

MARS NEWSLETTER

(STRICTLY FOR PRIVATE CIRCULATION AMONG MEMBERS ONLY)



Regd.no.: 346/2023 | Regd.Office: Plot #85, Part-1, 1st Main Road, Golden Sea View Layout, Palavakkam, Chennai 600041

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Abid Ansari - VU2AIV



The Editor's note

Hello fellow HAMs.

Another year comes to a close and MARS Amateur Radio society has been bustling with activity. Take a look at our calendar this year:

20th Jan'24 - Eyeball QSO + Presentation by VU2FFW, OM Diwakar, on "TinyGS Ground station for LoRA satellites"

11th Feb'24 - Foxhunt

16th Mar'24 - Eyeball QSO + Presentation by VU2OW, OM Rajesh, on "Software Defined Radio"

25th May'24 - Eyeball QSO + Presentation by VU2VWR, OM Raghav, on "Propagation"

22nd June'24 - Factory visit - PCB manufacturing unit

Aug'24 - Net Check-in contest

31st Aug'24 - 1st AGM of MARS + Presentation by VU2PTR, OM Thyagu, on "Construction & Testing of HF Linear Amplifiers"

28th Sep'24 - Eyeball QSO + Presentation by VU2SAA, OM Sampath, on "Understanding Airband Radio"

23rd Nov'24 - Presentation by VU2OW, OM Rajesh, on "Antenna Mysteries"

Amidst all this, we had many tech talks, interesting activities and workshops from dedicated HAMs:

VU2OW & VU2DPN - Maintenance of the MRR Repeater

VU2OW - Workshop on TDOA construction.

The highlight of the year was the establishment of our website <https://mars-ars.org/>

So here's looking forward to another year of enthusiasm and radio-activity!

Wishing all fellow HAMs 'A very Happy New Year'!

Content sourced from: Amateur Radio Guide to Digital Mobile Radio (DMR)

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From the President's desk



Dear members and friends,

I would like to extend my belated Christmas greetings and wish you all a very happy and prosperous New Year 2025. I hope this year brings joy, success, and exciting amateur radio experiences.

Recently, we had the pleasure of listening to an informative presentation by OM Rajesh VU2OW on November 23rd, where he shared his expertise on various HF and VHF antennas.

On December 29th, we conducted a successful workshop at our registered office, where members built their own "Time Difference on Arrival" antennas in preparation for our upcoming Fox Hunt event. Eight members actively participated and completed their projects within the allotted time. Congratulations to all participants on their enthusiasm and dedication!

Looking ahead, we have an exciting field day planned at Camp Tonakela in January 2025, complete with demonstrations, party games, and more. I encourage all members to participate and make it a memorable event.

Mark your calendars for our Fox Hunt event on Sunday, 16th February, 2025. Start forming your teams and get ready for a thrilling experience!

Once again, I wish you all a happy and prosperous 2025

73s

P.Thyagarajan

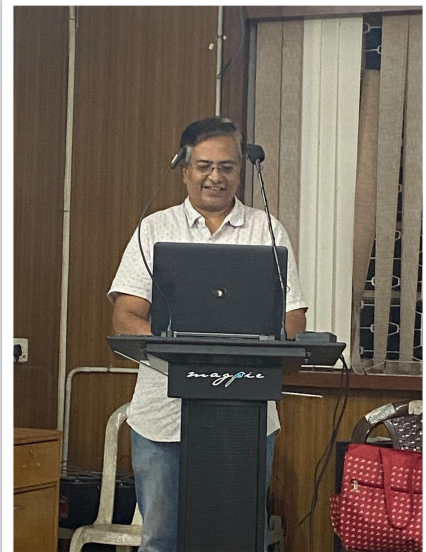
VU2PTR

Eyeball QSO - Members' Meeting

The last Members Eyeball QSO of the year 2024 of the MARS Amateur Radio Society was held on 23rd November 2024, at 'Hall no.1960 of the Dept. of Chemistry, College of Engineering, Guindy, Anna University., Chennai, at 6.00 pm IST (1800 hrs).

