Table 11
Specifications for the 144-MHz Family

No. of El	Boom Length (λ)	Gain (dBd)	DE impd (Ω)	FB Ratio (dB)	Beamwidth E/H (°)	Stacking E/H (°)
10	1.8	11.4	27	17	39 / 42	10.2 / 9.5
11	2.2	12.0	38	19	36 / 40	11.0 / 10.0
12	2.5	12.5	28	23	34 / 37	11.7 / 10.8
13	2.9	13.0	23	20	32 / 35	12.5 / 11.4
14	3.2	13.4	27	18	31 / 33	12.8 / 12.0
15	3.6	13.8	35	20	30 / 32	13.2 / 12.4
16	4.0	14.2	32	24	29 / 30	13.7 / 13.2
17	4.4	14.5	25	23	28 / 29	14.1 / 13.6
18	4.8	14.8	25	21	27 / 28.5	14.6 / 13.9
19	5.2	15.0	30	22	26 / 27.5	15.2 / 14.4

Table 12
Free-Space Dimensions for the 144-MHz Yagi Family

Element diameter is 1/4 inch.

El No.	Element Position (mm from reflector)	Element Length
REF	0	1038
DE	312	955
D1	447	956
D2	699	932
D3	1050	916
D4	1482	906
D5	1986	897
D6	2553	891
D7	3168	887
D8	3831	883
D9	4527	879
D10	5259	875
D11	6015	870
D12	6786	865
D13	7566	861
D14	8352	857
D15	9144	853
D16	9942	849
D17	10744	845

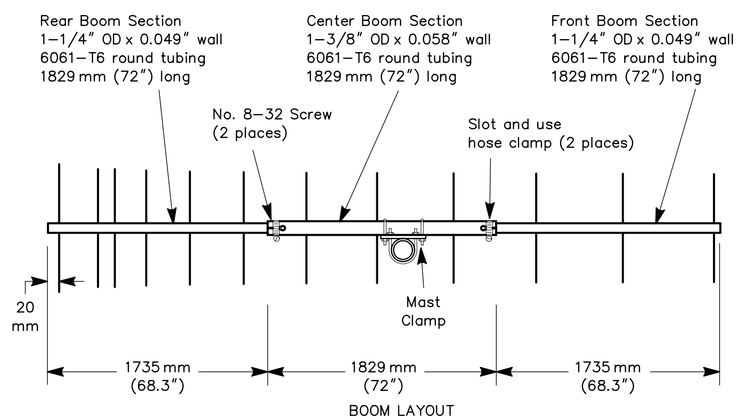

Fig 41—Boom layout for the 12-element 144-MHz Yagi. Lengths are given in millimeters to allow precise duplication.

Table 13
Dimensions for the 12-Element 2.5-λ Yagi

Element Number	Element Position (mm from reflector)	Element Length (mm)	Boom Diam (in)
REF	0	1044	
DE	312	955	
D1	447	962	
D2	699	938	1 1/4
D3	1050	922	
D4	1482	912	
D5	1986	904	
D6	2553	898	1 3/8
D7	3168	894	
D8	3831	889	
D9	4527	885	1 1/4
D10	5259	882	

does not require a boom support. The 12-element 17-foot-long design has a calculated wind survival of close to 120 mi/h! The absence of a boom support also makes vertical polarization possible.

Longer versions could be made by telescoping smaller-size boom sections into the last section. Some sort of boom support will be required on versions longer than 22 feet. The elements are mounted on shoulder insulators and mounted through the boom. However, elements may be mounted, insulated or uninsulated, above or through the boom, as long as appropriate element length corrections are made. Proper tuning can be verified by checking the depth of the nulls between the main lobe and first side lobes. The nulls should be 5 to 10 dB below the first side-lobe level at the primary operating frequency. The boom layout for the 12-element model is shown in **Fig 41**. The actual corrected element dimensions for the 12-element 2.5-λ Yagi are shown in **Table 13**.

The design may also be cut for use at 147 MHz. There is no need to change element spacings. The element lengths should be shortened by 17 mm for best operation between 146 and 148 MHz. Again, the driven element will have to be adjusted as required.

