THE PROPAGATOR

THE MONTHLY NEWSLETTER OF THE
WIRELESS INSTITUTE OF AUSTRALIA
ILLAWARRA BRANCH

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NOTICE OF ANNUAL GENERAL MEETING

Members are advised that the ANNUAL GENERAL MEETING for 1975 will be held at the Wollongong Town Hall Committee Room on Monday, 10th March at 7.30 p.m.

NOTICE OF GENERAL MEETING

Members are advised that the next GENERAL MEETING of the Illawarra Branch of the W.I.A. will be held at the Wollongong Town Hall Committee Room on Monday, 10th February 1975 at 7.30 p.m.

THE AGENDA READS AS FOLLOWS:

1) Apologies and welcome to visitors and new members.
2) Minutes of previous meeting.
3) Correspondence.
4) Financial Report.
5) General Business.
6) Raffle.
7) Lecture.

FEBRUARY MEETING.

MONDAY 10th February 1975.

Guest speaker at this meeting will be Tony Mulchay, President of N.S.W. Division of W.I.A. He will be speaking on the role of the W.I.A. and the services available.

We ask that members having specific questions to put to Tony may best do so in writing before the meeting or at the meeting to enable Tony to give some thought to the answers or to include the information in his talk.

MARCH MEETING.

Monday 10th March 1975.

This meeting is the Annual General Meeting.

We have, with the help of John 2BHO, arranged for a film and talk on the laying of PMG coaxial cable.

As this meeting is the Annual Meeting, it is the occasion for the election of the Branch Committee for 75-76. We ask that each member give thought to the election and to consideroffering to serve a term on Committee and to become more involved in Branch activities.

A NAME FOR OUR NEWSLETTER.

Following much discussion at the January Committee Meeting, we decided that the Monthly Newsletter of the Illawarra Branch should have a title.

We finally decided on the name THE PROPAGATOR.

Although the proposer of the name wishes to remain anonymous, we wondered whether his spell in North Queensland had anything to do with the choice.

So we now have a name. Any suggestions or criticisms regarding a permanent front page layout for the newsletter would be welcomed for consideration - we offer this present issue as a starter.

AOCP - PAST EXAMINATIONS.

In this issue we commence what we hope will be a regular feature. Hank 2BHL has undertaken to provide 'typical answers' to past AOCP examination papers.

Sets of Past Papers will be available to members wishing to have copies - using past papers, typical answers and reading the appropriate sections of text books is an excellent preparation for those contemplating sitting for the AOCP.

Our thanks to Hank for his work in preparing his typical answers.

FOX EEZY REPORTS.....

With the holidays over and a new year under way, there is lots of news to report. But I havn't heard any. Well not much anyway....

Gerry VK2APG is about to convert his YL into his XYL on the 15th February. Well that's the good news. Now for the bad news. When they move into the marital quarters, Gerry has to put his tri-band Yagi into mothballs and put up his recently aquired 14AVQ vertical. And a little advice Gerry - Don'y forget to reduce the spring tension on the PTT button!

.....

And now for some Maths. If you add about 2 ton of pipe, half a ton of concrete, 1½ gallons of perspiration, a couple of hundred man hours and throw in a mobile crane and a few slaves what do you get?? Answer: A new 55ft Tower at Frogs Hollow. Hank VK2BHL reckons even cyclone Tracy wouldn't shift this one, soon to have a 4 element Quad atop.

.....

With CW coming out of their ears, Keith VK2ZYI and Geoff VK2ZHU will both line up for the Feb, CW exam.Good luck fellas.

.....

An example of determination... Stan Brooks, an ardent SWL, bent on getting his own call come hell or high water, has just completed the 1974 AOCP course run by the Institute at North Sydney. Despite the frustration, doubts, rain and fog, Stan never missed one night. And after 12 months, 10,000 miles and countless hours of swatting, was 7 days too late to register for the Feb. exam. Good luck for August Stan.