After the initial chit chat, the formal meeting began at 6:45 pm with the President OM P.Thyagarajan, VU2PTR welcoming the gathering. He went on to inform about the successful filing of returns with the Registrar of Societies (ROS). He also informed us that so far 89 members had been officially enrolled in the society of which 18 were new members. He also gave a brief about the details of the proposed 'Field Day' event and the workshop planned for the members in the forthcoming days.

Then the Secretary VU2DPN, OM Deepan, introduced the speaker of the day, VU2OW, OM Rajesh and invited him to deliver his tech talk. Mr Rajesh covered various types of antennae used for High frequency and very high frequency operation. He explained in detail the construction of simple dipole with ladder line and its performance. He covered other types of antennae like vertical, J pole, G5RV, End fed, Delta loop and ground plane. The advantages of each type were brought out in detail. He explained the relation between the power transmitted and 'S' point at the receiver's end. The use of antenna and direction of propagation was also explained by him. He showed pictorial lobe formation of various type and its effective radiation. The take away of the presentation by Rajesh for the members was the emphasis on putting up a dipole antenna with random length with focus on operating on all bands of HF using antenna tuners and low loss transmission lines, rather than struggling to put up resonant antennas with band restrictions. On higher bands, resonant antennas with special dimensions / loading coils for higher isotropic gains can be used.



Subsequently, VU2DA, OM Manohar presented a memento to Mr. Rajesh. The meeting came to an end with a vote of thanks proposed by the secretary..

Radio Knowledge

'Time Difference on Arrival' Antenna

Time Difference of Arrival (TDoA) is a method used for locating the position of a transmitter based on the differences in propagation times of signals received by multiple receivers.

It relies on the principle that signals travel at finite speeds, and by measuring the differences in arrival times of these signals at different points, one can triangulate the transmitter's position.

Instead of measuring the absolute time of arrival of a signal, TDoA focuses on the relative differences in arrival times at different receivers or one receiver with two antennas.

A TDOA Antenna Unit for Fox-Hunting

At some point in your hunt for the elusive "fox", you will (with luck) be so close that simple fieldstrength direction-finding techniques may no longer work. The "fox"'s signal will be so strong that it will swamp your attenuator and leak through the plastic parts of your radio's case, resulting in "S9+" signal-strength readings in every direction, regardless of attenuator settings or antenna orientation. A "Time Difference of Arrival (TDOA)" antenna unit will put you back on the "hunt".

(How big a truck will I need?)

A TDOA antenna unit is simple and easy to build, and will work with any 2m FM mobile or handheld. There are many different designs of TDOA units, and some have additional "bells and whistles" (such as left/right indicators), but the basic design (which is all you really need) consists of a small dual antenna array and an electronic antenna-switching unit.

The antenna array usually consists of two vertical dipole antennas separated 12 to 36 inches apart, often mounted on a T-shaped support so that the array can be rotated. The purpose of the antenna switching unit is to alternately and rapidly switch the input of your FM receiver between the two dipoles. The switching rate is typically 1000 times per second. Switching is accomplished by a squarewave oscillator which alternately forward- or reverse-biases diodes connected in the circuit path between each dipole and the receiver. Common silicon switching diodes will work OK, but PIN diodes work best.

(How does it indicate direction ?)

The TDOA works by detecting the difference in the phase of the RF signal received by each dipole. If both dipoles are exactly the same distance from the RF source (the "fox"), the phase of the RF signal will be the same at each antenna. If you rotate the array, or the RF source moves to the left or right, then one dipole will be closer to the source than the other one, causing a small phase difference between the signals received. Your FM receiver will then detect an abrupt change in the phase of the RF signal it receives as the antenna switching unit switches rapidly back and forth between the two dipoles. To the receiver, the signal looks like square-wave- modulated FM ! Your receiver's speaker will emit an audio tone at the antenna-switching frequency. As the phase difference increases, the tone becomes louder. When both dipoles are equidistant from the source, the tone almost completely disappears.

One disadvantage of the TDOA is that when you have found the "null" or antenna position where the tone disappears, you cannot tell if the source is directly in front of you or directly behind you. Fortunately, there are other ways to determine this. A quick way, if you are using a handheld, is to use the "body shield" method - disconnect the antenna, hold the handheld close to your chest so that you can see the signal strength indicator, and turn your body. When the indicated signal strength is minimum, the source is somewhere behind you. Another technique involves converting the TDOA antenna to one which has a cardioid or heart-shaped radiation pattern - the null (which corresponds to the "notch" in the heart-shape) can be used to point a rough bearing to the source.

