THE PROPAGATOR

THE MONTHLY NEWSLETTER OF THE
WIRELESS INSTITUTE OF AUSTRALIA
ILLAWARRA BRANCH

Published by the Illawarra Branch of
the Wireless Institute of Australia
P.O. Box 110
DAPTO 2530

No 4/75 APRIL 1975 No 4/75

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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, 14th APRIL 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.

RAFFEL

Keith VK2ZYI has indicated that he is attempting to obtain a reasonably good piece of electronic equipment for this months fund raising.
Hope to see as many of you there as possable.

Geeff VK2ZHU

Moonbounce Report - April.

An EME test was made on March 22. VK2AMW missed out on most of the CQ period allocated to us due to need to clear up 'bugs' in new equipment being used for the first time and because of a misunderstanding of our start time.

An EME QSO between JAIVDV and VE7BBG was heard later. JAIVDV was up to 6db. above noise and VE7BBG was up to 3db. over noise. They were on JAIVDV's frequency of 432.060Mhz. The QSO was tape recorded.

We called after their QSO was finished but no reply was heard, possibly because our frequency of 432.000Mhz is a Repeater frequency in Japan.

Work is continuing on the new P.A. for the transmitter. Another quarter wave filter is also being made up for trial in front of the receiving preamplifier.

Lyle + VK2ALU.

THE PROPAGATOR.....

The Committee has decided, in view of increased Postal Rates, to review the Branch Subscription rates for 1975.

$2 normal members.
$1 students & pensioners.

It is proposed to send the next 3 months issues to all names on our present list, however after that period, The Propagator will only be mailed to paid up subscribers.

Please send P.N, Cheque, etc. for $2 (or $1 if applicable) to

The Secretary,
Illawarra Branch WIA.
P.O. Box 110
DAPTO. 2530.

Ian 2ZJA.

BILL - DIT TRANSCEIVER KIT.

All kit purchasers who still have items to be supplied are requested to have the supply of parts finalised by the end of this month if possible. This can be done by listing any items not yet supplied and obtaining them direct from P.E.S. in Auburn St, or by giving the lists to Bill Calvert or Charlie Proctor.

P.E.S. are not supplying the three MPF121's in the transmitter, the 2N301 in the Voltage regulator & the two 10 - 120 pF trimmers in the transmitter P.A.

These are obtained from Bill Calvert.

Charlie 2ZEN.

COMMONWEALTH OF AUSTRALIA

POSTMASTER-GENERAL'S DEPARTMENT

AMATEUR OPERATOR'S CERTIFICATE OF PROFICIENCY

SECTION M (Theory) FEBRUARY, 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. In relation to the final Class C radio-frequency power amplifier stage of a transmitter -

   (1) explain why the anode current varies as the tank circuit is brought into resonance; and

   (11) state whether the anode current will vary when a resonant aerial is coupled to the tank circuit. Explain.

2. (a) Define the terms :- (1) parasitic oscillation;
   (11) harmonic radiation; and
   (111) self oscillation.

   (b) Indicate a possible cause of parasitic oscillation in a transmitter and describe how you would locate and suppress such a condition.

3. (a) With the aid of sketches describe the construction and theory of operation of a helically - wound whip type aerial, for use in a fixed location, on the 160 metre band.

   (b) What method would you employ to resonate the aerial to the correct frequency?

4. In relation to a communications receiver define the following terms :-

   (1) cross modulation;

   (11) automatic gain control;

   (111) image ratio;

   (1v) selectivity;

   (v) signal to noise ratio.

5. (a) Explain the construction and operation of a moving-coil (dynamic) microphone. Illustrate your answer with a sketch.

   (b) Show by diagram how a moving-coil microphone may be connected to the input of an amplifier circuit.

6. (a) Discuss one method of generating a single - sideband suppressed-carrier transmission.

   (b) Compare any advantages and disadvantages of this type of transmission with that of normal amplitude-modulated transmissions.

7. Explain, with the aid of a circuit diagram, the operation of the detector and audio stages of a transistor type of superheterodyne receiver. Indicate the point at which the automatic-gain-control (A.G.C.) potential is obtained.

