

# **Assembly Instructions: UHF Television Antenna Kit**

*MTM Scientific, Inc. P.O. Box 522 Clinton, MI 49236*

## **Introduction**

The MTM Scientific, Inc. UHF Television Antenna Kit is designed to improve reception of broadcast television stations. The antenna is built for high gain on a single UHF channel of interest, ranging from 14 to 70. The antenna is primarily intended for temporary indoor use, although an outdoor version can be built.

## **Assembly Steps**

Step 1: Select the specific UHF channel you wish to receive. (Anywhere in the range of 14 to 70.)

Step 2: Refer to the Appendix and find the row entry for your selected channel. Hint: Use a highlighter to mark the row for easy reference during assembly.

Step 3: Drill the wooden mast beam per the dimensions given in the "position" columns of the Appendix. Note that at the loop position two holes are drilled  $\frac{1}{2}$ " apart, refer to the diagram.

Step 4: Cut the antenna elements to length. Strong wire cutters or a vise and hacksaw will work well. You may need to de-burr the ends after cutting. Note that the loop is formed separately, as described in the next steps.

Step 5: Carefully form the loop. The loop should have a separation of  $\frac{1}{2}$ ", and a length as given in the Appendix. Refer to the drawing. Note that the loop should be formed by first inserting the rod through a hole in the wooden mast and then starting to make the bends! It is easiest to make the final loop ends longer initially, and then cut them to fit for Step 6.

Step 6: Insert the short plastic piece in the wooden mast. Cut the ends of the loop to length such that they mate flush with the ends of the plastic piece. Slip the brass tubes (soldered to the coaxial cable) onto the loop ends. Telescope the tubes over the plastic piece to hold them in place. Refer to the drawing and photos. Solder may be added to the connection between the tubes and rods if you want a more permanent connection.

Step 7: Use the nylon cable ties to attach the coaxial cable to the wooden mast beam.

Step 8: Insert the remaining brass antenna elements. Each element should be centered in the wooden mast beam. If desired, a small amount of adhesive may be used to secure the antenna elements in place.

## **Directions for using the Antenna**

The antenna is designed to receive the channel you have built it for. The coaxial cable attached to the antenna is a low loss type. The antenna should be connected directly to the television set for best performance.

A small portable television is ideal for prospecting reception, because you can easily change location for the best signal.

In use the antenna should be pointed towards the direction of the television station. A clear view of the horizon towards the station is ideal, for example from the balcony of a 2<sup>nd</sup> story apartment. You will find keeping the antenna elements horizontal produces the best reception of television stations.

## **Ideas, Things to Try**

An outdoor version of the antenna can also be built by substituting a piece of 3/4 " PVC water pipe for the mast. It is still a good idea to drill the wooden mast first, and then simply transfer the holes to the PVC pipe. For an outdoor version, the antenna elements should be secured in place using silicone sealant. Also dab some sealant on the open end of the PVC cable to prevent moisture absorption.

An outdoor version of the antenna introduces hazards associated with lightning. Consequently the antenna should be grounded identically to any standard television antenna installation. Radio Shack sells the parts for doing the installation correctly.

The antenna can also be used with a radio or scanner. In that case you should build the antenna for the frequency of interest by referring again to the information in Appendix A. The output impedance of the antenna is 75 ohms, which will provide an adequate match for most receivers. It will be necessary to buy an RF adapter connector from Radio Shack to make the hook-up to your receiver with the F Connector Male fitting on the coaxial cable.