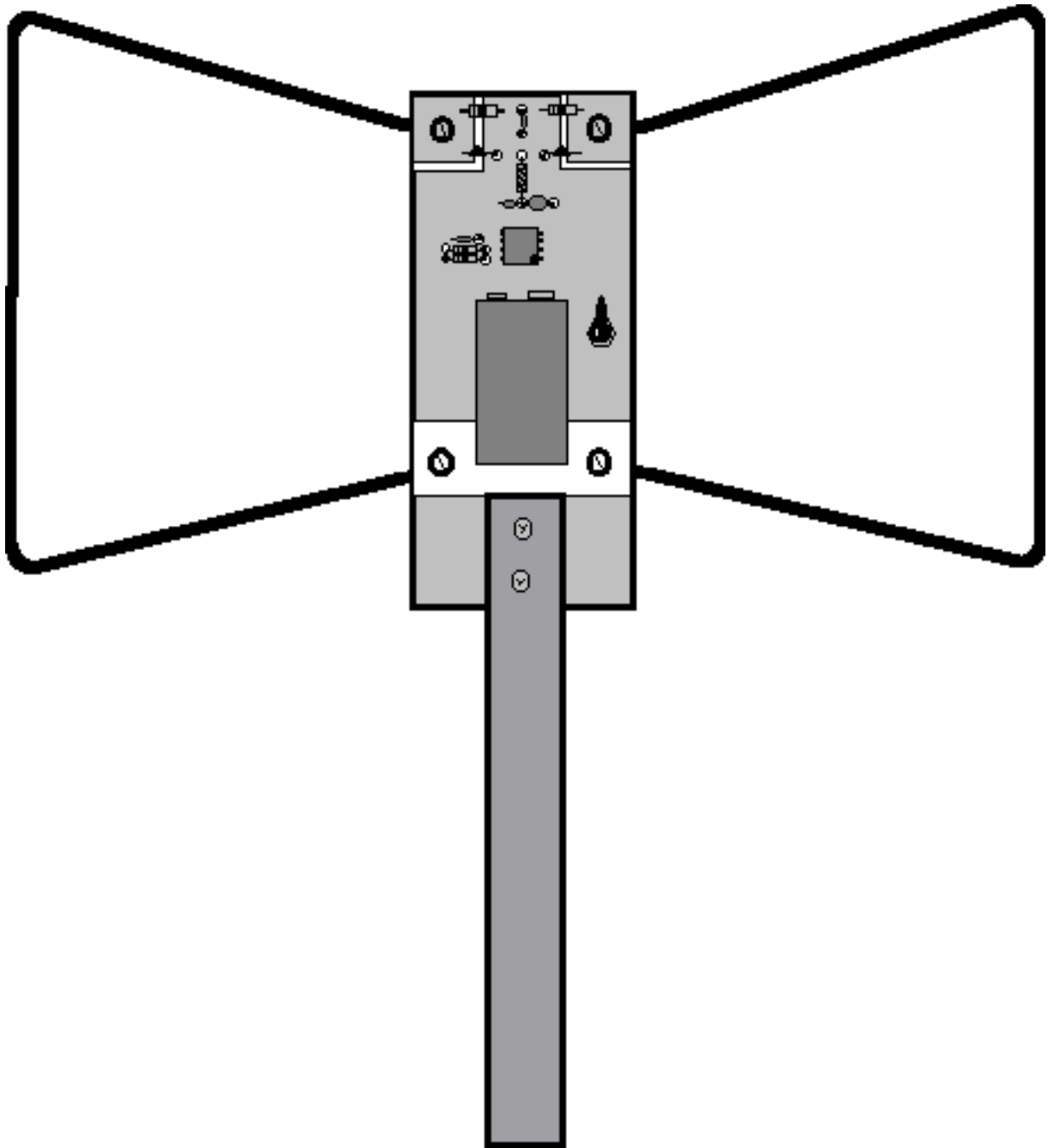


Fig. 1 - The assembled TDOA antenna unit - coaxial cable to receiver runs behind the PCB and through the PVC pipe handle.