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WANTED:

Egg Insulators any quantity.

See Hank 2BHL.

Fox eezy cont'd.

Welcome home..... Mick VK2BZE and XYL have recently returned from a trip to 'G' land and the continent and no doubt have many tales to tell. Mick bought back some new ideas for a 2 metre transceiver for FM utilising IC's. We hope to hear the results before too long.

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Yours truly had a trip to VK4 in December and found all the activity (as in VK3 & VK5) is on the new channel 4 and 1 and channel 50. The old channel B was extremely quiet.

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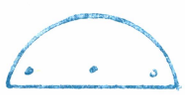
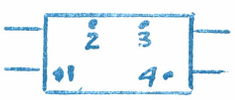
Has anyone had trouble finding FET connections? Here's a few of the common ones that might be handy.

Bottom view



Type	1	2	3
2N3819	D	G	S
2N5245	D	S	G
TIS73	S	D	G
TIS88	D	S	G
2N5248	S	G	D
2N5485/6	G	S	D

Top view



Type	1	2	3	4
MPF121	G1	S	G2	D

.....

73's hope to see you at the meeting.

de Barry VK2FE.

.....

As you have probably noticed elsewhere in this bulletin we will have the VK2 Division President down to our meeting to answer some of your questions concerning the functions of the WIA. I would appreciate it if you do NOT interject during Tony's talk. I will keep the meeting as short as possible so that there is ample time for questions when "Question Time" comes around. Remember! often when you baulk a speaker to ask questions, that was the next item he was about to cover - consequently it wastes everyones time.

73s Keith 2ZYI.

COMMONWEALTH OF AUSTRALIA

POSTMASTER-GENERAL'S DEPARTMENT

AMATEUR OPERATORS' CERTIFICATES OF PROFICIENCY

W

SECTION M (Theory) AUGUST, 1971

(Time allowed - 2½ hours)

NOTE :- SEVEN questions only to be attempted. Credit will not be given for more than SEVEN answers. All questions carry equal marks.

1. (a) With the aid of a block diagram describe the operation of a single-sideband suppressed-carrier transmitter.

(b) Explain how the transmitted sideband may be changed from upper to lower sideband.

2. A crystal oscillator and buffer stage of an amateur transmitter require a stabilised voltage source of 105 volts and 255 volts respectively. With the aid of a circuit diagram describe a suitable power supply to operate from the A.C. mains.

3. (a) With reference to a radio frequency amplifier stage, explain under what circumstances neutralisation is necessary.

(b) Aided by a circuit diagram, explain the theory of one method of neutralising a single-ended output stage.

(c) Explain why it is unnecessary to neutralise a frequency multiplying stage of a transmitter.

4. With the aid of a circuit diagram describe the operation of the "product detector" stage of a receiver built to receive single-sideband suppressed - carrier radiotelephone signals.

5. (a) Using diagrams, explain the principle of operation of a crystal microphone.

(b) Assisted by a diagram indicating component values, show how the crystal microphone may be connected to the input of an amplifier.

6. (a) With the aid of a sketch describe the construction of a three element Yagi type aerial suitable for operation in the 144 - 148 MHz band. Show approximate dimensions.

(b) What would be the effect of increasing the number of elements in a Yagi aerial?

7. Explain fully the construction and principle of operation of an instrument suitable for measuring the magnitude of radio-frequency currents

8. With reference to the propagation of radio frequencies explain what is meant by the following terms :-

(i) horizontal polarisation;

(ii) critical frequency:

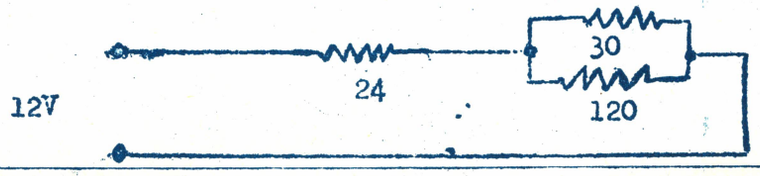
(iii) skip distance;

(iv) temperature inversion.