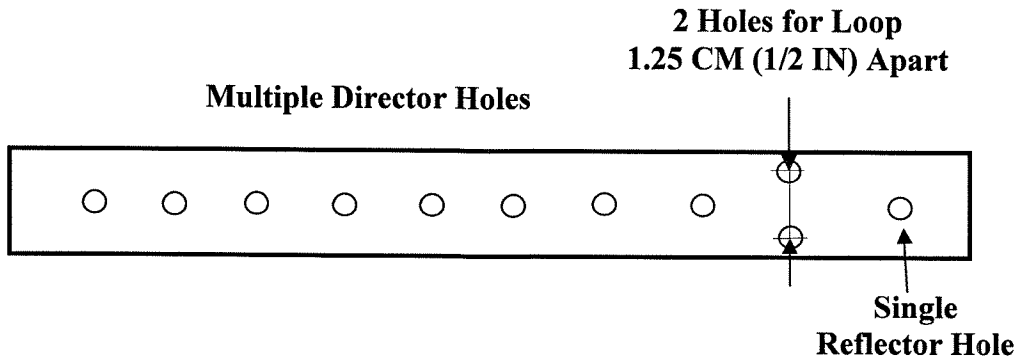
It is also possible to design and build your own custom YAGI antenna using the kit materials. One excellent program for designing your own antenna is "Quick Yagi" by Chuck Smith (WA7RAI). The software is available for free download on the internet.

This antenna kit can be used to make an antenna suitable for doing amateur radio astronomy. UHF Channel 37 is reserved for this very purpose (608-614 MHz). Refer to the MTM website if you are interested in pursuing this project, as they also offer a TV Tuner and additional information.

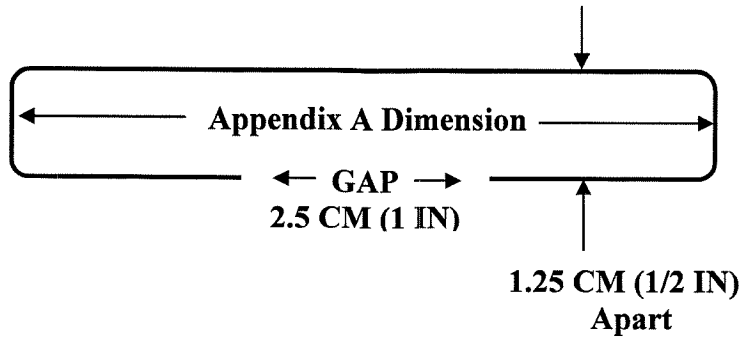
## **Specifications**

Antenna Type: YAGI Beam  
Impedance: 75 ohms  
Gain: 11 Db+  
Cable: RG-6  
Connector: F Type Male  
Rated Use: Indoor / Receive Only