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A quick (1-2 evening) TDOA antenna unit

Building a circuit for the antenna is quite simple. The circuit, shown in Fig. 2, shows the following:

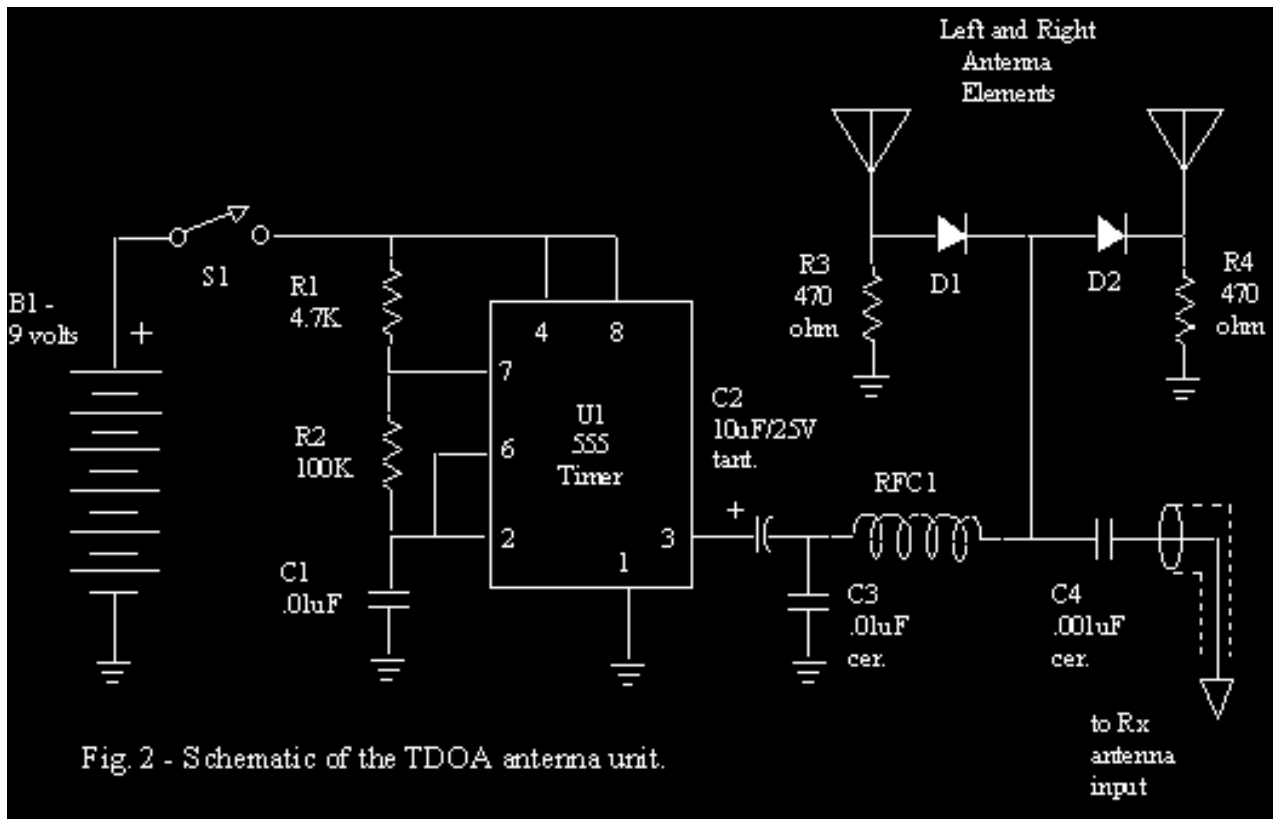
U1 is a 555 timer powered by a 9V battery, oscillating at about 1kHz. R1, R2 and C1 determine the frequency of oscillation. The output of U1 is a square-wave from +9V to ground. C2 allows the square-wave to be level shifted to between +4.5V and -4.5V. The positive half of the square-wave's cycle turns on (forward-biases) D1 and turns off (reverse-biases) D2; the negative half of the cycle does the opposite. R3 and R4 limit the forward bias current for each diode to about 9mA. When the diode is turned on, the RF signal received by that diode's dipole is conducted through the diode and coupled through C4 to the coaxial cable to the receiver. When the diode is turned off, the RF signal (from that diode's dipole) is blocked. RFC1 presents a high impedance to the RF signal so that it is not shunted by the oscillator circuit, but passes the relatively low-frequency square-wave to the diodes. RFC1 together with C3 also comprise a low-pass filter to prevent the high-frequency components of the square-wave from getting into the antenna circuit and the receiver. If you forget to install C3, you'll hear a continuous "hash" of switching noise.

