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Introduction to the CD-ROM Edition The ARRL Antenna Book, 21st Edition

“In recent years it has been borne home on us most forcibly that there is greater room for increased performance through superior antenna systems than in any other part of the equipment.”

—from the Foreword to the First Edition,

Much has changed since 1939, including the possible ways of delivering information—this CD-ROM is evidence of that! One thing that hasn’t changed is that antennas and antenna systems are still the make-or-break component of any amateur station. We are pleased to bring you this 21st edition of *The ARRL Antenna Book* on CD-ROM. The CD-ROM book contains all of the text, drawings and photos contained in the printed 21st edition. And exclusive to the CD-ROM are over 70,000 pages of propagation tables that can help you determine what HF propagation to expect throughout the world, throughout the year and throughout the sunspot cycle.

Make sure you try out the software included for the PC. Follow the instructions for installation of the software and data files.

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This CD-ROM is viewed using Adobe’s *Reader* software. Version 7.0 of the software is included on the CD-ROM. The book and the companion files include hyperlinks. These links will appear in blue or green text. Clicking on the text of a hyperlink will cause *Reader* to display another, related part of the book. (See the *Reader* Help documentation for information on configuring this feature.)

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You may not have *Acrobat Reader* installed on your computer or you may have an older version installed. Installing Adobe *Acrobat Reader Ver.7* is optional during the main Setup installation, and you can do it later, after installing the *Antenna Book* software too.

To install Acrobat Reader for Windows:

Select **Run** from the *Windows Start* menu.

1. Type or Browse to **d:\AdbRdr709_en_US.exe** (where d: is the drive letter of your CD-ROM drive; if the CD-ROM is a different drive on your system, use the appropriate letter) and press **Enter**.
2. Follow the instructions that appear on your screen.

To install Acrobat Reader for the Macintosh:

1. From the top-level folder of the CD, double click on the file “Adobe_Reader_MAC_708.dmg” to open up the disk image. Then double click the Adobe Reader Installer icon to launch the installer.

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Choices, Summary and Detailed Propagation Tables

USA

W1B Boston, MA
W2A Albany, NY
W2N NYC, NY
W3D Washington, DC
W4A Montgomery, AL
W4F Miami, FL
W4G Atlanta, GA
W4K Louisville, KY
W4N Raleigh, NC
W4T Memphis, TN
W5A Little Rock, AR
W5H Houston, TX
W5L New Orleans, LA
W5M Jackson, MS
W5N Albuquerque, NM
W5O Oklahoma City, OK
W5T Dallas, TX
W6L Los Angeles, CA
W6S San Francisco, CA
W7A Phoenix, AZ
W7I Boise, ID
W7M Helena, MT
W7N Las Vegas, NV
W7O Portland, OR
W7U Salt Lake City, UT
W7W Seattle, WA
W7Y Cheyenne, WY
W8M Detroit, MI
W8O Cincinnati, OH
W8W Charleston, WV
W9C Chicago, IL
W9I Indianapolis, IN
W9W Milwaukee, WI
W0C Denver, CO
W0D Bismarck, ND
W0I Kansas City, MO
W0K Middle of US, KS
W0M St. Louis, MO
W0N Omaha, NE
W0S Pierre, SD

Other, North America

6Y Kingston, Jamaica
8P Bridgetown, Barbados
HP Panama City, Panama
KL7 Anchorage, Alaska
KP2 Virgin Islands
TI San Jose, Costa Rica
V3 Belmopan, Belize
VE1 Halifax, Nova Scotia
VE2 Montreal, Quebec
VE3 Toronto, Ontario
VE4 Winnipeg, Manitoba
VE5 Regina, Saskatchewan
VE6 Edmonton, Alberta
VE7 Vancouver, BC
VE8 Yellowknife, NWT
VO1 St. John's, NFL
VP2 Anguilla
VP5 Turks & Caicos
XE1 Mexico City, Mexico

Europe

CT Lisbon, Portugal
DL Bonn, Germany
EA Madrid, Spain
EI Dublin, Ireland
ER Kishinev, Moldova
F Paris, France
G London, England
I Rome, Italy
JW Svalbard
OH Helsinki, Finland
OK Prague, Czech Republic
ON Brussels, Belgium
OZ Copenhagen, Denmark
SV Athens, Greece
TF Reykjavik, Iceland
UA3 Moscow, Russia
UA6 Rostov, Russia
UR Kiev, Ukraine
YO Bucharest, Romania
YU Belgrade, Yugoslavia

