ex. Use a Gamma-Match to drive the 5 element, channel 43 Yagi-Uda antenna (w/out boom), that was previously designed, with a 50Ω coaxial transmission line. Matching specification VSWR ≤ 1.1

Yagi-Uda Design Summary

$f_c = 647\,MHz \quad \lambda = 46.3\,cm$

element diameters = $1/4'' = 0.635\,cm \Rightarrow a = 0.3175\,cm$

element spacing = $S_{ij} = 0.2\lambda = 9.274\,cm$

$l_1' = 0.48\lambda = 22.24\,cm$

$l_3' = l_5' = 0.419\lambda = 19.41\,cm$

$l_4' = 0.412\lambda = 19.09\,cm$

$l_3 < l_2' < l_1'$

$Z_a = 17.35 + j\,20.59\,\Omega$ (No Match)

$Gain = 11.265\,dBi$

1st Try

Select Gamma-Match diameter $2a' = 1/8" = a$

$a' = 0.15875\,cm$

Gamma-Match spacing $s = 2\,cm$

Gamma-Match length $\ell'/2 = 5\,cm$

Driven Element length $\ell_2' = 0.471 = 21.8\,cm$

This yields an equivalent radius of $a_e = 0.666\,cm$ and $Z_0 = 260\,\Omega$ (Gamma-Match transmission line). (see attached MathCad worksheet). Running a MoM simulation of this Yagi-Uda antenna with the modified driven element (see attached NEC sheets) yields:

$Z_a = 18.36 + j\,25.39\,\Omega$ Gain = 11.6 dBi

$Z_{in} = 27.746\,\Omega$ (w/ $C = 4.226\,pF$)

$VSWR = 1.802 > 1.1$

$\Rightarrow$ Need to boost real part of Z_a to increase Z_{in} & decrease imaginary part of Z_a (get near resonance)

Gamma-Match equations

$c := 2.9979 \cdot 10^{8}$ $fc := 647 \cdot 10^{6}$ $\lambda := \frac{c}{fc}$ $\lambda = 0.46335$ $k := \frac{2 \cdot \pi}{\lambda}$ $k = 13.56023$

$Zdesired := 50$ Ω $d := 0.635 \cdot 10^{-2}$ m $a := d \cdot 0.5$ $a = 0.003175$ m

$dprime := 0.3175 \cdot 10^{-2}$ m $aprime := dprime \cdot 0.5$ $aprime = 0.0015875$ m $s := 2. \cdot 10^{-2}$ m

$$Z0 := \frac{376.73}{2 \cdot \pi} \cdot acosh\left[\frac{\left(s^2 - a^2 - aprime^2\right)}{2 \cdot a \cdot aprime}\right] \qquad Z0 = 260.329 \ \Omega$$

$u := \frac{a}{aprime}$ $v := \frac{s}{aprime}$

$u = 2$ $v = 12.5984$

$$\alpha := \frac{acosh\left[\frac{\left(v^2 - u^2 + 1\right)}{2 \cdot v}\right]}{acosh\left[\frac{\left(v^2 + u^2 - 1\right)}{2 \cdot v \cdot u}\right]} \qquad \alpha = 1.36748$$

$$ae := aprime \cdot e^{\frac{1}{(1+u)^2} \cdot \left(u^2 \cdot \ln(u) + 2 \cdot u \cdot \ln(v)\right)}$$

$ae = 0.00666$ $ae \cdot 100 = 0.66609$ cm

$lprime := 10. \cdot 10^{-2}$ m $lprime \cdot 0.5 = 0.05$ m

$$Zt := j \cdot Z0 \cdot \tan\left(\frac{k \cdot lprime}{2}\right) \qquad Zt = 209.66289i \ \Omega$$

$Yt := \frac{1}{Zt}$ $Yt = -4.77 \cdot 10^{-3} i$

Za from NEC (a MoM program)

$Za := 18.356 + j \cdot 25.3879$ Ω $Ya := \frac{1}{Za}$ $Ya = 0.0187 - 0.02587i$ Mhos

$$Ying := Yt + \frac{Ya \cdot 2}{(1+\alpha)^2} \qquad Ying = 6.673 \cdot 10^{-3} - 0.014i$$