A rough PCB layout with approximate dimensions is shown in the figure on the next page. It is best to keep the wiring between the antenna elements, diodes and coax as short as possible. Usually, the battery and coaxial cable could be centered so that they would not affect one antenna element more than the other. The coaxial cable lead to the receiver runs down the back of the PCB and through the PVC-pipe handle.

The PCB can be "etched" using a sharp exacto-knife (watch your fingers!) and a drill-bit. Score around the areas of copper-clad that you want to remove with the exacto-knife, then peel away the copper. Clear the copper around holes with a sharp 1/8" drill bit - for a handle, use a 1/8"- shaft knob with set-screws. This prevents shorts between the copper ground-plane and component leads which pass through holes in the PCB.

The "bow-tie" shaped antenna can be made like this:

Each element is a square "U", 6 inches across the bottom with 6-1/2" long arms. Each arm has a loop at each end for mounting to the PCB with #6 nuts and screws. It does not give as loud a tone or as sharp a null as two dipoles spaced 3 feet apart, but it's a lot smaller. A coat-hanger wire may be used, but stiff #12 copper wire or brass brazing rod would probably be better. The handle can be anything, preferably nonmetallic, such as a short length of PVC pipe, wooden dowel or broomstick with a slot sawed in one end for the PCB.



Any 555 timer IC will work with this unit but the CMOS part will nearly double your battery life. You can adjust R1 and C2 to vary the oscillator frequency (if you find a particular tone annoying). RFC1 is not especially critical, figure 1kohm impedance or better at 144MHz. If you have something in your junk-box, try it out by tuning your rig to a QSO in progress with the TDOA antenna unit connected but not switched on, then touch the leads of the RFC between ground and the connection between D1 and D2. If the signal strength drops appreciably, then the RFC does not have a high enough impedance at VHF.

Using the TDOA antenna unit

TDOA antenna units are not designed for transmitting. If your handheld has a "TX inhibit" feature, it's a good idea to enable it when foxhunting with a TDOA. Transmitting into the TDOA may damage your HT, the TDOA, or both. The TDOA works best with a strong, vertically-polarized signal. Strong multipath reflections caused by nearby vehicles, buildings, fences, powerlines, steel lamp-posts, etc. can make the null difficult to detect, or even appear on a wrong bearing. If possible, look for open areas clear of obstructions and reflectors when taking bearings. If the bearing appears to change as you move around, your location may be affected by multipath. With practice, you'll be able to tell from the tone whether you have a good signal or one distorted by multipath.

Parts List for the TDOA Antenna Unit

1. U1 - CMOS 555 timer
2. R1 - 4k7, 1/4W, 5%
3. R2 - 100K, 1/4W, 5%
4. R3,4 - 470R, 1/4W, 5%
5. C1 - 0.01uF, 50V ceramic
6. C2 - 10uF, 25V tantalum
7. C3 - 0.01uF, 50V ceramic
8. C4 - 0.001uF, 50V ceramic
9. D1,2 - PIN diode, MPN3404
10. RFC1 - RF choke, 8 turns magnet wire space-wound over 1/4W carbon comp resistor (100k or greater)
11. S1 - Switch SPST (toggle or slide)
12. Misc. - PCB, 9volt battery, battery holder, stiff wire (for ant.), RG-58 coax and BNC connector.

Homebrewing

Time Delay on Arrival Antenna Construction Workshop

On December 29, 2024, our society conducted a hands-on workshop on constructing "Time Delay on Arrival" antennas, specifically designed for fox hunting. The event took place at our registered office, where eight enthusiastic members gathered to learn and build their own antennas.

The following members participated actively in the workshop.