South America

CE Santiago, Chile
CP La Paz, Bolivia
FY Cayenne, French Guiana
HC Quito, Ecuador
HC8 Galapagos Islands
HK Bogota, Columbia
LU Buenos Aires, Argentina
OA Lima, Peru
P4 Aruba
PY1 Rio de Janeiro, Brazil
PY0 Fernando de Noronha
YV Caracas, Venezuela
YV0 Aves Island
ZP Asuncion, Paraguay

Asia

1S Spratly Islands
3W Ho Chi Minh City, Vietnam
4J Baku, Azerbaijan
4S Colombo, Sri Lanka
4X Jerusalem, Israel
9N Katmandu, Nepal
A6 Dubai, UAE
AP Karachi, Pakistan
BY1 Beijing, China
BY4 Shanghai, China
BY0 Lhasa, China
HS Bangkok, Thailand
HZ Riyadh, Saudi Arabia
JA1 Tokyo, Japan
JA3 Osaka, Japan
JA8 Sapporo, Japan
JT Ulan Bator, Mongolia
TA Ankara, Turkey
UA9 Perm, Russia
UA0 Khabarovsk, Russia
UN Alma-Ata, Kazakh
VR2 Hong Kong
VU New Delhi, India
VU7 Andaman Islands
XZ Rangoon, Myanmar



Oceania

3D2 Fiji Islands
 DU Manila, Philippines
 FO Tahiti
 H4 Honiara, Solomon Islands
 JD1 Ogasawara Island
 KH0 Saipan, Mariana Islands
 KH5K Kingman Reef
 KH6 Honolulu, Hawaii
 KH8 American Samoa
 V7 Kwajalein, Marshall Islands
 VK2 Sydney, Australia
 VK6 Perth, Australia
 VK8 Darwin, Australia
 YB Jakarta, Indonesia
 ZL1 Auckland, New Zealand
 ZL3 Christchurch, New Zealand

Africa

3B9 Rodrigues
 3C Bata, Equatorial Guinea
 3V Tunis, Tunisia
 5N Lagos, Nigeria
 5R Antananarivo, Madagascar
 5U Niamey, Niger Republic
 5Z Nairobi, Kenya
 6W Dakar, Senegal
 7Q Lolongwe, Malawi
 7X Algiers, Algeria
 9J Lusaka, Zambia
 9L Freetown, Sierra Leone
 9X Kigali, Rwanda

C9 Maputo, Mozambique
 CN Casablanca, Morocco
 CT3 Madeira Islands
 D2 Luanda, Angola
 EA8 Canary Islands
 IG9 Lampedusa, Italy
 J2 Djibouti
 ST Khartoum, Sudan
 SU Cairo, Egypt
 VQ9 Chagos, Diego Garcia
 XT Burkina Faso
 ZS1 Capetown, So. Africa
 ZS6 Johannesburg, So. Africa

These PDF files contain propagation prediction tables valid from the transmitting site indicated in the filename to seven generalized receiving locations throughout the world in the Summary Tables and for the 40 CQ Zones in the Detailed Tables. The user selects a single transmitting site closest to his/her location. You can access this data by opening *Adobe Acrobat Reader* and selecting **Prop Index.pdf**. Or you can operate from the main table of contents in the left pane of the opening window.

Each transmitting location is organized by five levels of solar activity over the whole 11-year solar cycle:

VL (Very Low: SSN between 0 to 20)
 LO (Low: SSN between 20 to 40)
 ME (Medium: SSN between 40 to 60)
 HI (High: SSN between 60 to 100)
 VH (Very High: SSN between 100 to 150)
 UH (Ultra High: SSN greater than 150)

The seven generalized locations throughout the world for the Summary Tables are:

EU = Europe (all of Europe)
 FE = Far East (centered on Tokyo, Japan)
 SA = South America (centered on Asuncion, Paraguay)
 AF = Africa (centered on Lusaka, Zambia)
 AS = southern Asia (centered on New Delhi, India)
 OC = Oceania (centered on Sydney, Australia)
 NA = North America (all of USA).