9. A resistance of 24 ohms is connected in series with two resistances in parallel of 30 and 120 ohms respectively. This combination is connected across a 12 volt accumulator of negligible internal resistance.

Calculate :- (i) the total current flowing

(ii) the power dissipated by the 120 ohm resistor.



A.O.C.P.

In an effort to help people studying for the A.O.C.P. Examination it is the intention of the Committee to provide a monthly series of typical answers to questions from past exams. In this issue the august 1971 exam was tackled.

Copies of the old exam. papers will be available from keith 2ZYI. A word of warning: As time is usually short at an exam, the answers given are of necessity brief. Furthermore, they are often not the only answer to the question. I recommend therefore to read and study the relevant material in books like "The Amateur Radio Handbook" (ARRL), & "Radio Communications Handbook" (RSGB).

Hank. VK2BHL.

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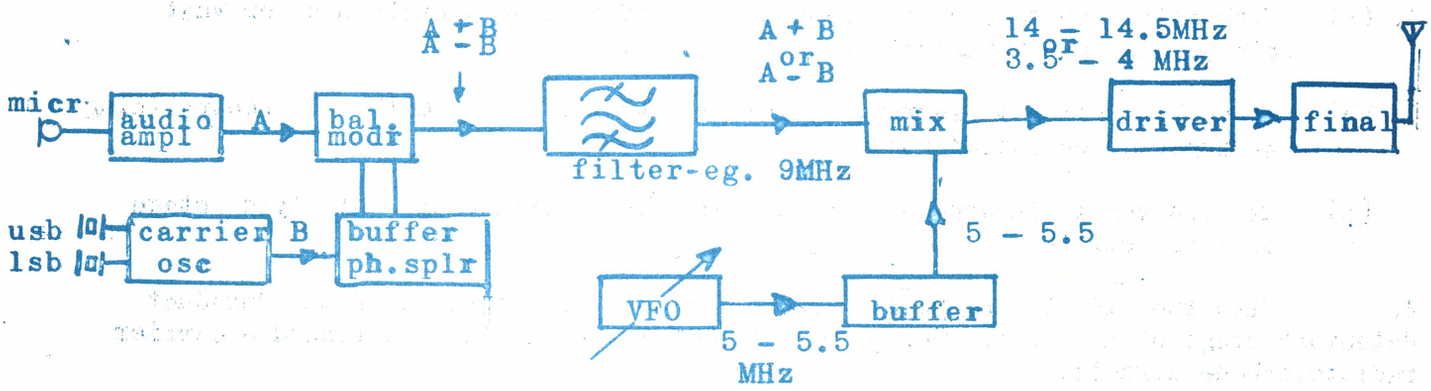
AUGUST 1971.

1 (a).



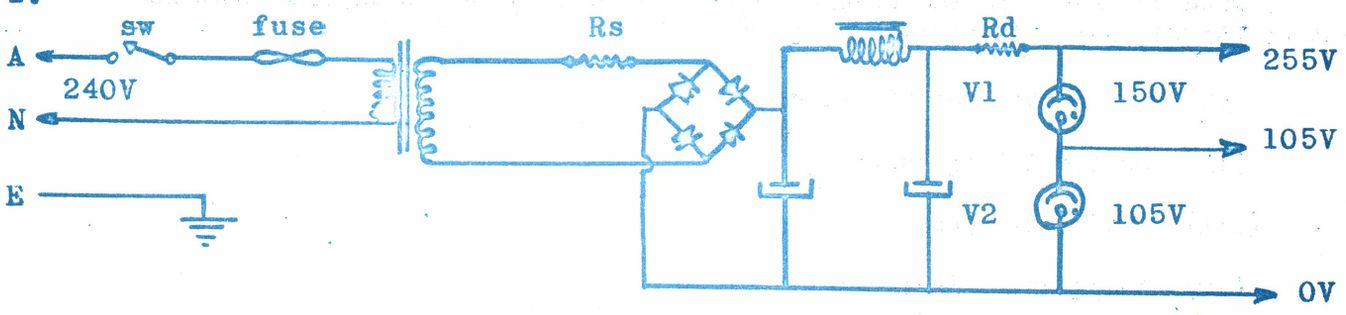
The carrier oscillator generates a carrier at say 8998.5 kHz or 9001.5 kHz depending on sideband in use. In the balanced modulator the carrier is modulated with audio. A balanced modulator will pass the sum as well as the difference of audio and carrier but if properly adjusted (balanced) no carrier should appear at the output, due to cancelling action. (-60 to -80 db for 7360 BM).

