THE CANADIAN WIRELESS SET NO 52

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The Canadian WS 52 was designed and built in Canada by Canadian Marconi. It could be used either as a vehicle set or a ground station.

The set was intended as a replacement for the Canadian No 9, and derived much of its design from that set. The dimensions are almost identical, and in most cases the 52 could be mounted directly in the same location. The 52 was, however, immensely superior in power and performance.

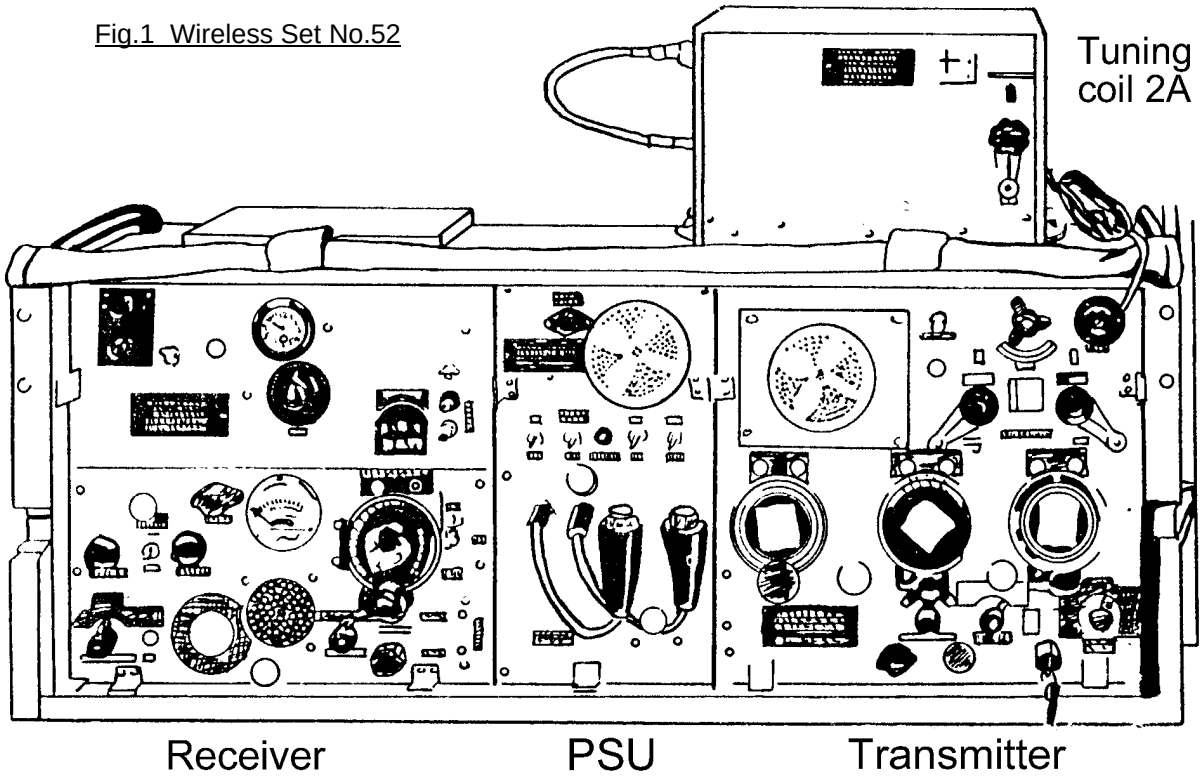
The set itself consists of three units: a Receiver, Power Supply and Transmitter. There is also an Aerial Tuning Coil in a wooden box, which can be mounted either on the top of the carrier, or on the side – see Figs 1 and 3. These units mount in a carrier with carrying handles, which incorporates anti-vibration mountings – see Fig.4. There is also a nice canvas curtain which covers the front to protect the set from weather and dirt. The 52 is no lightweight, as the three units in the carrier weigh 255 lbs. The dimensions are 44 inches by $17^{1}/_{2}$ high and 14 deep.

The Receiver

The receiver is really good. The mechanical design is excellent, and must contribute to its fine stability. It is possible to tune in an SSB station, and there is almost no need for readjustment over a long period, unlike many of its contemporaries. The frequency range is from 1.75 to 16MHz, and it has a crystal calibrator, which enables any frequency to be set up within 5KHz. The tuning dial is similar to that used in the 19 and 22 sets (see Fig.2), but the three bands are colour coded – band one being green, 2 yellow and 3 orange. The transmitter uses similar colours too, of course. Above the main tuning dial is a fine-tuning adjustment, which is in effect a small bandspread capacitor. It is spring-loaded to centre and comes in useful for SSB signals, as the main tuning is rather high-geared, being identical to the 19 set.