The driven-element size (1/2-inch diameter) was chosen to allow easy impedance matching. Any reasonably sized driven element could be used, as long as appropriate length and T-match adjustments are made. Different driven-element dimensions are required if you change the boom length. The calculated natural driven-element impedance is given as a guideline. A balanced T-match was chosen because it's easy to adjust for best SWR and provides a balanced radiation

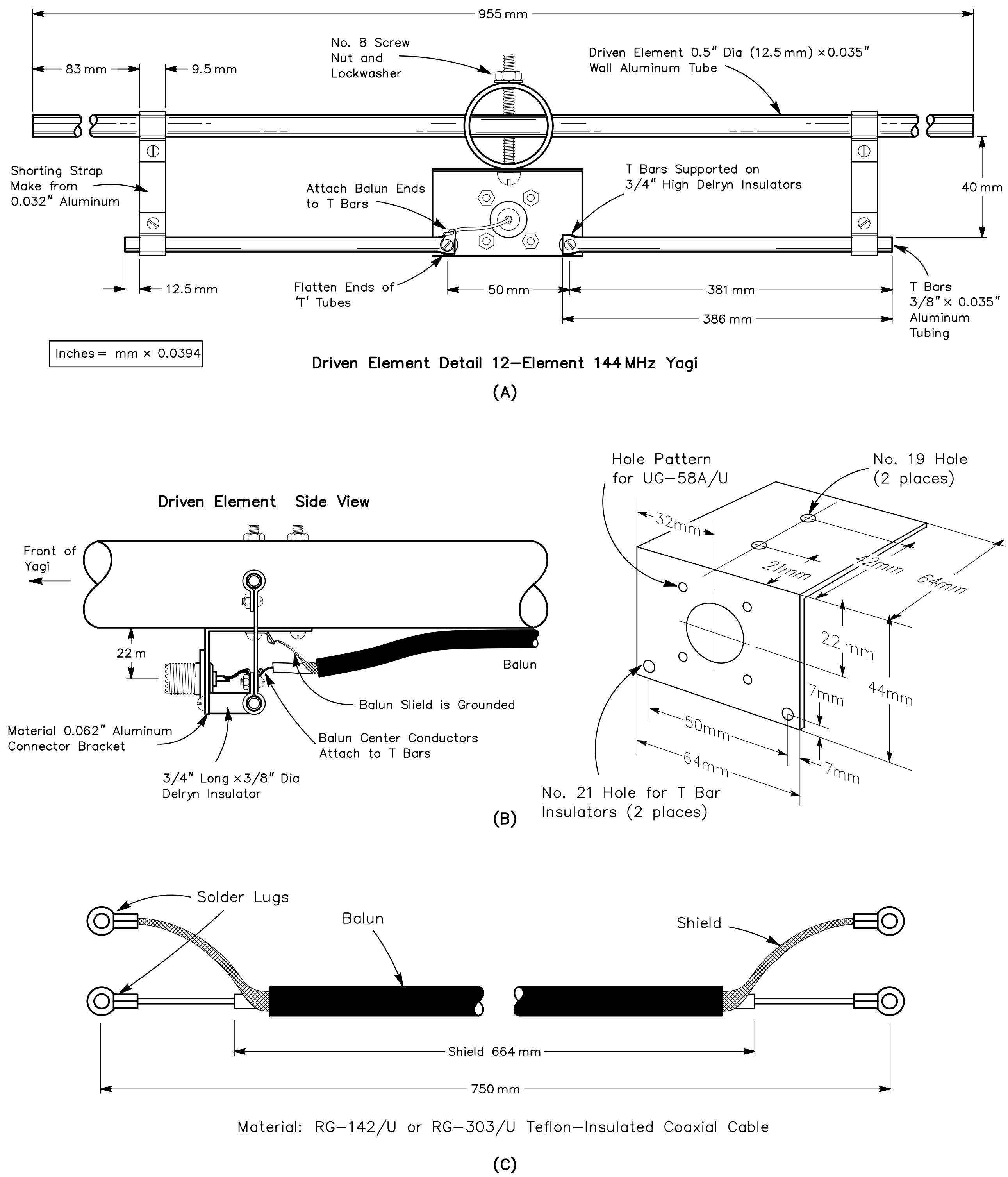

Fig 42—Driven-element detail for the 12-element 144-MHz Yagi. Lengths are given in millimeters to allow precise duplication.

pattern. A 4:1 half-wave coaxial balun is used, although impedance-transforming quarter-wave sleeve baluns could also be used. The calculated natural impedance will be useful in determining what impedance transformation will be required at the 200-Ω balanced feed point. *The ARRL Antenna Book* contains information on calculating folded-dipole and T-match driven-element parameters. A balanced feed is important for best operation on this antenna. Gamma matches can severely distort the pattern balance. Other useful driven-element arrangements are the Delta match and the folded dipole, if you're willing to sacrifice some flexibility. Fig 42 details the driven-element dimensions.