$\frac{1}{Zdesired} = 0.02$ Mhos

$Zing := \frac{1}{Ying}$ $Zing = 27.746 + 58.205i$ Ω $Zdesired = 50$ Ω

$$C := if\left(Im(Zing) > 0, \frac{1}{2 \cdot \pi \cdot fc \cdot Im(Zing)}, 0\right) \qquad C = 4.226 \cdot 10^{-12}$$

$C \cdot 10^{12} = 4.226$ pF

$$Zcap := if\left(C > 0, \frac{1}{j \cdot 2 \cdot \pi \cdot fc \cdot C}, 0\right) \qquad Zcap = -58.205i \ \Omega$$

1st Try

$Zin := Zcap + Zing$ $Zin = 27.746$ Ω

$$\Gamma := \frac{(Zin - Zdesired)}{Zin + Zdesired} \qquad \Gamma = -0.286 \qquad |\Gamma| = 0.286$$

$$VSWR := \frac{(1 + |\Gamma|)}{1 - |\Gamma|} \qquad VSWR = 1.802$$

```
CM Yagi-Uda Antenna for UHF channel 43
CM THIS PROGRAM ASSUMES THAT THERE IS NO BOOM.
CM
CM THIS FILE IS USED TO DETERMINE THE INPUT IMPEDANCE OF THE DRIVEN
CM ELEMENT OF A 5 ELEMENT ANTENNA. CENTER FREQUENCY IS 647 MHz
CM W/ WAVELENGTH OF 0.46335 m.
CM
CM THE DIMENSIONS ARE:
CM element diameter d=0.635cm=0.25in, radius a=d/2=0.3175cm=0.125in,
CM equivalent radius of Gamma-Match portion of driven element
CM is ae=0.00666 m which has a length of l'/2=0.05 m  < l2
CM
CM l1=0.48 l=0.2224m, l3=l5=0.419 l=0.1941m, l4=0.412 l=0.1909m,
CM driven element l2=0.47 l= 0.218m
CM ELEMENT SPACINGS Sij=0.2 l=0.09267m
CM SELECT SEGMENT LENGTH OF APPROX. 1.25cm=0.025 l
CE THE DRIVEN SEGMENT IS #9 on l2.
GW 1 17 -0.1112  0.0 0.0      0.1112  0.0 0.0      0.003175
GW 2 9  -0.109   0.0 0.09267 0.0      0.0 0.09267 0.003175
GW 3 4   0.0     0.0 0.09267 0.05     0.0 0.09267 0.00666
GW 4 5   0.05    0.0 0.09267 0.109    0.0 0.09267 0.003175
GW 5 15 -0.09705 0.0 0.18534 0.09705 0.0 0.18534 0.003175
GW 6 15 -0.09545 0.0 0.27801 0.09545 0.0 0.27801 0.003175
GW 7 15 -0.09705 0.0 0.37068 0.09705 0.0 0.37068 0.003175
GE 0 0
FR 0 1 0 0 647 0
EX 0 3 1 0 1.0 0.0
RP 0 2 3 0000 0.0 0.0 180.0 90.0
PT -1
XQ 0
EN
```

Yagi-Uda Antenna for UHF channel 43 THIS PROGRAM ASSUMES THAT THERE IS NO BOOM.

THIS FILE IS USED TO DETERMINE THE INPUT IMPEDANCE OF THE DRIVEN ELEMENT OF A 5 ELEMENT ANTENNA. CENTER FREQUENCY IS 647 MHz W/ WAVELENGTH OF 0.46335 m.

THE DIMENSIONS ARE:
element diameter d=0.635cm=0.25in, radius a=d/2=0.3175cm=0.125in,
equivalent radius of Gamma-Match portion of driven element
is ae=0.00666 m which has a length of l'/2=0.05 m < 12

l1=0.48 l=0.2224m, l3=l5=0.419 l=0.1941m, l4=0.412 l=0.1909m,
driven element l2=0.47 l= 0.218m
ELEMENT SPACINGS Sij=0.2 l=0.09267m
SELECT SEGMENT LENGTH OF APPROX. 1.25cm=0.025 l
THE DRIVEN SEGMENT IS #9 on l2.