The filter following the Bal. Mod. filters out the unwanted sideband If the filter centre frequency is say 9MHz, mixing to 5 - 5.5MHz from the VFO & Buffer results in output from 14 to 14.5 MHz if the 20Mtr. band was selected. If 80 M was selected, the difference I.E. 3.5 to 4MHz output would be used.

1 (b).

the output would be U or L sideband depending on what carrier crystal is used.

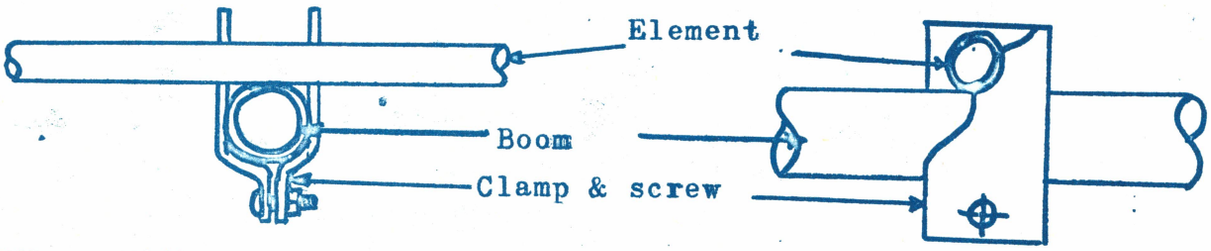
2.



Rs - To limit switch on surge current when capacitors are empty.
Rd - Dropping resistor for gas filled voltage regulating tubes.

Tubes ignite at slightly higher than ref. voltage then maintain constant voltage drop across them.
if for example the 105V drops to say 103 volts, V2 would draw far less current than before, thereby trying to raise the voltage again. If the voltage went up to 110 volts the tube would draw a lot more current, causing greater voltage drop across Rd, maintaining the 105 volts again.
Tubes must be rated for no load conditions, Rd must be rated for MAX. load conditions.
This type of circuit is generally only used up to say 20mA supply.

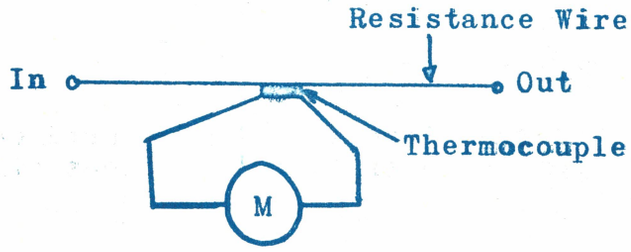
CONSTRUCTION.



FEEDING. With eg. Gamma bar and capacitor.

6 (b). More Gain, more directivity, lower feedpoint impedance.

7.



The RF current heats the resistance wire which in turn heats the thermocouple, consisting of two dissimilar metals. This gives off a DC voltage which can be measured with an ordinary DC millivolt meter, calibrated to read amps or milliamps.

8.