8. (a) Assisted by a circuit diagram describe a variable-frequency-oscillator (V.F.O.) suitable for use in the 3.5 MHz band.

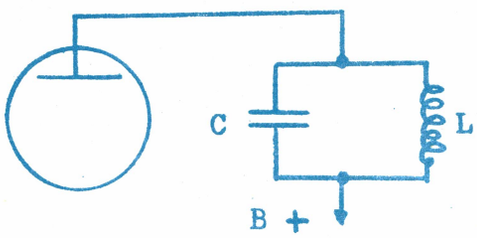
   (b) Discuss the factors upon which the stability of the generated frequency depend in a V.F.O.

9. (a) Explain the theory of operation of grid leak bias when used in the final stage of a transmitter.

   (b) If the required bias is 60 volts of which 45 volts is supplied by an external source, what grid current is necessary to provide this extra voltage if the grid resistor is 3,000 ohms.

SAMPLE ANSWERS TO AOCP EXAM. FEB. 1971.

1. (i).

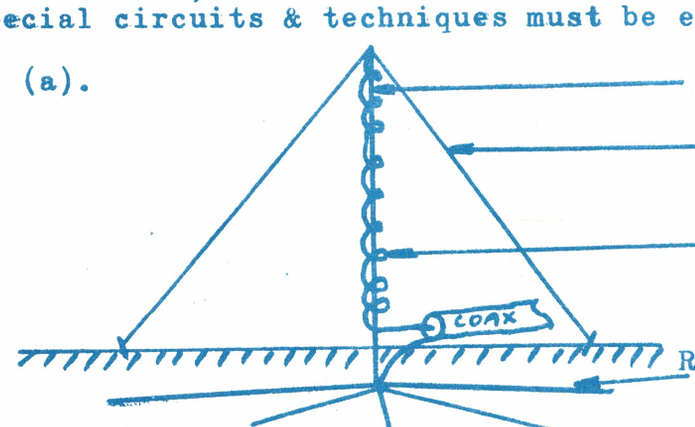


When the L C tuned circuit is not in resonance, the HT flowing to the anode, only sees the DC resistance of coil L, which could be a few ohms. When L C is brought into resonance, the resistance of the network could increase to a couple of thousand ohms, hence a drop (dip) in anode current.

(ii).
When a resonant aerial is coupled to the tank circuit, the anode current will increase due to the"loading" effect of the aerial on the working (loaded Q) impedance of the L C circuit.

2. (a).
(i). Parasitic oscillation is oscillation on all frequencies bar the wanted one.
(ii). Harmonic radiation is the radiation of multiples (or submultiples) of a given frequency.
(iii). Self oscillation is oscillation in a circuit where the feedback is positive,greater than 1 and large enough to overcome circuit losses.
(b). Parasitics -- causes.....
(i). Insufficient bypassing of supply rails, screen grids, emitter resistors etc. Cure: increase the bypass capacitor in size. To locate the culprit, use an absorbtion wavemeter to locate the stage where it occurs.
(ii). Location of components. Input & output components should not "see" one another. Shields of tinplate etc. usually cures this problem.
(iii). Incorrect neutralising. Using an absorbtion wavemeter, locate the faulty stage. Then employ inductive(link) or capacitive neutralising.
(iv). Incorrect earthing (earth loops). Transistor circuits are more prone to this type of fault than valve circuits due to their low impedence. Can often be located by shorting various parts of the earthing circuit with a stout wire.
(v). General. To locate parasitics in say a multistage transmitter, disable the final, driver and so on until the parasitic disappears. Using a G.D.O. an indication of frequency will often help in locating the parasitic as well. In valve circuits, a stage can often be tamed by reducing gain thru lowering of the screen grid voltage or in transistor circuits, by lowering the supply rail voltage. In particular when multistage oscillation occurs this may be the only way to locate the source. At VHF & UHF, when tubes are used above their self neutralising frequency special circuits & techniques must be employed to achieve stable operation.

3. (a).



fibre glass pole

insulated guywires (eg. shark fishing line- nylon etc).

Enamelled copper wire wound with decreasing pitch towards the top.

Radials buried in the ground to form a ground mat.