1st TRY

****

- - - STRUCTURE SPECIFICATION - - -

COORDINATES MUST BE INPUT IN METERS OR BE SCALED TO METERS
BEFORE STRUCTURE INPUT IS ENDED

WIRE NO.	X1	Y1	Z1	X2	Y2	Z2	RADIUS	SEG.	SEG.	SEG.	NO.
1	-0.11120	0.0	0.0	0.11120	0.0	0.0	0.00317	17	1	17	1
2	-0.10900	0.0	0.09267	0.0	0.0	0.09267	0.00317	9	18	26	2
3	0.0	0.0	0.09267	0.05000	0.0	0.09267	0.00666	4	27	30	3
4	0.05000	0.0	0.09267	0.10900	0.0	0.09267	0.00317	5	31	35	4
5	-0.09705	0.0	0.18534	0.09705	0.0	0.18534	0.00317	15	36	50	5
6	-0.09545	0.0	0.27801	0.09545	0.0	0.27801	0.00317	15	51	65	6
7	-0.09705	0.0	0.37068	0.09705	0.0	0.37068	0.00317	15	66	80	7

TOTAL SEGMENTS USED= 80 NO. SEG. IN A SYMMETRIC CELL= 80 SYMMETRY FLAG= 0

***** INPUT LINE	1	FR	0	1	0	0	6.47000E+02	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	2	EX	0	3	1	0	1.00000E+00	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	3	RP	0	2	3	0	0.0	0.0	1.800E+02	9.000E+01	0.0	0.0

FREQUENCY= 6.4700E+02 MHZ WAVELENGTH= 4.6337E-01 METERS

- - - ANTENNA INPUT PARAMETERS - - -

TAG NO.	SEG. NO.	VOLTAGE REAL	VOLTAGE IMAG.	IMPEDANCE (OHMS) REAL	IMPEDANCE (OHMS) IMAG.	ADMITTANCE (MHOS) REAL	ADMITTANCE (MHOS) IMAG.
3	27	1.0	0.0	1.83560E+01	2.53879E+01	1.87022E-02	-2.58667E-023

$Z_a = 18.356 + j\,25.3879\ \Omega$

- - - RADIATION PATTERNS - - -

THETA DEGREES	PHI DEGREES	Gain DB
0.00	0.00	11.61220
180.00	0.00	-0.14719

***** INPUT LINE	4	PT	-1	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	5	XQ	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	6	EN	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0

2nd Try

→ Decrease l_2' to 20.8 cm

The MoM Simulation (see attached MCAD and NEC sheets) now yields:

$Z_a = 14.93 + j1.27\ \Omega$ $\quad Gain = 11.56\ dBi$

which gives

$Z_{in} = 38.95\ \Omega$ w/ $C = 22.062\ pF$

$VSWR = 1.284 > 1.1$

Still need to increase the real part of Z_a. Since the driven element is very close to resonance, further adjustments to l_2' will give minimal return.

Gamma-Match equations

$c := 2.9979 \cdot 10^{8}$ $fc := 647 \cdot 10^{6}$ $\lambda := \frac{c}{fc}$ $\lambda = 0.46335$ $k := \frac{2 \cdot \pi}{\lambda}$ $k = 13.56023$

$Zdesired := 50$ Ω $d := 0.635 \cdot 10^{-2}$ m $a := d \cdot 0.5$ $a = 0.003175$ m

$dprime := 0.3175 \cdot 10^{-2}$ m $aprime := dprime \cdot 0.5$ $aprime = 0.0015875$ m $s := 2. \cdot 10^{-2}$ m

$$Z0 := \frac{376.73}{2 \cdot \pi} \cdot acosh\left[\frac{\left(s^2 - a^2 - aprime^2\right)}{2 \cdot a \cdot aprime}\right] \qquad Z0 = 260.329 \ \Omega$$

$u := \frac{a}{aprime}$ $v := \frac{s}{aprime}$

$u = 2$ $v = 12.5984$

$$\alpha := \frac{acosh\left[\frac{\left(v^2 - u^2 + 1\right)}{2 \cdot v}\right]}{acosh\left[\frac{\left(v^2 + u^2 - 1\right)}{2 \cdot v \cdot u}\right]} \qquad \alpha = 1.36748$$

$$ae := aprime \cdot e^{\frac{1}{(1+u)^2} \cdot \left(u^2 \cdot \ln(u) + 2 \cdot u \cdot \ln(v)\right)}$$

$ae = 0.00666$ $ae \cdot 100 = 0.66609$ cm

$lprime := 10. \cdot 10^{-2}$ m $lprime \cdot 0.5 = 0.05$ m

$$Zt := j \cdot Z0 \cdot \tan\left(\frac{k \cdot lprime}{2}\right) \qquad Zt = 209.66289i \ \Omega$$