1. OM Aravind VU2ABS
2. OM Arun kumar VU2BBF
3. OM Rajaram VU2RJV
4. OM Vivekanandan VU3CDV
5. OM Amarnath VU3CUT
6. OM Sampath VU2SAA
7. OM Shivram Sagar VU3OVD
8. OM Ravichandran VU3WAW

Inauguration and Welcome

The workshop commenced with OM Ram, VU2AB handing over the antenna kit to OM Raj, VU2RJV, marking the official start of the event. Our President, OM Thyagu, VU2PTR, warmly welcomed the participants and provided an overview of the workshop.



Technical Session and Assembly

OM Rajesh delivered an informative introduction on the working principle of the circuit and guided the members through the assembly process. The participants worked diligently, equipped with their soldering irons & tools, and successfully completed the homebrewing within the allotted time.

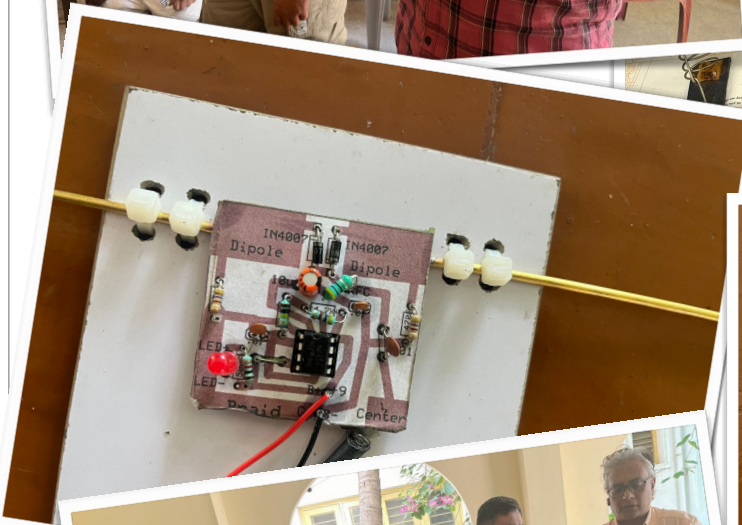
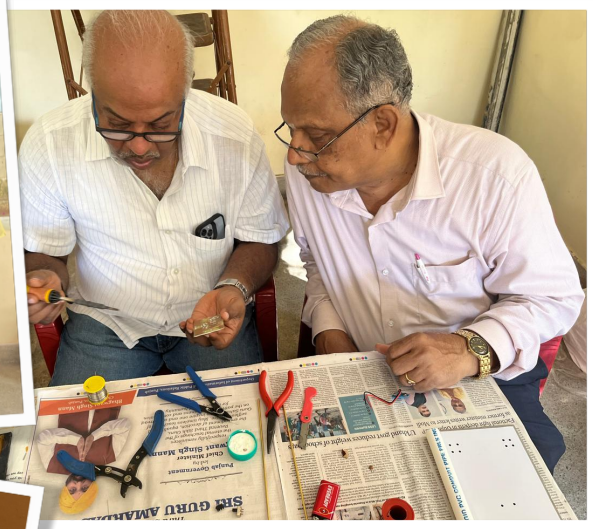
Testing and Conclusion

All assembled antennas were thoroughly tested, ensuring they functioned as intended. A Nano VNA unit was used as signal source for testing. The workshop not only provided members with hands-on experience but also offered a valuable opportunity for socializing, eyeball QSOs, and camaraderie.



Acknowledgments

Special thanks to OM Rajesh, VU2OW and OM Deepan, VU2DPN for meticulously planning and preparing the kits in advance. The Secretary, OM Deepan, proposed a vote of thanks, bringing the event to a close. Members departed with their newly constructed antennas, eager to put them to use during ensuing Foxhunt event.



In this quarter, we celebrated many birthdays and wedding anniversaries. Our best wishes to all. May they continue to celebrate many more years of happiness.



