREQUENCY RANGE
ABAL-AD100- DB1 V2.0	30 MHz to 65 MHz
ABAL-AD100- DB2 V2.0	65 MHz to 180 MHz
ABAL-AD100- DB3 V2.0	180 MHz to 400 MHz
ABAL-AD100- DB4 V2.0	400 MHz to 1 GHz

Select the appropriate balun, referred to hereafter as DB1, DB2, DB3, and DB4, respectively, based on the test frequency.

4.1.2 Mounting the Balun

Install ATC-22M-AD Antenna Tripod Clamp-22 mm Rod or AMA-22MR Antenna Mast Adapter-22 mm Rod on your tripod or antenna mast, as appropriate.

Mount the balun to be used onto the mounting adapter. For the tripod clamp, clamp it around the rear metallic rod. Make sure that the tapped holes for the elements, or, in the case of DB4, the elements themselves, are aligned with the intended antenna polarity: horizontally or vertically.

4.2 Dipole Elements

4.2.1 Element Combinations

The following applies only to the DB1, DB2, and DB3 baluns. The DB4 balun has non-removable, collapsible elements.

Selecting which elements, or combinations of elements, to use is also based on frequency. Refer to Table 2 to determine which collapsible (or telescoping) elements to select, as well as which extension elements are required for a particular frequency.

For example, at 30 MHz, you will need to combine two 700 mm extension elements, one 300 mm extension element, and the long collapsible element on each side of the dipole.

SECTION 4 – OPERATING INSTRUCTIONS

Table 2 – Element Combinations, Lengths, Antenna Factors, and Isotropic Gain

Balun	Freq. (MHz)	Length of each element measured from center of dipole		700 mm extension element #1	700 mm extension element #2	300 mm extension element	Collapsible long element	Collapsible short element	Ant. Factor (dB/m)	Isotropic Gain (dBi)
		(m)	(mm)	AELE- AD100V2-F7	AELE- AD100V2-F7	AELE- AD100V2-F3	AELE- AD100V2-CL	AELE- AD100V2-CS		
ABAL-AD100-DB1 V2.0	30	2.413	2413	✓	✓	✓	✓		-1.3	1.05
	35	2.08	2080	✓	✓		✓		0	1.09
	40	1.803	1803	✓	✓		✓		1.1	1.15
	45	1.6	1600	✓			✓		2.2	1.07
	50	1.438	1438	✓			✓		3.1	1.09
	60	1.197	1197	✓			✓		4.7	1.07
	65	1.112	1112	✓			✓		5.4	1.07
ABAL-AD100-DB2 V2.0	65	1.112	1112			✓	✓		5.4	1.07
	70	1.026	1026			✓	✓		6	1.11
	80	0.889	889			✓	✓		7.2	1.07
	90	0.791	791			✓	✓		8.2	1.09
	100	0.714	714			✓	✓		9.1	1.11
	120	0.589	589				✓		10.7	1.09
	140	0.5	500				✓		12	1.13
	160	0.438	438				✓		13.2	1.09
	180	0.389	389				✓		14.2	1.12
ABAL-AD100-DB3 V2.0	180	0.389	389					✓	14.2	1.12
	200	0.352	352					✓	15.1	1.13
	250	0.283	283					✓	17.1	1.07
	300	0.235	235					✓	18.6	1.15
	400	0.175	175					✓	21.1	1.15
ABAL-AD100-DB4 V2.0	400	0.175	175	N/A <i>(INTEGRAL, COLLAPSIBLE ELEMENTS)</i>					21.1	1.15
	500	0.143	143						23.1	1.09
	600	0.117	117						24.7	1.07
	700	0.102	102						26	1.11
	800	0.089	89						27.2	1.07
	900	0.079	79						28.2	1.09
	1000	0.076	76						29.1	1.11

SECTION 4 – OPERATING INSTRUCTIONS

4.2.2 Attaching Elements

The DB1, DB2, and DB3 baluns have two tapped holes, 180 degrees opposite one another. The holes are threaded [3/8" x 16 tpi] to accept all provided elements. Each extension element has one end tapped to accept all extension and collapsible elements. All elements screw on clockwise, as shown in Figure 3. The DB4 balun has permanently attached collapsible elements.

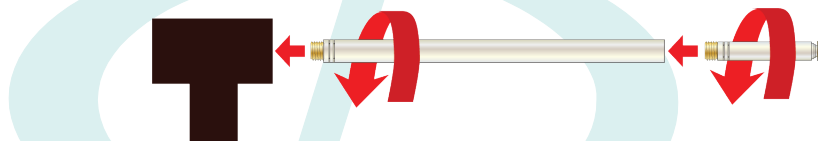


Figure 3 – Attaching Elements

4.2.3 Element Lengths

The exact lengths of the elements are also determined according to frequency. The combined length of the dipole elements is approximately equal to one-half wavelength. Therefore, the length of the individual elements is approximately equal to one-quarter wavelength.