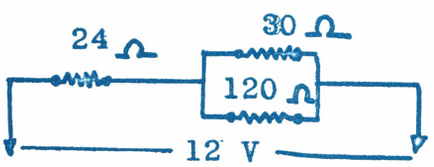
(i) Horizontal polarisation means that the radio waves originated from an aerial that was parallel to the earths surface. ie. horizontal.

(ii) At a low enough frequency, a vertical signal will bounce back to the transmitter. If the frequency is increased, at a point there will be no return wave. That point is called the critical frequency.

(iii). Skip distance is the distance between the transmitter and the closest useable bounce of the skywave.

(iv). Temperature inversion occurs at the boundary of two air masses with different temperature and humidity. The (step) change in refractive index provides good bounce and makes VHF DX possible.

9.

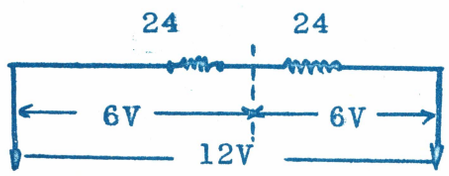


The replacement value for 30 parallel 120 is calculated as follows: $\frac{1}{Rx} = \frac{1}{30} + \frac{1}{120}$

or $\frac{1}{Rx} = \frac{4}{120} + \frac{1}{120} = \frac{5}{120} = \frac{1}{24}$

$Rx = 24\,\Omega$.

The resultant circuit looks like this.



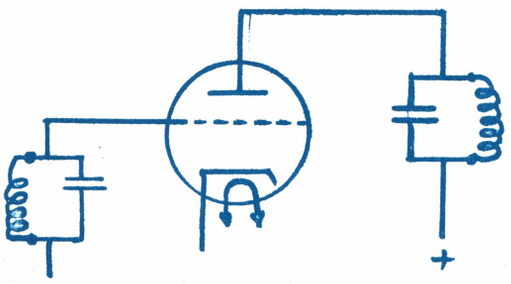
Total Resistance 24 + 24 = 48 Ohms.

" current flow : $I = \frac{E}{R} = \frac{12}{48} = \frac{1}{4}$ A or 250 mA.

Since the resistors are equal, the voltage across the 30 // 120 is 6V. It draws $\frac{6}{120} = \frac{1}{20}$ A or 50 mA.

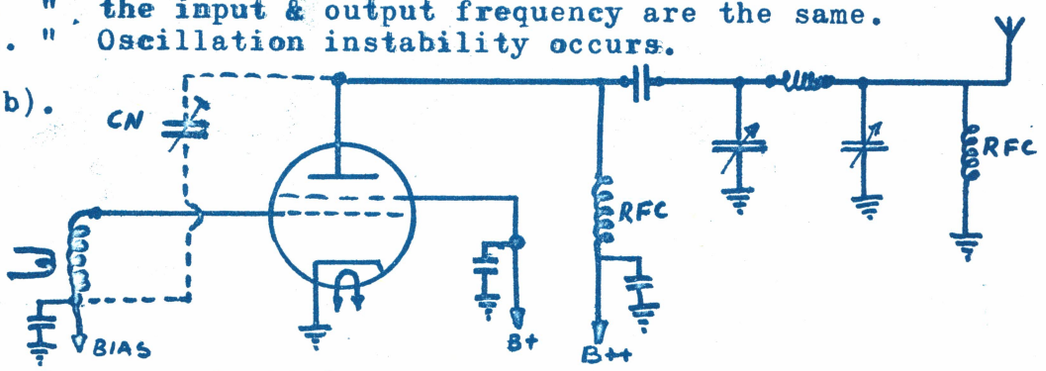
Wattage $V \times A = 6 \times \frac{1}{20} = \frac{3}{10}$ or .3 W.

3 (a).



i. When a triode is used (Miller effect).
ii. " the input & output frequency are the same.
iii. " Oscillation instability occurs.