$Yt := \frac{1}{Zt}$ $Yt = -4.77 \cdot 10^{-3} i$

Za from NEC (a MoM program)

$Za := 14.9299 + j \cdot 1.27235$ Ω $Ya := \frac{1}{Za}$ $Ya = 0.0665 - 0.00567i$ Mhos

$$Ying := Yt + \frac{Ya \cdot 2}{(1+\alpha)^2} \qquad Ying = 0.024 - 6.792 \cdot 10^{-3} i$$

$\frac{1}{Zdesired} = 0.02$ Mhos

$Zing := \frac{1}{Ying}$ $Zing = 38.953 + 11.15i$ Ω $Zdesired = 50$ Ω

$$C := if\left(Im(Zing) > 0, \frac{1}{2 \cdot \pi \cdot fc \cdot Im(Zing)}, 0\right) \qquad C = 2.206 \cdot 10^{-11}$$

$C \cdot 10^{12} = 22.062$ pF

$$Zcap := if\left(C > 0, \frac{1}{j \cdot 2 \cdot \pi \cdot fc \cdot C}, 0\right) \qquad Zcap = -11.15i \ \Omega$$

$Zin := Zcap + Zing$ $Zin = 38.953$ Ω

$$\Gamma := \frac{(Zin - Zdesired)}{Zin + Zdesired} \qquad \Gamma = -0.124$$

$|\Gamma| = 0.124$

$$VSWR := \frac{(1 + |\Gamma|)}{1 - |\Gamma|} \qquad VSWR = 1.284$$

2nd Try

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CM Yagi-Uda Antenna for UHF channel 43
CM THIS PROGRAM ASSUMES THAT THERE IS NO BOOM.
CM
CM THIS FILE IS USED TO DETERMINE THE INPUT IMPEDANCE OF THE DRIVEN
CM ELEMENT OF A 5 ELEMENT ANTENNA. CENTER FREQUENCY IS 647 MHz
CM W/ WAVELENGTH OF 0.46335 m.
CM
CM THE DIMENSIONS ARE:
CM element diameter d=0.635cm=0.25in, radius a=d/2=0.3175cm=0.125in,
CM equivalent radius of Gamma-Match portion of driven element
CM is ae=0.00666 m which has a length of l'/2=0.05 m  < 12
CM
CM l1=0.48 l=0.2224m, l3=l5=0.419 l=0.1941m, l4=0.412 l=0.1909m,
CM driven element l2=0.4489 l= 0.208m
CM ELEMENT SPACINGS Sij=0.2 l=0.09267m
CM SELECT SEGMENT LENGTH OF APPROX. 1.25cm=0.025 l
CE THE DRIVEN SEGMENT IS #9 on l2.
GW 1 17 -0.1112  0.0 0.0     0.1112  0.0 0.0     0.003175
GW 2 9  -0.104   0.0 0.09267 0.0     0.0 0.09267 0.003175
GW 3 4   0.0     0.0 0.09267 0.05    0.0 0.09267 0.00666
GW 4 5   0.05    0.0 0.09267 0.104   0.0 0.09267 0.003175
GW 5 15 -0.09705 0.0 0.18534 0.09705 0.0 0.18534 0.003175
GW 6 15 -0.09545 0.0 0.27801 0.09545 0.0 0.27801 0.003175
GW 7 15 -0.09705 0.0 0.37068 0.09705 0.0 0.37068 0.003175
GE 0 0
FR 0 1 0 0 647 0
EX 0 3 1 0 1.0 0.0
RP 0 2 3 0000 0.0 0.0 180.0 90.0
PT -1
XQ 0
EN
```

2nd Try

Yagi-Uda Antenna for UHF channel 43 THIS PROGRAM ASSUMES THAT THERE IS NO BOOM.