Both types of propagation files show the highest predicted signal strength (in S-units) throughout the generalized receiving area, for a 1500-W transmitter and rather good antennas on both sides of the circuit. The standard antennas are 100-foot high inverted-V dipoles for 80 and 40 meters, a 3-element Yagi at 100 feet for 20

meters, and a 4-element Yagi at 60 feet for 15 and 10 meters. Discount the S-Meter readings in the tables to represent a smaller station:

Subtract 2 S units for a dipole instead of a Yagi
 Subtract 3 S units for a dipole at 50 feet instead of a Yagi at 100 feet
 Subtract 1 S unit for a dipole at 50 feet rather than a dipole at 100 feet
 Subtract 3 S units for 100 W rather than 1500 W.
 Subtract 6 S units for 5 W rather than 1500 W.

Shown below is an image of a Summary Table printout from Boston to the rest of the world, for Very High solar activity in January. This table could be used, for example, to help plan which bands to operate when on a DXpedition to some exotic location.

The Detailed Table printout from Boston to the rest of the world on 20 meters for January from Boston during a Very High level of the solar cycle is shown on the following page. It shows the predicted signal strength in each of the 40 CQ Zones around the world. Note that long-path openings are predicted by an asterisk appended to the end of the predicted signal strength.

Also located on the CD-ROM in the \Propagation subdirectory is the **Fig6Tab.pdf** file described in Chapter 3 of the printed book. This set of tables shows the hours open to each of 10 regions throughout the USA for Very-Low/Medium/Very-High levels of SSN.

Enjoy the software. We would appreciate any feedback or bug reports you might have.

73,

R. Dean Straw, N6BV
 Editor, *The ARRL Antenna Book*
 email: n6bv@arri.org

Sample Summary Propagation-Prediction Table, January from Boston to the World

Jan., MA (Boston), for SSN = Very High, Sigs in S-Units. By N6BV, ARRL.