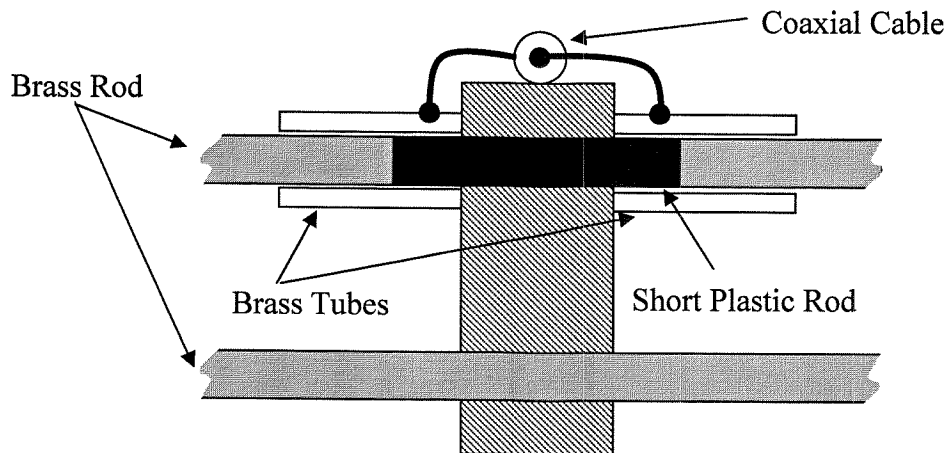
## Wooden Beam Layout

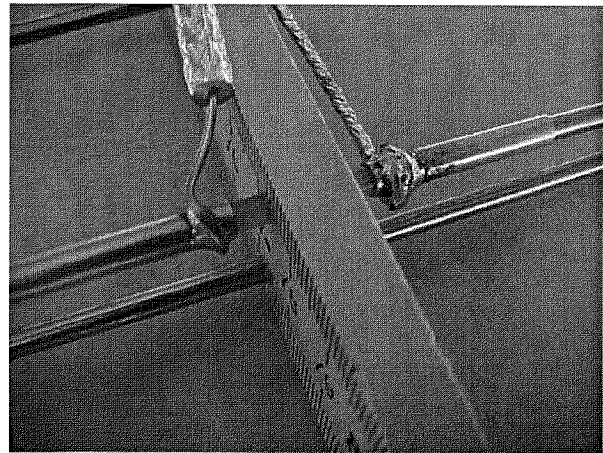
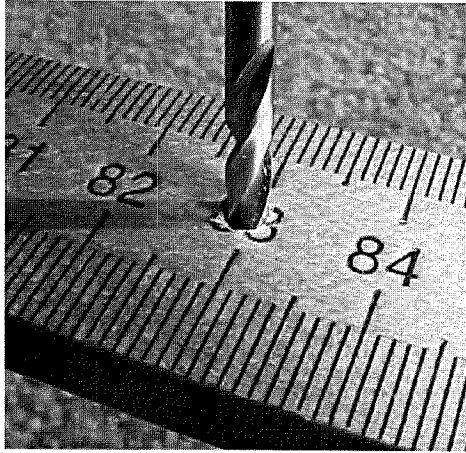


## Loop Detail

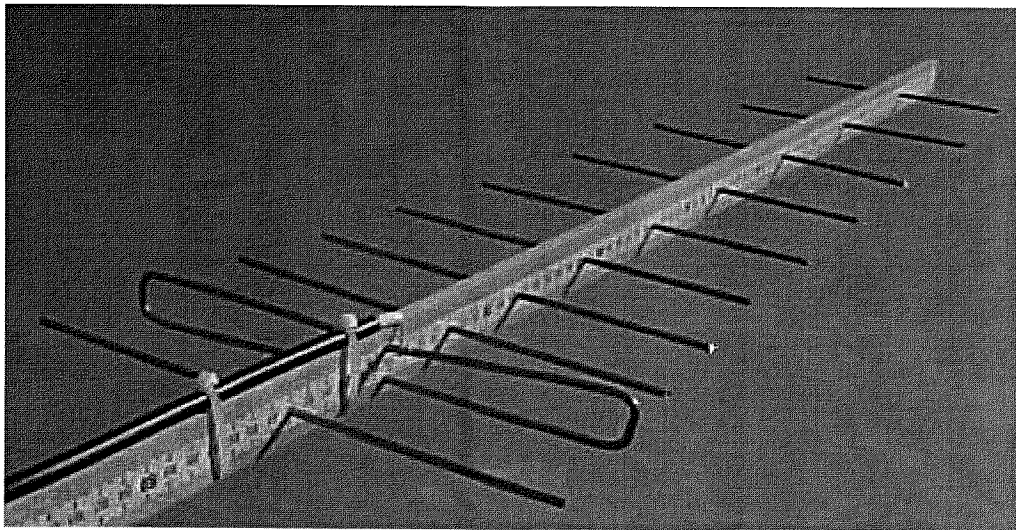


## Loop Attachment





Assembly details for the Loop Antenna Kit



The Loop Antenna Kit fully assembled.