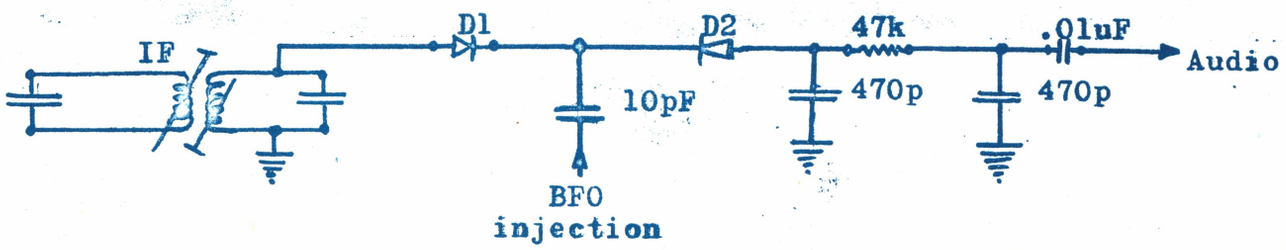
(b).



By using a neutralising capacitor between plate & bottom of grid coil an antiphase (180°) signal can be used to neutralise the output stage.

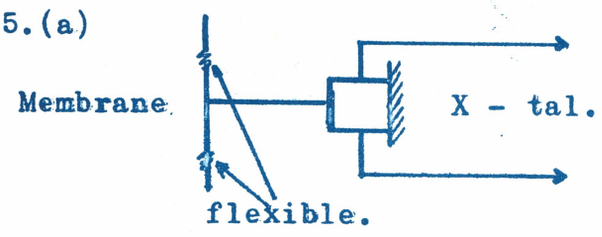
(c). Because input and output circuits are tuned to different frequencies.

4.



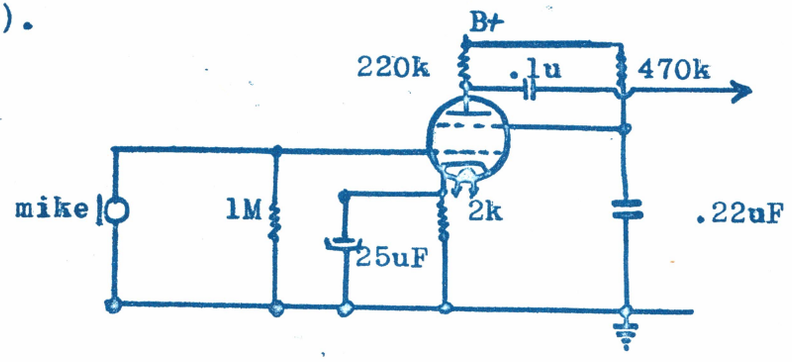
Germanium diodes D1 & D2 are switched on and off by the BFO voltage. The 47k resistor and 2 x 470p caps form a low pass filter to eliminate RF from the audio.

5.(a)

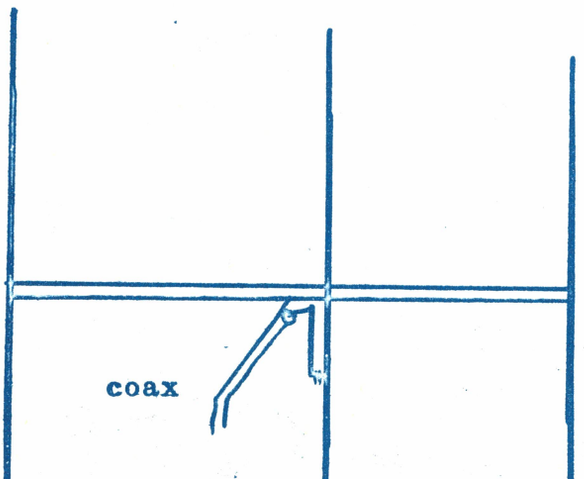


Compression & expansion of the X-tal causes minute voltages to be generated. (Piezo-effect).

(b).