THIS FILE IS USED TO DETERMINE THE INPUT IMPEDANCE OF THE DRIVEN ELEMENT OF A 5 ELEMENT ANTENNA. CENTER FREQUENCY IS 647 MHz W/ WAVELENGTH OF 0.46335 m.

THE DIMENSIONS ARE:
element diameter d=0.635cm=0.25in, radius a=d/2=0.3175cm=0.125in,
equivalent radius of Gamma-Match portion of driven element
is ae=0.00666 m which has a length of l'/2=0.05 m < l2

l1=0.48 l=0.2224m, l3=l5=0.419 l=0.1941m, l4=0.412 l=0.1909m,
driven element l2=0.4489 l= 0.208m
ELEMENT SPACINGS Sij=0.2 l=0.09267m
SELECT SEGMENT LENGTH OF APPROX. 1.25cm=0.025 l
THE DRIVEN SEGMENT IS #9 on l2.

2nd Try

****

- - - STRUCTURE SPECIFICATION - - -

COORDINATES MUST BE INPUT IN METERS OR BE SCALED TO METERS
BEFORE STRUCTURE INPUT IS ENDED

WIRE NO.	X1	Y1	Z1	X2	Y2	Z2	RADIUS	NO. OF SEG.	FIRST SEG.	LAST SEG.	TAG NO.
1	-0.11120	0.0	0.0	0.11120	0.0	0.0	0.00317	17	1	17	1
2	-0.10400	0.0	0.09267	0.0	0.0	0.09267	0.00317	9	18	26	2
3	0.0	0.0	0.09267	0.05000	0.0	0.09267	0.00666	4	27	30	3
4	0.05000	0.0	0.09267	0.10400	0.0	0.09267	0.00317	5	31	35	4
5	-0.09705	0.0	0.18534	0.09705	0.0	0.18534	0.00317	15	36	50	5
6	-0.09545	0.0	0.27801	0.09545	0.0	0.27801	0.00317	15	51	65	6
7	-0.09705	0.0	0.37068	0.09705	0.0	0.37068	0.00317	15	66	80	7

TOTAL SEGMENTS USED= 80 NO. SEG. IN A SYMMETRIC CELL= 80 SYMMETRY FLAG= 0

***** INPUT LINE	1	FR	0	1	0	0	6.47000E+02	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	2	EX	0	3	1	0	1.00000E+00	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	3	RP	0	2	3	0	0.0	0.0	1.800E+02	9.00E+01	0.0	0.0

FREQUENCY= 6.4700E+02 MHZ WAVELENGTH= 4.6337E-01 METERS

- - - ANTENNA INPUT PARAMETERS - - -

TAG NO.	SEG. NO.	VOLTAGE REAL	VOLTAGE IMAG.	IMPEDANCE (OHMS) REAL	IMPEDANCE (OHMS) IMAG.	ADMITTANCE (MHOS) REAL	ADMITTANCE (MHOS) IMAG.
3	27	1.0	0.0	1.49299E+01	1.27235E+00	6.64966E-02	-5.66692E-03

- - - RADIATION PATTERNS - - -

THETA DEGREES	PHI DEGREES	MAJOR DB
0.00	0.00	11.56149
180.00	0.00	-0.12704

***** INPUT LINE	4	PT	-1	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	5	XQ	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
***** INPUT LINE	6	EN	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0

3rd Try

Increase l_1' to 22.4cm
& decrease l_3' to 19.1cm

The MoM simulation (see attached MCAD + NEC sheets) now yield:

$Z_a = 18.2632 - j\,0.205\ \Omega$ Gain = 11.46 dBi

which give