Theory of operation:
Because the length of the aerial is shorter than required for 160 M, it shows a large capacitive reactance. This can be tuned out by using inductance in the form of a spiral wound"coil".

3. Cont'd.

If proper radiation is to be achieved, sufficient current is to flow in the circuit.
With a spiral wound "coil" , current flow can be fairly well distributed over the length of the aerial and hence it will radiate well.

Tuning.....

Using an S.W.R. meter and an impedence bridge, the aerial can quickly be tuned by removing or adding turns of wire.

4. (i). Cross modulation occurs as a result of a strong signal causing rectification in the front end of a receiver. The receiver can be tuned to a station and the strong signal can be many MHz away from that frequency and still cause cross modulation.

Sometimes corroded metal (gutter, downpipes, guywires etc,) can be the cause of it.

(ii).AGC.....

The AGC circuit reduces the gain of the receiver on strong signals, thereby maintaining reasonably constant audio level output.

(iii).

The image ratio is the ratio between signal frequency input voltage and the unwanted (image) frequency input voltage.

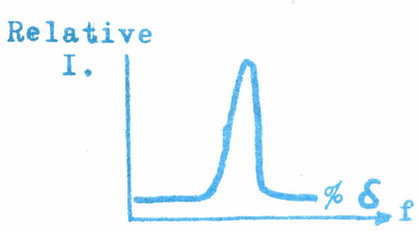
eg.

I.F. freq	=	450 KHz	
Loc Osc Freq	=	7500 "	
Signal freq	=	7050 "	(7500- 450) Sensitivity say 5uV.
Image "	=	7950 "	(7500+450) " " 100uV.

The ratio would be 100:5 20:1 and depends on the selectivity of the R.F. (front end) circuits.

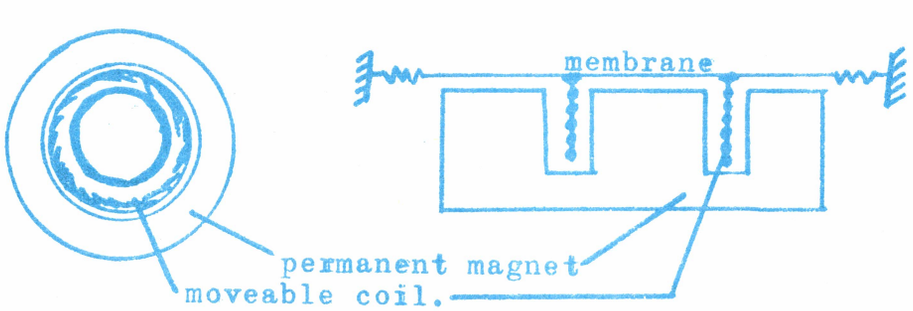
(iv). Selectivity is the ability of the receiver to pick up the wanted signal without nearby interference or other nearby signals. An important factor in selectivity is the R.F. tuned circuit resonance curve. It is preferable to have a low R and high Q to get a shape like this.....

Superhets are preferable over T.R.F. receivers because more selectivity & higher gain can be achieved at lower T.F. frequencies, with narrower bandwidth.



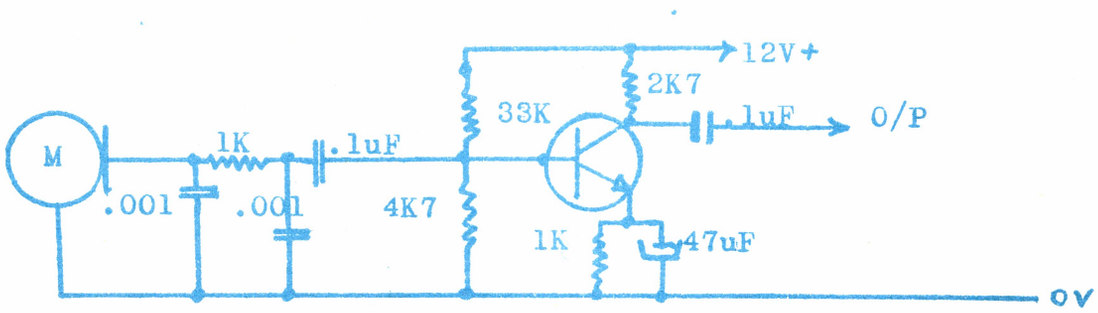
(v). Signal to noise ratio is the power ratio between signal to noise power of an ideal receiver and an actual receiver. Usually given in dB.