A noninsulated driven element was chosen for mounting convenience. An insulated driven element may also be used. A grounded driven element may be less affected by static build-up. On the other hand, an insulated driven element allows the operator to easily check his feed lines for water or other contamination by the use of an ohmmeter from the shack.

Fig 43 shows computer-predicted E and H-plane radiation patterns for the 12-element Yagi. The patterns are

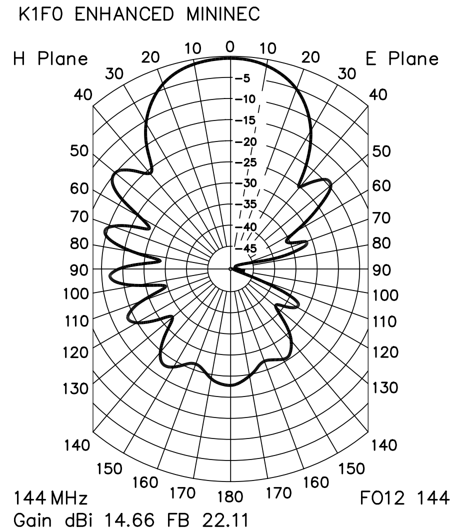

Fig 43—H and E-plane pattern for the 12-element 144-MHz Yagi.

Table 14
Free-Space Dimensions for the 222-MHz Yagi Family
Element diameter is 3/16 inch.

El No.	*Element Position (mm from reflector)*	*Element Length (mm)*
REF	0	676
DE	204	647
D1	292	623
D2	450	608
D3	668	594
D4	938	597
D5	1251	581
D6	1602	576
D7	1985	573
D8	2395	569
D9	2829	565
D10	3283	562
D11	3755	558
D12	4243	556
D13	4745	554
D14	5259	553
D15	5783	552
D16	6315	551
D17	6853	550
D18	7395	549
D19	7939	548
D20	8483	547

Table 15
Specifications for the 222-MHz Family

No. of El	*Boom Length(λ)*	*Gain (dBd)*	*FB Ratio (dB)*	*DE Impd (Ω)*	*Beamwidth E/H (°)*	*Stacking E/H (feet)*
12	2.4	12.3	22	23	37 / 39	7.1 / 6.7
13	2.8	12.8	19	28	33 / 36	7.8 / 7.2
14	3.1	13.2	20	34	32 / 34	8.1 / 7.6
15	3.5	13.6	24	30	30 / 33	8.6 / 7.8
16	3.9	14.0	23	23	29 / 31	8.9 / 8.3
17	4.3	14.35	20	24	28 / 30.5	9.3 / 8.5
18	4.6	14.7	20	29	27 / 29	9.6 / 8.9
19	5.0	15.0	22	33	26 / 28	9.9 / 9.3
20	5.4	15.3	24	29	25 / 27	10.3 / 9.6
21	5.8	15.55	23	24	24.5 / 26.5	10.5 / 9.8
22	6.2	15.8	21	23	24 / 26	10.7 / 10.2

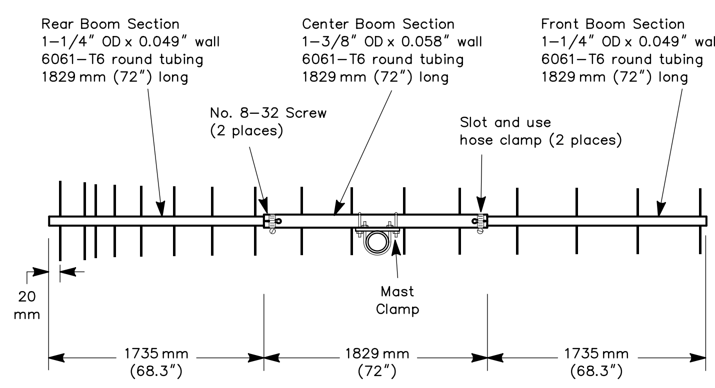

Fig 44—Boom layout for the 16-element 222-MHz Yagi. Lengths are given in millimeters to allow precise duplication.