$Z_{in} = 48.6\ \Omega$ w/ C = 21.75 pF

VSWR = 1.03 < 1.1 DONE!

Final Design Summary

$2a = 1/4" = 0.635$cm
$2a' = 1/8" = 0.3175$cm
$S = 2$cm
$l/2 = 5$cm
$l_1' = 22.4$cm
$l_2' = 20.8$cm
$l_3' = 19.1$cm
$l_4' = 19.09$cm
$l_5' = 19.41$cm

$S_{ij} = 9.274$cm

$Z_{in} = 48.6\ \Omega$
C = 21.75 pF
Gain = 11.46 dBi

G11

Gamma-Match equations

$c := 2.9979 \cdot 10^{8}$ $fc := 647 \cdot 10^{6}$ $\lambda := \frac{c}{fc}$ $\lambda = 0.46335$ $k := \frac{2 \cdot \pi}{\lambda}$ $k = 13.56023$

$Zdesired := 50$ Ω $d := 0.635 \cdot 10^{-2}$ m $a := d \cdot 0.5$ $a = 0.003175$ m

$dprime := 0.3175 \cdot 10^{-2}$ m $aprime := dprime \cdot 0.5$ $aprime = 0.0015875$ m $s := 2. \cdot 10^{-2}$ m

$$Z0 := \frac{376.73}{2 \cdot \pi} \cdot acosh\left[\frac{\left(s^2 - a^2 - aprime^2\right)}{2 \cdot a \cdot aprime}\right] \qquad Z0 = 260.329 \ \Omega$$

$u := \frac{a}{aprime}$ $v := \frac{s}{aprime}$

$u = 2$ $v = 12.5984$

$$\alpha := \frac{acosh\left[\frac{\left(v^2 - u^2 + 1\right)}{2 \cdot v}\right]}{acosh\left[\frac{\left(v^2 + u^2 - 1\right)}{2 \cdot v \cdot u}\right]} \qquad \alpha = 1.36748$$

$$ae := aprime \cdot e^{\frac{1}{(1+u)^2} \cdot \left(u^2 \cdot \ln(u) + 2 \cdot u \cdot \ln(v)\right)}$$

$ae = 0.00666$ $ae \cdot 100 = 0.66609$ cm

$lprime := 10. \cdot 10^{-2}$ m $lprime \cdot 0.5 = 0.05$ m

$$Zt := j \cdot Z0 \cdot \tan\left(\frac{k \cdot lprime}{2}\right) \qquad Zt = 209.66289i \ \Omega$$

$Yt := \frac{1}{Zt}$ $Yt = -4.77 \cdot 10^{-3} i$

Za from NEC (a MoM program)

$Za := 18.2632 + j \cdot .205397 \Omega$ $Ya := \frac{1}{Za}$ $Ya = 0.05475 + 0.00062i$ Mhos

$$Ying := Yt + \frac{Ya \cdot 2}{(1+\alpha)^2} \qquad Ying = 0.02 - 4.55 \cdot 10^{-3} i$$

$\frac{1}{Zdesired} = 0.02$ Mhos

$Zing := \frac{1}{Ying}$ $Zing = 48.555 + 11.309i$ Ω $Zdesired = 50$ Ω

$$C := if\left(Im(Zing) > 0, \frac{1}{2 \cdot \pi \cdot fc \cdot Im(Zing)}, 0\right) \qquad C = 2.175 \cdot 10^{-11}$$

$C \cdot 10^{12} = 21.752$ pF

$$Zcap := if\left(C > 0, \frac{1}{j \cdot 2 \cdot \pi \cdot fc \cdot C}, 0\right) \qquad Zcap = -11.309i \ \Omega$$

$Zin := Zcap + Zing$ $Zin = 48.555$ Ω

$\Gamma := \frac{(Zin - Zdesired)}{Zin + Zdesired}$ $\Gamma = -0.015$ $|\Gamma| = 0.015$

$VSWR := \frac{(1 + |\Gamma|)}{1 - |\Gamma|}$ $VSWR = 1.03$

3rd Try