5. (a)..

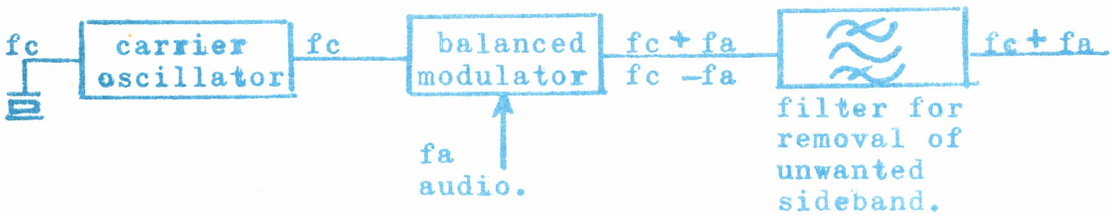


Sound waves striking the diaphram cause movement of the coil thru the permanent magnetic field, thereby generating a voltage.

(b).

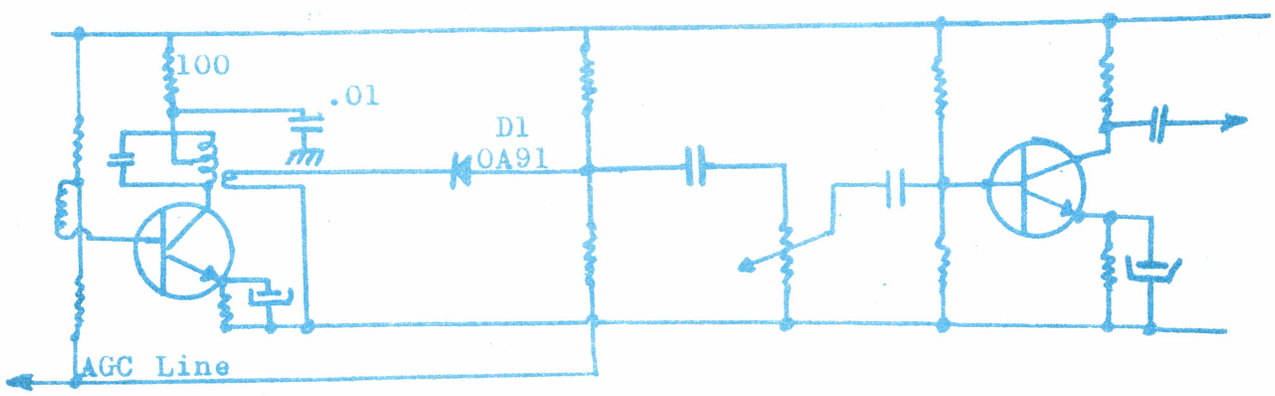


6. (a).