UTC	80 Meters				40 Meters				20 Meters				15 Meters				10 Meters				UTC								
	EU	FE	SA	AF AS OC NA	EU	FE	SA	AF AS OC NA	EU	FE	SA	AF AS OC NA	EU	FE	SA	AF AS OC NA	EU	FE	SA	AF AS OC NA									
0	9+	-	9+9+8	-	9+	9+5	9+9+9	-	9+	1	9+	9+9+9	9+	9+	9+2	2	9+9+	-	1	8	-	8	9+	0					
1	9+	-	9+9+8	-	9+	9+4	9+9+9	2	9+	1	9	9+8	9+9+9+	-	3	9	-	7	9+9	-	-	-	-	4	2	1			
2	9+	-	9+9+7	-	9+	9+4	9+9+9	7	9+	1	9	9+8	9	9+9+	-	3	-	-	7	9	-	-	-	-	2	2			
3	9+	-	9+9+1	2	9+	9+4	9+9+9	9	9+	-	7	9+7	8	9+9	-	-	-	-	-	-	-	-	-	-	2	3			
4	9+	-	9+9+	-	7	9+	9+5	9+9+8	9	9+	-	5	9+9	9	9+	-	1	-	-	-	-	-	-	-	2	4			
5	9+	-	9+9+	-	8	9+	9+6	9+9+7	9	9+	-	5	9+9	9	5	9+	-	-	-	-	-	-	-	-	2	5			
6	9+	-	9+9+	-	8	9+	9+7	9+9+7	9	9+	-	8	9+8	9	5	9+	-	-	-	-	-	-	-	-	2	6			
7	9+	-	9+9+	-	8	9+	9	8	9+9+7	9+	9+	-	9	9+	-	7	9	9+	-	-	-	-	-	-	2	7			
8	9	7	9+9	-	8	9+	9	8	9+9+8	9+	9+	-	9	9+	-	4	9+9+	-	-	-	-	-	-	-	2	8			
9	8	7	9+7	-	8	9+	9	9+9	8	9+	9+	-	6	9+	-	1	9+9+	-	-	-	-	-	-	-	2	9			
10	5	8	9+2	3	8	9+	9	9+8	8	9	9+	4	-	9+9+1	5	9	-	-	-	-	-	-	-	-	2	10			
11	1	8	9+	-	4	9	9+	8	9+5	8	9	9+	9+4*	9+9+7	-	8	-	-	9	9	-	-	-	-	2	11			
12	-	7	8	-	1	9	9+	6	9	9+1	8	9	9+	9+9	9	1*	9+	9	8*	9+9+9	5*	-	-	2	9	1	1*2	12	
13	-	-	-	-	2	9+	4	8	8	-	7	9	9+	9+9	9	9+9+	9+	7	9+9+9+3	3	9	9	5*	9+9+9	6	2	13		
14	-	-	-	-	9+	2	7	4	-	5	8	9+	9+9	9+8	9	9	9+	9	9	9+9+9+9	9+	9	6*	9+9+9	1	1	14		
15	-	-	-	-	9	1	5	-	-	4	5	9+	9+9	9+9	9	9	9+	9	9+9+9+9+9	9+	9	5	9+9+6	6	8	15			
16	-	-	-	-	8	3	4	-	-	3	1	9+	9+8	9	9	9	9+	9	9+9+9+9+9	9+	9+	8	9+9+	-	8	9	16		
17	-	-	-	-	8	5	3	-	2	4	-	9+	9+8	9+9+9	9	9+	9+	9	9+9+1*	9+9+	-	8	9+9+	-	8	9+	17		
18	-	-	-	-	9	7	4	2	5	5	-	9+	9+9	9+9+9	9	9+	9+	9	9+9+1	9+9+	-	7	9+9+	-	9+9+	18			
19	1	-	1	-	9+	8	5	6	8	7	-	9+	9+9	9+9+9	9	9+	-	9+9+9+2	9	9+	-	6	9+9+	-	9+9+	19			
20	4	-	2	5	-	9+	9	6	9	9	8	-	9+	9+9	9+9+9	9	9+	-	8	9+9+3	9	9+	-	1	9+9	-	9	9+	20
21	7	-	8	7	1	-	9+	9+7	9+9+8	1	9+	8	9	9+9+9	9	9+	-	6	9+9+3	9	9+	-	-	9+5*	-	9+9+	21		
22	9	2	9+9	8	-	9+	9+7	9+9+9	4	9+	2	9+9+9+9	9	9+	-	9+9+9	1	9+9+	-	5	9+4*	-	5	9+4*	-	9	6	22	
23	9	-	9+9	8	-	9+	9+7	9+9+9	-	9+	1	9+9+9+9	9	9+	-	9+9+6	-	9	9+	-	7	9+2*	-	7	9+2*	-	9	2	23
EU FE SA AF AS OC NA EU FE SA AF AS OC NA EU FE SA AF AS OC NA EU FE SA AF AS OC NA EU FE SA AF AS OC NA																													

Sample Detailed Propagation Table for 20 Meters, January, Boston to World for Very High SSN