6 (a).



DIMENSIONS:
Reflector length = $\frac{1}{2}\lambda + 5\%$
= $\frac{1}{2}$ x $\frac{300}{146}$ + 5% = 105cM + 10 = 115
Driven Element = 105 cMetre.
Director $\frac{1}{2}\lambda$ -5%
= 105 - 10 = 95 cmetre.
Distance between elements = $\frac{1}{4}\lambda$
$\frac{1}{4}$ x 205 = 51 cm.

Moonbounce Report-February 1975

Over the two month period since the last report, most available time has gone into the continued repairs and reassembly of equipment damaged by lightning last October.

The transmitter was completed and was checked out with a dummy load in mid December. An output of 350 watts was obtained, which was as much as had been available earlier.

The WUC was approached and agreed to obtain replacements for the damaged FLT4575 transistors and coaxial relay. The price of these transistors has now dropped to $44 each (duty free).

An Insurance Claim was then compiled to cover the damaged components and was forwarded for attention.

It appeared that work on the receiving system would then have to wait on arrival of the transistors and relay from U.S.A., but our good friends Cor Maas,VE7BBG and Joe Reisert,W1JAA (ex W6FZJ) heard of our problem and sent the appropriate Christmas presents. Needless to say these gestures are very much appreciated. They illustrate the wonderful spirit that exists amongst the Moonbounce group throughout the world, which helps to make this work so worthwhile.

The transistors were then replaced in the preamp. and the postamp. and noise figure checks were made with the assistance of the CSIRO. The original system noise figure of 1.5db. was achieved again.

A quarter wave coaxial filter was later constructed, for installation immediately before the preamplifier. Its main purpose is to increase the selectivity of the very broadband (50MHz to 500MHz) preamp. and postamp. thus alleviating the effects of strong signals far removed in frequency from 432MHz. and reducing the possibility of future lightning damage to transistors. The attenuation of this filter is extremely low at less than 0.2db. (its -3db. bandwidth is approx. 15MHz.) GreameVK2AGV assisted in tuning the filter to 432MHz.

The preamp. was then modified to the W6FZJ 'Ultra Low Noise' circuit and a further slight improvement in system noise figure (0.1db.) was obtained, as measured by the Gas Tube Noise Generator.

It is hoped that all equipment will be reinstalled within the next 2 weeks.

Advice has been received of special Moonbounce tests to be made on 2 metres and on 432MHz. by the Stanford Research Institute group (WA6LET) in U.S.A. on Feb. 22 &23, using their 150 ft. dia. dish. They will be on from 0500Z to 1000Z on Feb. 22 when they will have a window to ZL and VK.

If VK2AMW is operational in time, we will be on from 0630Z to 0830Z or later and have suggested the use of FSK CW in addition to CW (170 &850Hz shift) and also RTTY if they can get set up for it. Anumber of other stations in W & VE should also be on during this test.

Metalwork has been commenced at the University for a new P.A. stage for the transmitter. If it is ready in time then we will rebuild the transmitter in March to use the K2RIW parallel tube P.A. circuit which is capable of producing nearly 700 watts of rf output for 1KW. input, which would give a 3db. increase over our present transmitted power to bring VK2AMW transmit capability closer to our receive capability.

A piece of double sided circuit board, required for the new P.A., has been received from ZE5JJ in Rhodesia.

A comprehensive 'Equipment & Operating Status Report' for VK2AMW has been compiled as requested by the 432MHz. EME scheduling coordinator VE7BBG, and has been forwarded to K2UYH for publication in the'432MHz EME Newsletter'.

Photos of the VK2AMW dish have been sent to ZE5JJ to assist him in his planning for the construction of a parabolic reflector in place of his present array.

Details and a photo of the VK2AMW dish and feed system have also been included in the recent publication 'Successful 432MHz EME Antennas', produced by EIMAC of U.S.A.

Lyle + VK2ALU.