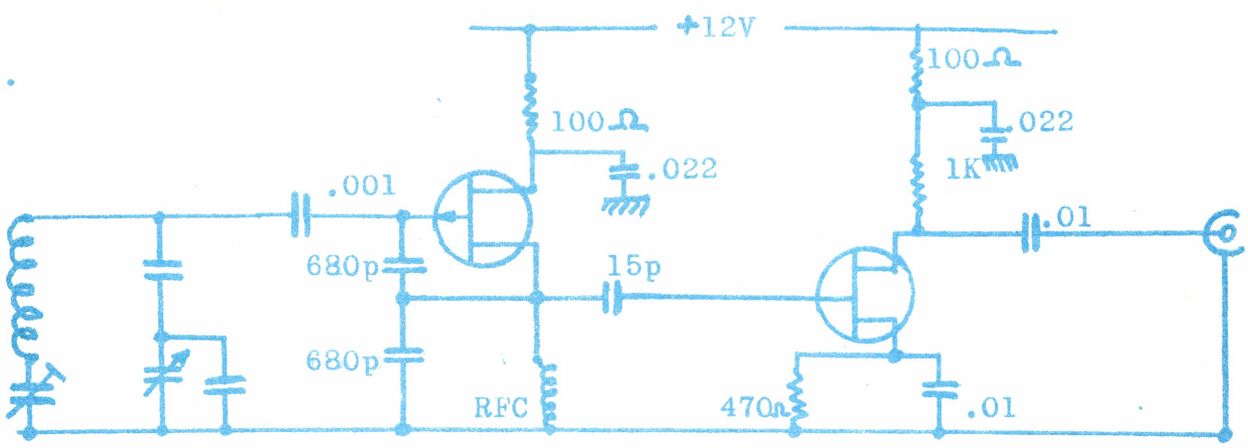
(b). SSB. Advantages:
(i). Only transmits R.F. when audio (speech) is present.
(ii). Effective gain about 9dB over A.M. - Equivalent to 8 x the TXR. power.
(iii). A.M. has about 2/3 of its power in the carrier.
(iv). Approx 1/6 power is upper sideband.
(v). " " " " lower "
(vi). All intelligence is carried in one sideband; therefore the carrier & one sideband are wasted in a fully modulated A.M. signal.
(vii). Bandwith less than $\frac{1}{4}$ of A.M. more stations can be accomodated.
SSB. Disadvantages:
Carrier must be reinserted at the Rxr.

7.



When 455 KHz IF signal is present, rectified DC will appear after diode D1. This negative voltage to the bottom of the voltage dividers for transistor bias can reduce the transistor gain according to the strength of RF.(IF Sig).

8. (a).



(b). i. Positive feedback for the oscillator is applied via the capacitive voltage divider. (2 x 680pF).
ii. Bandspread capacitors & Trimmers to suit coverage required & to "linearise" the scale somewhat.
iii. FET amplifier, loosely coupled, for very light loading of oscillator.
iv. Regulated Stabilised power supply.
v. Mechanicall robust.
vi. RF Proof enclosure etc.

9. RF Voltage driving the grid positive with respect to the cathode, causes grid current to flow. The amount of current produces a voltage drop across the grid leak resistor - refered to as grid leak bias.

(b).
60V - 45V = 15V to be generated by grid current.

$$I = \frac{E}{R} = \frac{15}{3000} = 5 \text{ mA.}$$

DX PANORAMA

By Gerry VK2APG

Having settled into my new QTH at West Wollongong and having all my aerials now erected I am in a position to work some DX again. My rig is still the FTDX560 and the aerial the TA33Jr at 40 feet. Anyone who has any DX news for the newsletter either HF or VHF should forward it to any person on the committee.

Conditions over the last month on 20 & 15 have been reasonably active. There have been regular openings to Europe, States, and Asia on 20 while 15 has openings to Japan in thevAfternoons.

There should be a little more activity on HF soon when Hank 2BHL with an FT200 and 4 element quad and Jim 2BBG also with FT200 and a newly erected TH3 statr to get active again.

Some intereting DX I have worked on 20 recently are:-

3D2CM	0820	Fiji
9H4D	0614	Gozo
YU1EXY	0619	Belgrade
OK3OAMI	0655	Prague
ON5IF	0719	Mons
UL7YR	1221	Khazak
CY6GQ	0336	Calgary
KA6PA	1306	Okinawa
KL7BJW	0410	Alaska
A35AF	0602	Tonga
KZ5TC	0629	Canal Zone
VR3AJ	0644	Christmas Is.
HA8CY	0617	Hungary
4Z4EC	0652	Haifa
G3JaG	0809	Manchester
OZ2FL	0659	Copenhagen
PY2EGM	0558	Sao Paulo
OE9WOI	0714	Austria
XW8GV	1007	Vientienne
5Z4OW	0615	Nairobi
HB9ADD	0717	Switzerland
OH2BCV	1221	Finland
SP5EWY	1259	Warsaw
UZ3TC	1107	Gorky
UP2OU	1445	Lithuania
EA6BZ	0711	Balearic Is.
HMØB	2239	Seoul

These stations are the most interesting over the last few weeks.

Good DX to all.

Gerry

VK2APG