# HF Antennas

## *Feedline*

The HF feed between the shack and the antennas consist of the following:

| Purpose | Material Information | Gain * |
|---|---|---|
| Feed between tuner and entrance box | RG-213, 12 feet | -0.09 |
| Lightning arrestor | | ? |
| Feed between entrance box and hardline | RG-213, 3 feet | -0.02 |
| Feed between house and HF tower | 0.5 inch hardline, 100 feet | -0.24 |
| Feed between hardline and switch | RG-213, 3 feet | -0.02 |
| Antenna switch | | ? |
| Calculated total Gain | | -0.37 dB |
| Total Gain measured at 3.6 MHz | | -0.3 dB |
| Total Gain measured at 7.12 MHz | | -0.3 dB |
| Total Gain measured at 14.15 MHz | | -0.7 dB |
| Total Gain measured at 21.2 MHz | | -0.7 dB |
| Total Gain measured at 30 MHz | | -0.8 dB |

## *Cushcraft A4S with 40 meter dipole*

| Purpose | Material Information | Gain * |
|---|---|---|
| Feed from switch to antenna | RG-213, 62 feet | -0.46 dB |
| Tribander: 28, 21, 14 MHz | Front to back ration: 25 dB | 8.9 dB, front |
| 40 meter dipole | | 2 dB |

## *Terminated, Folded Dipole (T2FD)*

| Purpose | Material Information | Gain * |
|---|---|---|
| Feed from switch to antenna | RG-8X, 65 feet | -0.71 dB |
| T2FD | | 1-2 dB |

- Does not contain connector loss

## *Feedline to Cushcraft A4S (10/15/20 Meters)*

Frequency gain plus antenna feed = $G_f$+(-0.46)
$G_{10M}$=(-0.8)+(-0.46)= -1.26 dB  Power to antenna = 0.75 x transmitter output
$G_{15M}$=(-0.7)+(-0.46)= -1.25 dB  Power to antenna = 0.75 x transmitter output
$G_{20M}$=(-0.7)+(-0.46)= -1.25 dB  Power to antenna = 0.75 x transmitter output

## *Feedline to Cushcraft 40 Meter Dipole*

Frequency gain plus antenna feed = $G_f$+(-0.46)
$G_{40M}$=(-0.3)+(-0.46)= -0.76 dB  Power to antenna = 0.84 x transmitter output

## *Feedline to T2FD*

Frequency gain plus antenna feed = $G_f$+(-0.71)
$G_{80M}$=(-0.3)+(-0.71)= -1.01 dB  Power to antenna = 0.79 x transmitter output

## *Power Loss/Gain*

$dB=10\log_{10}(P_2/P_1)$ for Power

$P_2= P_{1\,x}\,10^{(dB/10)}$

## *Links*

Station Evaluation: https://www.arrl.org/fcc-rf-exposure-regulations-the-station-evaluation

Exposure Calculator: https://www.arrl.org/rf-exposure-calculator

Calculator Parameters: https://www.arrl.org/rf-exposure-calc-instructions

## *RF Exposure*

| Antenna | Band | Power Trans | Power Ant | Duty cycle | Gain | Min Safe Con | Min Safe Uncon |
|---|---|---|---|---|---|---|---|
| A4S Dig | 10 | 50 | 37.5 | 100 | 8.9 | 5 ft | 12 ft |
| A4S Voice | 10 | 1000 | 750 | 50 | 8.9 | 9 | 20 |
| A4S Dig | 15 | 50 | 37.5 | 100 | 8.9 | 4 | 9 |
| A4S Voice | 15 | 1000 | 750 | 50 | 8.9 | 6 | 14 |
| A4S Dig | 20 | 50 | 37.5 | 100 | 8.9 | 3 | 6 |
| A4S Voice | 20 | 1000 | 750 | 50 | 8.9 | 4 | 10 |
| A4S Dipole Dig | 40 | 50 | 42 | 100 | 2 | 1 | 2 |
| A4S Dipole Vo | 40 | 1000 | 840 | 50 | 2 | 2 | 4 |
| T2FD Dig | 80 | 50 | 39.5 | 100 | 1 | 0.3 | 0.7 |
| T2FD Voice | 80 | 1000 | 790 | 50 | 1 | 1 | 2 |

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