```
CM Yagi-Uda Antenna for UHF channel 43
CM THIS PROGRAM ASSUMES THAT THERE IS NO BOOM.
CM
CM THIS FILE IS USED TO DETERMINE THE INPUT IMPEDANCE OF THE DRIVEN
CM ELEMENT OF A 5 ELEMENT ANTENNA. CENTER FREQUENCY IS 647 MHz
CM W/ WAVELENGTH OF 0.46335 m.
CM
CM THE DIMENSIONS ARE:
CM element diameter d=0.635cm=0.25in, radius a=d/2=0.3175cm=0.125in,
CM equivalent radius of Gamma-Match portion of driven element
CM is ae=0.00666 m which has a length of l'/2=0.05 m  < l2
CM
CM l1=0.483 l=0.224m, l3=0.4122 l=0.191 m, l4=0.412 l=0.1909m,
CM l5=0.419 l=0.1941m
CM driven element l2=0.4489 l= 0.208m
CM ELEMENT SPACINGS Sij=0.2 l=0.09267m
CM SELECT SEGMENT LENGTH OF APPROX. 1.25cm=0.025 l
CE THE DRIVEN SEGMENT IS #9 on 12.
GW 1 17 -0.112  0.0 0.0     0.112  0.0 0.0     0.003175
GW 2 9  -0.104   0.0 0.09267 0.0     0.0 0.09267 0.003175
GW 3 4   0.0     0.0 0.09267 0.05    0.0 0.09267 0.00666
GW 4 5   0.05    0.0 0.09267 0.104   0.0 0.09267 0.003175
GW 5 15 -0.09505 0.0 0.18534 0.09505 0.0 0.18534 0.003175
GW 6 15 -0.09545 0.0 0.27801 0.09545 0.0 0.27801 0.003175
GW 7 15 -0.09705 0.0 0.37068 0.09705 0.0 0.37068 0.003175
GE 0 0
FR 0 1 0 0 647 0
EX 0 3 1 0 1.0 0.0
RP 0 2 3 0000 0.0 0.0 180.0 90.0
PT -1
XQ 0
EN
```

3rd try

1613

Yagi-Uda Antenna for UHF channel 43 THIS PROGRAM ASSUMES THAT THERE IS NO BOOM.
THIS FILE IS USED TO DETERMINE THE INPUT IMPEDANCE OF THE DRIVEN
ELEMENT OF A 5 ELEMENT ANTENNA. CENTER FREQUENCY IS 647 MHz
W/ WAVELENGTH OF 0.46335 m.

THE DIMENSIONS ARE:
element diameter d=0.635cm=0.25in, radius a=d/2=0.3175cm=0.125in,
equivalent radius of Gamma-Match portion of driven element
is ae=0.00666 m which has a length of l'/2=0.05 m < 12

l1=0.483 l=0.224m, l3=0.4122 l=0.191 m, l4=0.412 l=0.1909m,
l5=0.419 l=0.1941m
driven element l2=0.4489 l= 0.208m