20 Meters: Jan., MA (Boston), for SSN = Very High, Sigs in S-Units. By N6BV, ARRL.

Zone	UTC -->																							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
KL7 = 01	9+	9+	9+	7	-	-	-	-	-	-	-	-	-	-	-	3	9+	9+	9+	9+	9+	9+	9+	9+
VO2 = 02	9+	9	9	9	9	9	8	7	5	3	2	1	5	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
W6 = 03	9+	9+	9+	7	7	1	1	5	8	8	3	-	-	1	9	9+	9+	9+	9+	9+	9+	9+	9+	9+
W0 = 04	9+	9+	9+	8	5	5	5	3	2	1	-	-	-	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
W3 = 05	4	2	2	2	2	2	2	3	3	3	2	1	1	8	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
XE1 = 06	9+	9+	7	9	9+	9+	9+	9+	9+	9+	9	8	9	9+	9+	9+	9+	9	9	9	9	9+	9+	9+
TI = 07	9+	9+	9	8	9	9	9	9	9	9	9	9	9	9+	9+	9+	9	8	9	9	9	9+	9+	9+
VP2 = 08	9+	9+	9+	9	9+	9+	9+	9+	9	8	9	9	9	9+	9+	9+	9	9	9	9	9	9	9	9
P4 = 09	9+	9+	9+	9	9+	9+	9+	9+	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
HC = 10	9+	8	9+	9	9	9	9	9	7	3	1	7	9	9	9	5	5	5	7	8	9	9	9	9
PY1 = 11	9+	9+	9	9	9	9	9	9	8	6	9	9	8	2	1	-	-	1	4	8	9	9	9	9
CE = 12	9+	9+	9	9	9	9	9	9	9	8	8	9	8	2	1	1	-	-	1	3	7	9	9	9
LU = 13	9+	9	9	9	9	9	9	9	9	8	8	9	8	4	2	1	-	-	1	4	8	9	9	9
G = 14	-	-	-	-	-	-	-	-	-	-	-	9	9	9	9	9	9	9	9	9	9	9	9	9
I = 15	-	-	-	-	-	-	-	-	-	-	4	9	9	9	9	9	9	9	9	9	9	9	9	9
UR3 = 16	1	1	1	-	-	-	-	-	-	-	-	8	9	9	9	9	9	9	9	9	9	9	9	9
UN = 17	1	-	-	8	7	7	7	1	-	-	-	2	9	9	9	6	-	-	2	4	8	9	5	4
UR9 = 18	6	7	6	6	9	9	9	7	4	1	-	-	8	8	6	6	5	6	7	8	9	9	8	7
UR0 = 19	9	9	9	6	5	5	8	8	8	4	-	-	2	6	8	8	8	7	4	4	7	9	9	9
4X = 20	8	6	3	1	-	3	4	-	-	-	1	8	8	8	8	8	9	9	9	9	9	8	7	7
HZ = 21	9+	9	4	3	8	8	2	-	-	-	1	7	8	9	8	8	9	9	9	9	9	9	9	9
VU = 22	7	5	8	7	6	7	5	-	-	-	6	9	9	9	9	3	2	2	2	2	8	8	9	8
JT = 23	9	9	9	5	7	8	8	6	3	-	-	2*	8	8	5	6	8	8	8	8	9	7	5	6
VS6 = 24	9	9	9	5	4	5	7	8	6	1	-	1*	5	7	1	1	1	1	4	2	-	-	9	
JR1 = 25	9	9	8	7	5	5	8	9	9	6	-	1	1	2	7	7	6	2	-	7	9	9	9	9
HS = 26	9	9	6	4	2	-	-	2	1	-	-	2*	9	9	9	9	8	7	5	4	5	-	1*	1
DU = 27	9	8	7	-	-	-	5	7	7	1	-	-	1*	9	9	7	6	4	5	3	1*	1*	8	9
YB = 28	9	8	1	-	-	-	-	-	-	-	-	4*	8	9	9	9	8	8	9	9	9	9	9	9
VK6 = 29	3*	4*	-	-	-	-	-	-	5	3	-	-	-	5	9	9	9	8	9	9	9	9	9	8
VK3 = 30	1*	-	-	-	-	-	1	3	9	9	4	-	-	9+	9	8	2	1	-	1	2*	5*	4*	
KH6 = 31	9	9+	9+	8	2	2	6	4	-	-	-	-	-	-	-	-	-	9	9	8	7	6	4	7
KH8 = 32	-	2	9	9	9	5	5	9	9+	5	-	-	-	9+	9	9	8	5	3	1	-	-	-	-
CN = 33	-	-	-	-	-	-	-	-	-	-	9	9	9	9	8	9	9	9	9	9	9	9	9	9
SU = 34	9	8	3	3	-	1	4	-	-	-	2	7	8	8	8	8	9	9	9	9	9	9	9	9
6W = 35	9+	9	8	-	2	7	5	-	-	-	9+	9	8	5	4	3	7	9	9	9	9	9	9	9
B2 = 36	9+	9+	5	3	9	9	8	-	-	-	3	-	-	-	4	4	4	7	8	9	9	9	9	9
5Z = 37	9+	9	2	4	8	8	1	-	-	-	2	-	-	3	5	5	7	8	9	9	9	9	9	9
ZS6 = 38	9+	9	8	7	8	9	6	-	-	-	-	-	-	1*	1	2	6	8	9	9	9	9	9	9
ER = 39	9	8	2	1	4	1	-	-	-	-	-	-	-	2*	3*	1*	1	3	8	9	9	9	9	9
FJL = 40	9+	9	7	4	7	8	7	1	-	-	1*	8	9	9	9	9	9	9	9	9	9	9	9	9
Zone	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Expected signal levels using 1500 W and 3-element Yagis at 100 feet at each station.