<i>MTM Inc.</i>	Reflector	Loop	Director 1	Director 2	Director 3	Director 4	Director 5	Director 6	Director 7	Director 8	Director 9
CH 14	93.8	85.8	79.5	72	63.3	53	40.9	26.7	10		
473 MHz	31.8	30.1	29.1	27.2	26.3	26	23.8	23.7	21.7		
CH 15	92.7	84.9	78.6	71.3	62.6	52.5	40.5	26.5	10		
479 MHz	31.4	29.8	28.7	26.8	25.9	25.7	23.5	23.4	21.4		
CH 16	91.7	83.9	77.7	70.5	61.9	51.9	40.1	26.3	10		
486 MHz	31	29.4	28.3	26.5	25.6	25.3	23.2	23.1	21.2		
CH 17	90.7	83	76.9	69.8	61.3	51.4	39.8	26.1	10		
491 MHz	30.6	29	28	26.2	25.3	25	22.9	22.8	20.9		
CH 18	89.7	82.2	76.1	69	60.7	50.9	39.4	25.9	10		
497 MHz	30.2	28.7	27.6	25.9	24.9	24.8	22.6	22.6	20.6		
CH 19	88.8	81.3	75.3	68.3	60.1	50.4	39.1	25.7	10		
503 MHz	29.9	28.3	27.3	25.6	24.6	24.5	22.4	22.3	20.4		
CH 20	87.8	80.5	74.6	67.6	59.5	49.9	38.7	25.5	10		
509 MHz	29.5	28	27	25.3	24.3	24.2	22.1	22	20.2		
CH 21	86.9	79.6	73.8	67	58.9	49.5	38.4	25.3	10		
515 MHz	29.2	27.6	26.6	25	24.1	23.9	21.8	21.8	19.9		
CH 22	86	78.8	73.1	66.3	58.4	49	38	25.2	10		
521 MHz	28.8	27.3	26.3	24.7	23.8	23.6	21.6	21.5	19.7		
CH 23	85.2	78.1	72.4	65.7	57.8	48.6	37.7	25	10		
527 MHz	28.5	27	26	24.4	23.6	23.4	21.3	21.3	19.5		
CH 24	84.3	77.3	71.7	65.1	57.3	48.2	37.4	24.8	10		
533 MHz	28.2	26.7	25.7	24.1	23.3	23.1	21.1	21	19.3		
CH 25	83.5	76.5	71	64.4	56.8	47.7	37.1	24.7	10		
539 MHz	27.9	26.4	25.5	23.9	23.1	22.8	20.9	20.8	19		

	Reflector	Loop	Director 1	Director 2	Director 3	Director 4	Director 5	Director 6	Director 7	Director 8	Director 9
CH 26	82.7	75.8	70.3	63.8	56.2	47.3	36.8	24.5	10		
545 MHz	27.6	26.1	25.2	23.6	22.9	22.6	20.6	20.6	18.8		
CH 27	72	65.2	59.7	53.3	45.8	37	26.6	14.4	10		
551 MHz	27.3	25.8	24.9	23.3	22.6	22.4	20.4	20.3	18.6		
CH 28	81.1	74.4	69	62.7	55.2	46.5	36.2	24.2	10		
557 MHz	27	25.5	24.7	23.1	22.5	22.1	20.2	20.1	18.4		
CH 29	80.4	73.7	68.4	62.1	54.8	46.1	36	24	10		
563 MHz	26.7	25.3	24.4	22.8	22.3	21.9	20	19.9	18.2		
CH 30	95.9	89.3	84.1	77.9	70.6	62	52	40.2	26.3	10	
569 MHz	26.5	25	24.4	22.7	22.2	21.4	20.1	19.5	18.7	18	
CH 31	95	88.5	83.3	77.2	69.9	61.5	51.5	39.9	26.1	10	
575 MHz	26.3	24.7	24.1	22.5	22	21.2	19.9	19.3	18.5	17.8	
CH 32	94.1	87.7	82.5	76.5	69.3	61	51.1	39.6	26	10	
581 MHz	26	24.5	23.8	22.2	21.8	21	19.7	19.1	18.4	17.6	
CH 33	93.3	86.9	81.8	75.8	68.7	60.4	50.7	39.3	25.8	10	
587 MHz	25.7	24.2	23.6	22	21.5	20.7	19.5	18.9	18.2	17.4	
CH 34	92.4	86.1	81.1	75.1	68.1	59.9	50.3	38.9	25.6	10	
593 MHz	25.5	24	23.3	21.8	21.3	20.5	19.3	18.7	18	17.3	
CH 35	91.6	85.4	80.4	74.5	67.6	59.4	49.9	38.7	25.5	10	
599 MHz	25.3	23.7	23.1	21.6	21.1	20.3	19.1	18.6	17.8	17.1	
CH 36	90.8	84.6	79.7	73.8	67	58.9	49.5	38.4	25.3	10	
605 MHz	25	23.5	22.9	21.4	20.9	20.1	18.9	18.3	17.6	16.9	
CH 37	90	83.9	78.9	73.2	66.4	58.5	49.1	38.1	25.2	10	
611 MHz	24.8	23.3	22.6	21.1	20.7	19.9	18.7	18.1	17.5	16.8	