ELEMENT SPACINGS Sij=0.2 l=0.09267m
SELECT SEGMENT LENGTH OF APPROX. 1.25cm=0.025 l
THE DRIVEN SEGMENT IS #9 on l2.

3rd TRY

****

- - - STRUCTURE SPECIFICATION - - -

COORDINATES MUST BE INPUT IN METERS OR BE SCALED TO METERS
BEFORE STRUCTURE INPUT IS ENDED

WIRE NO.	X1	Y1	Z1	X2	Y2	Z2	RADIUS	NO. OF SEG.	FIRST SEG.	LAST SEG.	TAG NO.
1	-0.11200	0.0	0.0	0.11200	0.0	0.0	0.00317	17	1	17	1
2	-0.10400	0.0	0.09267	0.0	0.0	0.09267	0.00317	9	18	26	2
3	0.0	0.0	0.09267	0.05000	0.0	0.09267	0.00666	4	27	30	3
4	0.05000	0.0	0.09267	0.10400	0.0	0.09267	0.00317	5	31	35	4
5	-0.09505	0.0	0.18534	0.09505	0.0	0.18534	0.00317	15	36	50	5
6	-0.09545	0.0	0.27801	0.09545	0.0	0.27801	0.00317	15	51	65	6
7	-0.09705	0.0	0.37068	0.09705	0.0	0.37068	0.00317	15	66	80	7

TOTAL SEGMENTS USED= 80 NO. SEG. IN A SYMMETRIC CELL= 80 SYMMETRY FLAG= 0

***** INPUT LINE 1 FR 0 1 0 0 6.47000E+02 0.0 0.0 0.0 0.0 0.0
***** INPUT LINE 2 EX 0 3 1 0 1.00000E+00 0.0 0.0 0.0 0.0 0.0
***** INPUT LINE 3 RP 0 2 3 0 0.0 0.0 1.80E+02 9.00E+01 0.0 0.0

FREQUENCY= 6.4700E+02 MHZ WAVELENGTH= 4.6337E-01 METERS

- - - ANTENNA INPUT PARAMETERS - - -

TAG NO.	SEG. NO.	VOLTAGE REAL	VOLTAGE IMAG.	IMPEDANCE (OHMS) REAL	IMPEDANCE (OHMS) IMAG.	ADMITTANCE (MHOS) REAL	ADMITTANCE (MHOS) IMAG.
3	27	1.0	0.0	1.82632E+01	-2.05397E-01	5.47479E-02	6.15721E-04

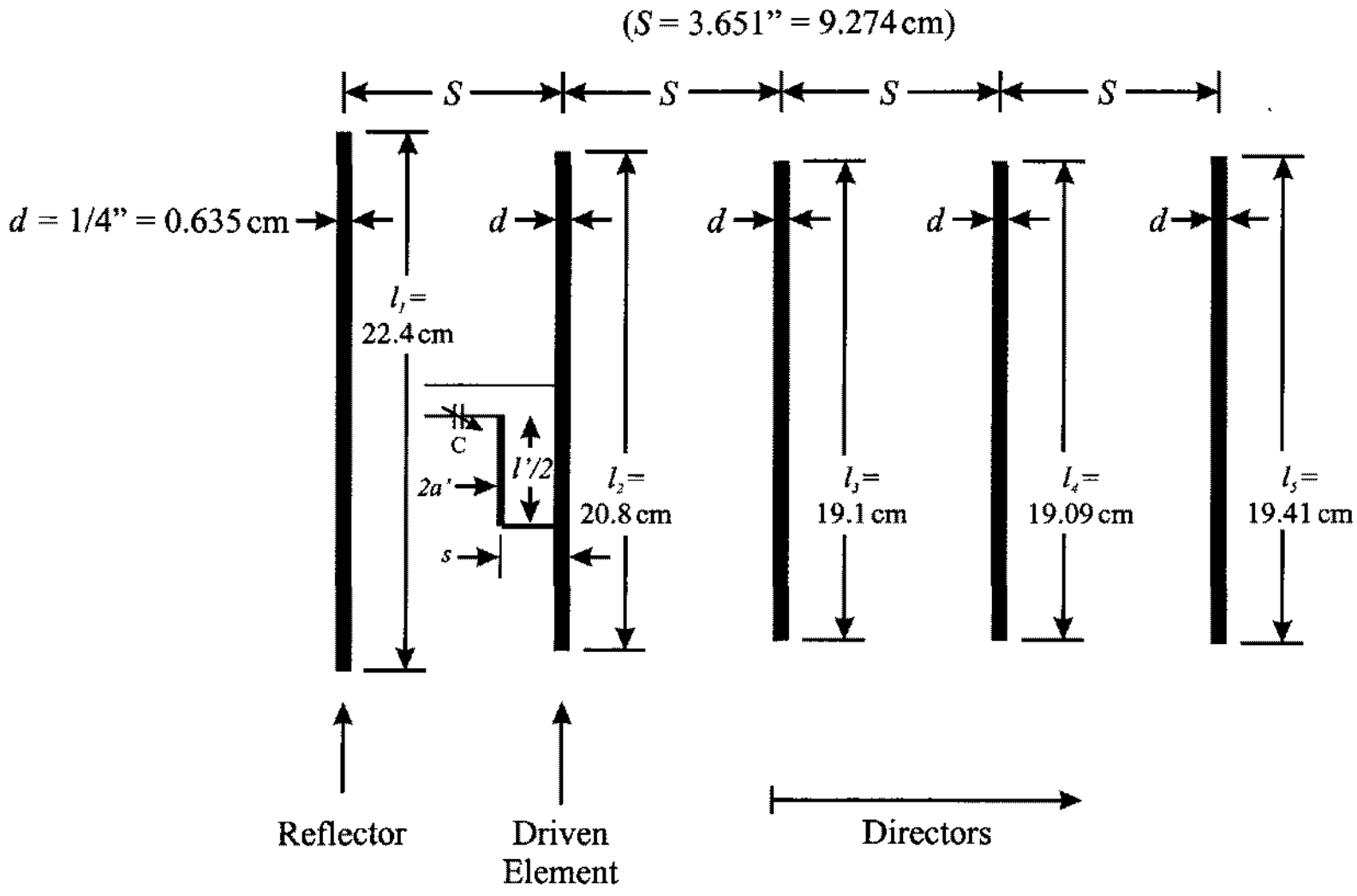
- - - RADIATION PATTERNS - - -

$Z_a = 18.2632 - j\,0.205397\ \Omega$

THETA DEGREES	PHI DEGREES	Gain DB
0.00	0.00	11.45567
180.00	0.00	-1.78089

***** INPUT LINE 4 PT -1 0 0 0 0.0 0.0 0.0 0.0 0.0 0.0
***** INPUT LINE 5 XQ 0 0 0 0 0.0 0.0 0.0 0.0 0.0 0.0
***** INPUT LINE 6 EN 0 0 0 0 0.0 0.0 0.0 0.0 0.0 0.0

5 element, channel 43 Yagi-Uda antenna w/ Gamma-Match



Gamma-Match Dimensions: $2a'$ = 1/8" = 0.3175cm, s = 2.0 cm, l'/2 = 5 cm, and C = 21.75 pF