There is a meter on the panel which reads for both the Receiver and Transmitter, and enables every valve in the set to be checked, as well as the various currents and voltages. A built-in speaker, which can be switched off, is also a useful feature. For CW use, the set really comes into its own. Unlike most others of its class, there is a good CW filter tuned to around 1000Hz, and it not only cuts out unwanted signals, but boosts the wanted one. When the receiver is used in conjunction with

Fig.1 Wireless Set No.52

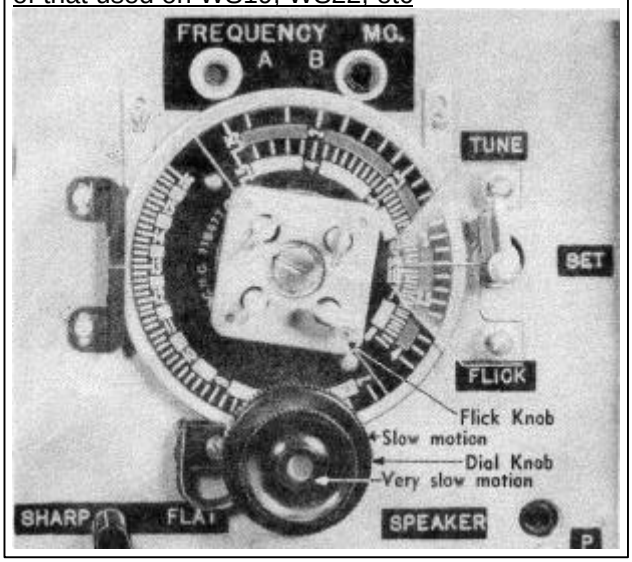


the transmitter, the transmitter tank coil helps to match the aerial and definitely improves the performance.

The layout is fairly conventional for the period, with one RF and two IF stages (see the block diagram in Fig.5), but the first two IF transformers are double tuned, and the coupling is increased by putting the selectivity switch to flat. There are 13 valves used in it - all 12 volt, and mainly ARP3s. The IF frequency is 420KHz, which must be borne in mind if any attempt is made at realignment.

As it is such a good receiver, large numbers have survived, and are fairly cheap as a consequence. The main fault to which they seem to be prone is the common one of resistors going high or open circuit. It is worth checking them all, as the set is easy to work on. The same goes for the capacitors. The sensitivity of the receiver is almost up to present day standards, being in the region of 0.7 microvolts for a 10 to 1 signal-to-noise ratio in CW, and 2.5 in R/T. It is also protected by a gas discharge tube across the aerial input.

Fig.2: The receiver tuning dial – an enhancement of that used on WS19, WS22, etc



The Transmitter

The transmitter is also an excellent piece of engineering, and gives little trouble. The layout (see Fig.6 for block diagram) consists of 6V6 oscillator covering 1.75 to 4MHz with provision for two crystal positions. Next comes a 6V6 Amplifier/Doubler followed by the 813 PA. There is an additional 6V6 amplifier on band 3, dubbed the Intermediate Power Amplifier. There is a voltage stabiliser for the oscillator HT, which contributes to the nice note always reported on CW.

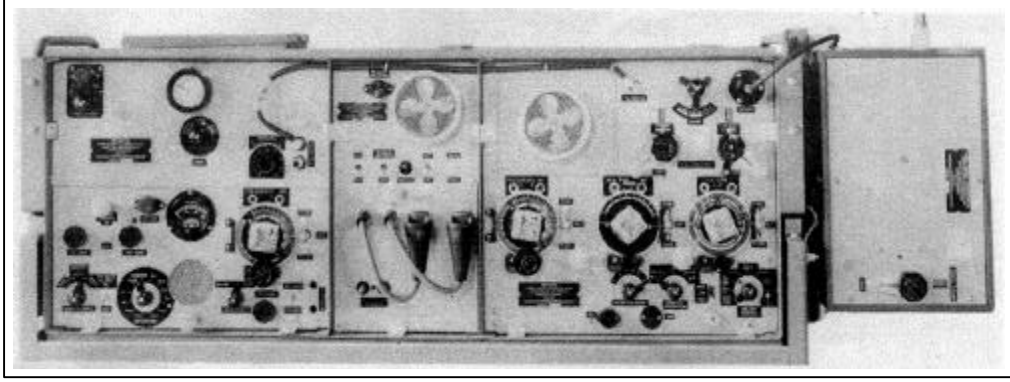
The PA is grid modulated on R/T by a 6V6 fed by another ARP3 speech amplifier. Negative feedback is employed. On MCW the modulator is used as the oscillator, and modulates the carrier over 80%. The standard microphone does not seem to achieve more than 70%. Sidetone is fed to the headphones from the modulator, and does not come through the receiver audio. The headset is the standard type as used with the 19, 22 and 62. On the panel next to the key socket is a similar one, which takes the standard Canadian C3 carbon microphone. This gives slightly greater depth of modulation, but does not sound so nice.