	Reflector	Loop	Director 1	Director 2	Director 3	Director 4	Director 5	Director 6	Director 7	Director 8	Director 9
CH 38	89.2	83.1	78.3	72.6	65.9	58	48.7	37.8	25	10	
617 MHz	24.5	23	22.4	20.9	20.5	19.7	18.5	18	17.2	16.6	
CH 39	88.5	82.5	77.6	72	65.3	57.5	48.3	37.6	24.9	10	
623 MHz	24.3	22.8	22.2	20.7	20.3	19.5	18.3	17.8	17.1	16.4	
CH 40	87.7	81.8	77	71.4	64.8	57.1	48	37.3	27.7	10	
629 MHz	24.1	22.6	22	20.5	20.1	19.4	18.2	17.7	17	16.3	
CH 41	87	81.1	76.4	70.8	64.3	56.6	47.6	37	24.6	10	
635 MHz	23.8	22.4	21.8	20.3	20	19.1	18	17.5	16.8	16.1	
CH 42	86.3	80.4	75.7	70.2	63.8	56.2	47.3	36.8	24.5	10	
641 MHz	23.6	22.2	21.6	20.2	19.8	19	17.9	17.3	16.6	16	
CH 43	85.6	79.8	75.1	69.7	63.3	55.8	46.9	36.5	24.3	10	
647 MHz	23.4	21.9	21.4	20	19.6	18.8	17.7	17.2	16.5	15.8	
CH 44	84.9	79.1	74.5	69.1	62.8	55.3	46.6	36.3	24.2	10	
653 MHz	23.2	21.7	21.1	19.8	19.4	18.6	17.5	17	16.3	15.7	
CH 45	84.2	78.5	73.9	68.6	62.3	54.9	46.3	36.1	24.1	10	
659 MHz	23	21.5	20.9	19.6	19.2	18.5	17.4	16.9	16.2	15.5	
CH 46	83.5	77.9	73.4	68.1	61.8	54.5	45.9	35.8	23.9	10	
665 MHz	22.8	21.3	20.7	19.4	19	18.3	17.2	16.7	16	15.4	
CH 47	82.9	77.3	72.8	67.6	61.4	54.1	45.6	35.6	23.8	10	
671 MHz	22.6	21.1	20.5	19.3	18.8	18.1	17.1	16.6	15.9	15.3	
CH 48	82.2	76.7	72.2	67	60.9	53.7	45.3	35.4	23.7	10	
677 MHz	22.4	20.9	20.4	19.1	18.7	18	16.9	16.4	15.8	15.1	
CH 49	81.6	76.1	71.7	66.5	60.5	53.4	45	35.1	23.6	10	
683 MHz	22.2	20.7	20.2	18.9	18.5	17.8	16.7	16.3	15.6	15	