Birthdays

OCTOBER - 2024

4th Oct - VU3MPD
5th Oct - VU2FFW
7th Oct - VU2XTL
9th Oct - VU2NID
11th Oct - VU3RKC
12th Oct - VU3SHO
13th Oct - VU2JSM
14th Oct - VU2ZKM
16th Oct - VU2CCK
21st Oct - VU2IKK
21st Oct - VU3MDM
23rd Oct - VU2WYR
24th Oct - VU2XIB
24th Oct - VU3MLI
26th Oct - VU2DNY
28th Oct - VU2FSS
31st Oct - VU3ANU
31st Oct - VU2RJJ

NOVEMBER - 2024

3rd Nov - VU2SJD
6th Nov - VU3VAH
7th Nov - VU3HAS
10th Nov - VU3VRN
11th Nov - VU3RMR
11th Nov - VU3TAB
11th Nov - VU3SBC
12th Nov - VU2SHO
13th Nov - VU3MES
16th Nov - VU2ROW
18th Nov - VU2OCK
18th Nov - VU3JJT
20th Nov - VU2GGK
20th Nov - VU2EAK
24th Nov - VU3SCH
26th Nov - VU2DRK
27th Nov - VU2DNB
27th Nov - VU3ANG
29th Nov - VU2DH

DECEMBER - 2024

1st Dec - VU2AKW
2nd Dec - VU2JKX
3rd Dec - VU2MSS
4th Dec - VU3MBN
4th Dec - VU2AMN
5th Dec - VU2DMK
5th Dec - VU2VKJ
6th Dec - VU2VKE
7th Dec - VU3JRN
8th Dec - VU2ZNS
8th Dec - VU3JDS
9th Dec - VU3ISJ
11th Dec - VU2ABS
14th Dec - VU2OLA
21st Dec - VU2GHX
27th Dec - VU2MTS
27th Dec - VU2YLC
28th Dec - VU2INA
28th Dec - VU2JRU
28th Dec - VU3JEM
28th Dec - VU2RRU



Wedding Anniversaries

OCTOBER - 2024

24th Oct - VU2NF
 25th Oct - VU2DPN
 26th Oct - VU3KVB
 30th Oct - VU3FTN
 31st Oct - VU2FSS +
 VU3INS
 31st Oct - VU2FFW

NOVEMBER - 2024

3rd Nov - VU2JSM
 8th Nov - VU3TBR
 9th Nov - VU3VNL
 10th Nov - VU2SVF
 13th Nov - VU3MES
 29th Nov - VU2BBF
 29th Nov - VU2RDX

DECEMBER - 2024

1st Dec - VU3NKQ
 4th Dec - VU3LEN
 4th Dec - VU3MNE
 5th Dec - VU2SWG
 6th Dec - VU2GMS +
 VU2PXN
 12th Dec - VU2NGK +
 VU2JYG
 12th Dec - VU2ZQJ
 12th Dec - VU3RKC
 15th Dec - VU2GGN +
 VU3GGN
 22nd Dec - VU2AIV
 23rd Dec - VU2TSF
 25th Dec - VU2NGH +
 VU2VEE
 26th Dec - VU2TTL

Ragchew -

MARS newsletter would be happy to publish articles written by Amateur Radio enthusiasts in its forthcoming issues. We invite all HAMs to send in their manuscripts in Word format to the email id mentioned below. Please also send photos if possible in jpeg or png format.

Additionally, we invite your comments and critiques on the new look and feel of the MARS newsletter. We are open to suggestions for improvements.

In keeping with the times, this newsletter shall be available as an e-magazine only. We shall endeavour to provide future issues in a mobile friendly format too.

For sponsorship and advertisements please contact the President.

Any HAM interested in conducting workshops in Amateur Radio technology or communications related matters may contact the Executive committee for assistance.

If you want to demonstrate your homebrew kits or present a technical seminar on your experiments and expertise, you are most welcome.



Website:

<https://mars-ars.org/>
Image sourced from: newhams.info



Email:

info@mars-ars.org

Image sourced from: spreadshirt



OVER THE RADIO WAVES								
Type	Repeater	Start Time	End Time	Echolink	Rx	Shift	Schedule	Slots
Analog	VU2MRR	07:00	07:15	VU2PUM	145.775	-600kHz	Daily	
	VU2MRR	21:00	21:15	VU2PUM	145.775	-600kHz	Daily	
	VU2LHS	21:15	21:30	VU2LHS	145.55	-600kHz	Daily	
Type	Repeater	Start Time	End Time	TGID	Rx	Shift	Schedule	Slots
DMR	VU2MWG	06:30	06:50	4040454	435.8	-1.7MHz	Daily	CC1, TS2
	YSFINDIA	19:00	20:00	404004			Sat & Sun	CC1, TS2