ANSI C63.5 defines these exact lengths. The "ANSI" element lengths are given in Table 2. The length is measured from the center of the dipole balun to the tip of each element, as shown below in Figure 4.

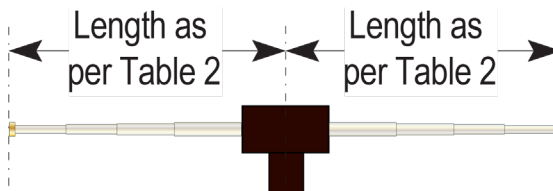


Figure 4 – Measuring the element length

When adjusting the length of the collapsible elements, the thinner segments should always be collapsed first, as shown in Figure 5.

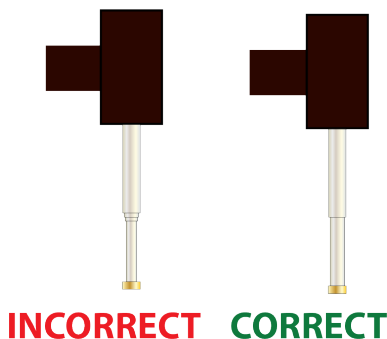


Figure 5 – Method of length adjustment

SECTION 4 – OPERATING INSTRUCTIONS

4.2.4 Dipole Factors

ANSI C63.5 also defines the antenna factors for a “lossless dipole”, calculated using the formula below:

$$\begin{array}{l} \text{Antenna Factor} \\ \text{(in dB/m)} \end{array} = 20 \cdot \log(\text{freq. in MHz}) - 31.4$$

ANSI C63.5 also states that the antenna factor shall be combined with an averaged loss for the matching balun of 0.5 dB:

$$\begin{array}{l} \text{Antenna Factor} \\ \text{(in dB/m)} \end{array} = 20 \cdot \log(\text{freq. in MHz}) - 31.4 + 0.5$$

-or-

$$\begin{array}{l} \text{Antenna Factor} \\ \text{(in dB/m)} \end{array} = 20 \cdot \log(\text{freq. in MHz}) - 30.9$$

Tabulated in Table 2 are the antenna factors calculated as described above.

When the dipole is used as a receiving antenna, the measured field strength (in dBμV/m) is calculated by adding the antenna factor (in dB/m) to the measured voltage value (in dBμV).

$$\begin{array}{l} \text{Field Strength} \\ \text{(in dBμV/m)} \end{array} = \begin{array}{l} \text{Measured Value} \\ \text{(in dBμV)} \end{array} + \begin{array}{l} \text{Antenna Factor} \\ \text{(in dB/m)} \end{array}$$

When using the dipole as a transmitting antenna, the dipole's isotropic gain is typically considered.

$$\begin{array}{l} \text{Isotropic Gain} \\ \text{(in dBi)} \end{array} = 20 \cdot \log(\text{freq. in MHz}) - 29.79 - \begin{array}{l} \text{Antenna Factor} \\ \text{(in dB/m)} \end{array}$$

The isotropic gain values for the AD-100 V2.0 dipoles are also given in Table 2.

For example, when performing Effective Isotropic Radiated Power (EIRP) tests as per ETSI standards for radio equipment, the radio equipment is replaced by a dipole antenna driven by an RF signal generator. The signal generator output is adjusted until the received signal matches the level produced by the radio equipment. The EIRP is then equal to input power delivered to the dipole plus the isotropic gain value of the dipole:

$$\begin{array}{l} \text{Equivalent Isotropic} \\ \text{Radiated Power} \\ \text{(in dBm)} \end{array} = \begin{array}{l} \text{Dipole Input Power} \\ \text{(in dBm)} \end{array} + \begin{array}{l} \text{Isotropic Gain of Dipole} \\ \text{(in dBi)} \end{array}$$

SECTION 4 – OPERATING INSTRUCTIONS

5.0 Warranty

Com-Power warrants to its Customers that the products it manufactures will be free from defects in materials and workmanship for a period of three (3) years. This warranty shall not apply to:

- Transport damages during shipment from your plant.
- Damages due to poor packaging.
- Products operated outside their specifications.
- Products Improperly maintained or modified.
- Consumable items such as fuses, power cords, cables, etc.
- Normal wear
- Calibration
- Products transported outside the United States without the prior knowledge of Com-Power.

In addition, Com-Power shall not be obliged to provide service under this warranty to repair damage resulting from attempts to install, repair, service, or modify the instrument by personnel other than Com-Power service representatives.

Under no circumstances does Com-Power recognize or assume liability for any loss, damage, or expense arising, either directly or indirectly, from the use or handling of this product, or any inability to use this product separately or in combination with any other equipment.

When requesting warranty services, it is recommended to use the original packaging material for shipping. Damage due to improper packaging will void the warranty.

In the case of repair or complaint, please visit our website www.com-power.com and fill out the RMA form (<http://com-power.com/repairservicereq.asp>). Our technical assistance personnel will contact you with an RMA number. The RMA number should be displayed prominently on the packaging and the product, along with a description of the problem and your contact information.

SECTION 5 – WARRANTY