	Reflector	Loop	Director 1	Director 2	Director 3	Director 4	Director 5	Director 6	Director 7	Director 8	Director 9
CH 50	Position	75.5	71.2	66	60	53	44.7	34.9	23.5	10	
689 MHz	Length	20.6	20	18.7	18.3	17.7	16.6	16.1	15.5	14.9	
CH 51	Position	74.9	70.6	65.6	59.6	52.6	44.4	34.7	23.3	10	
695 MHz	Length	20.4	19.8	18.6	18.2	17.5	16.5	16	15.3	14.7	
CH 52	Position	74.4	70.1	65.1	59.2	52.2	44.1	34.5	23.2	10	
701 MHz	Length	20.2	19.7	18.4	18.1	17.4	16.3	15.8	15.2	14.6	
CH 53	Position	73.8	69.6	64.6	58.8	51.9	43.8	34.3	23.1	10	
707 MHz	Length	20	19.5	18.3	17.9	17.2	16.2	15.7	15.1	14.5	
CH 54	Position	73.3	69.1	64.2	58.4	51.5	43.5	34.1	23	10	
713 MHz	Length	19.9	19.3	18.1	17.7	17.1	16.1	15.6	15	14.4	
CH 55	Position	72.8	68.6	63.7	57.9	51.2	43.2	33.9	22.9	10	
719 MHz	Length	19.7	19.1	18	17.6	16.9	15.9	15.4	14.8	14.2	
CH 56	Position	76.5	72.4	67.7	62.3	56.2	49.2	41.2	32.2	21.8	10
725 MHz	Length	19.6	18.9	18.1	17.8	17.7	17.2	17.7	16.6	16.4	15.8
CH 57	Position	76	71.9	67.2	61.9	55.8	48.9	41	32	21.7	10
731 MHz	Length	19.4	18.8	18	17.7	17.6	17	17.6	16.5	16.3	15.7
CH 58	Position	75.5	71.4	66.8	61.5	55.4	48.6	40.7	31.8	21.6	10
737 MHz	Length	19.2	18.6	17.9	17.5	17.5	16.9	17.4	16.4	16.2	15.6
CH 59	Position	75	70.9	66.3	61.1	55.1	48.3	40.5	31.6	21.5	10
743 MHz	Length	19.1	18.4	17.7	17.4	17.3	16.7	17.3	16.2	16.2	15.4
CH 60	Position	74.4	70.4	65.9	60.6	54.7	47.9	40.2	31.4	21.4	10
749 MHz	Length	18.9	18.3	17.6	17.4	17.2	16.6	17.1	16.1	16	15.3
CH 61	Position	73.9	69.9	65.4	60.2	54.4	47.7	40	31.3	21.3	10
755 MHz	Length	18.8	18.2	17.5	17.3	17	16.5	17	15.9	15.9	15.2



	Reflector	Loop	Director 1	Director 2	Director 3	Director 4	Director 5	Director 6	Director 7	Director 8	Director 9
CH 62	Position	78.3	69.5	65	59.9	54	47.4	39.8	31.1	21.3	10
761 MHz	Length	20	18	17.3	17	16.9	16.4	16.9	15.7	15.8	15.1
CH 63	Position	77.8	69	64.5	59.5	53.7	47.1	39.5	30.9	21.2	10
767 MHz	Length	19.8	17.9	17.2	16.9	16.7	16.2	16.8	15.7	15.7	15
CH 64	Position	77.3	68.5	64.1	59.1	53.3	46.8	39.3	30.8	21.1	10
773 MHz	Length	19.7	17.8	17.1	16.7	16.6	16.1	16.6	15.6	15.6	14.9
CH 65	Position	76.8	68.1	63.7	58.7	53	46.5	39.1	30.6	21	10
779 MHz	Length	19.6	17.6	16.9	16.6	16.5	16	16.5	15.5	15.5	14.7
CH 66	Position	76.2	67.6	63.3	58.3	52.7	46.2	38.9	30.5	20.9	10
785 MHz	Length	19.4	17.5	16.8	16.5	16.4	15.9	16.4	15.4	15.4	14.6
CH 67	Position	75.7	67.2	62.9	58	52.3	45.9	38.6	30.3	20.8	10
791 MHz	Length	19.3	17.4	16.7	16.3	16.2	15.7	16.2	15.3	15.3	14.5
CH 68	Position	75.3	66.8	62.5	57.6	52	45.7	38.4	30.2	20.7	10
797 MHz	Length	19.1	17.3	16.5	16.3	16.1	15.6	16.1	15.1	15.2	14.4
CH 69	Position	74.8	66.4	62.1	57.2	51.7	45.4	38.2	30	20.7	10
803 MHz	Length	19	17.1	16.4	16.1	15.9	15.5	16	15.1	15.1	14.2
CH 70	Position	74.3	65.9	61.7	56.9	51.4	45.1	38	29.9	20.6	10
809 MHz	Length	18.8	17	16.2	16	15.8	15.4	15.9	14.9	15	14.2