A fan is fitted on the panel in a hinged door, which gives access to the interior of the set for valve and crystal changing. It only operates at high ambient temperatures. It is possible to change all the valves and crystals through this door, which has a micro switch to cut the HT when opened. However you have to be somewhat of a contortionist to do this – I suppose practise must help.

The tank circuit consists of two roller coasters, one for band 3 and the other for bands 1 and 2. The PA tuning capacitor is a massive affair, which looks as if it would handle more than double the power.

The bottom row of controls consists of a meter-sensitivity switch for the aerial current, a function switch for the aerial current, a function switch with positions for R/T, MCW, CW and break in operation, and the meter selection switch. Between the function and meter switches is the High/Low/Med power switch,

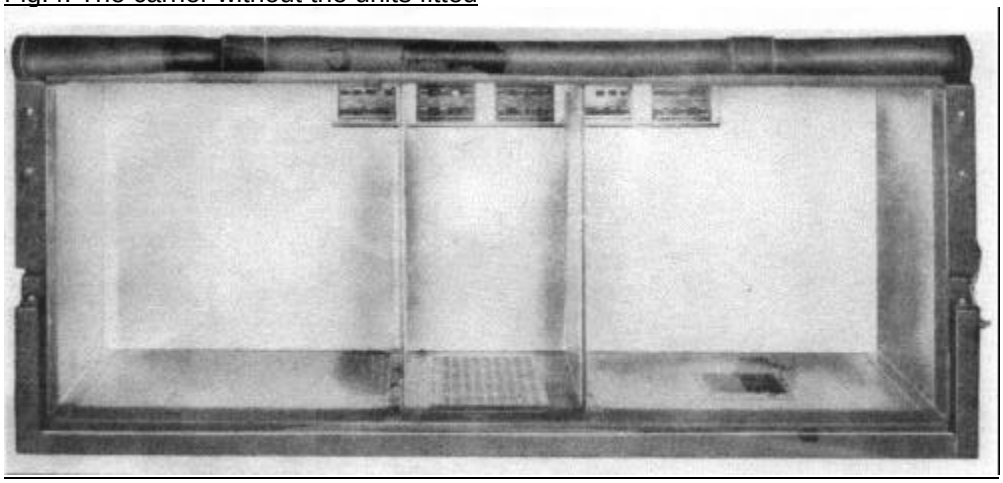
Fig.3: WS52 showing the alternative arrangement of the tuning coil



which has a lock to prevent unauthorised use of high power.

The power output varies from 45 to 85 Watts in R/T or 70 to 110 in CW in the High Power position, to between 2 and 4 Watts in Low. The current drain also varies with the power setting, being up to 57 amps at 12 volts in High Power CW.

Fig.4: The carrier without the units fitted



The power supply

The centre of the carrier is occupied by the Power Supply Unit. This contains the 1200 Volt dynamotor for the 813, a 300 volt one for the rest of the transmitter, and a vibrator pack for the receiver. On the panel of this are the various switches , and the two snatch plugs for the headsets.

The three units have plugs at the top rear, which connect to a bus which couples them – see Fig.4. The weakest part of the whole set is the 1200 volt dynamotor. It always gave trouble, and does not seem to be really up to the job. Most of the British sets were converted to use an external dynamotor, which seems a good idea.

Nicht fur dummkopf!

Unlike the 19 and similar sets, the 52 really requires a skilled operator. It is "nicht fur dummkopf", as severe damage can be done quite quickly. The maximum PA current of 200 milliamps can easily be exceeded on tune up if the correct procedure is not followed, or if sufficient attention is not being paid. The modulation level seems to depend on the PA being correctly loaded, and doing stupid things like disabling the safety interlock could result in a lethal shock if contact is made with the 1200 volt supply.

Using the WS52 today

If it is desired to operate the set today, the best thing to do is to obtain the remains of a Power Supply and build a mains one in the chassis. This is not a hard job, but there is not a lot of room, so some thought must be given to it. In the original one, the 813 filament only receives power when the transmit relay is closed, but this is not good for the valve, and it is much better to have it on all the time the filament switch is on. This means that the fan supply must also be on, as the 813 generates a lot of heat.

When the 52 is considered, it is hard to see why it was so good. The same job could have been done with something much simpler and cruder. The 1154 is an excellent illustration of this point. However, thank goodness it was built the way it was – the set is a delight to use once it has been mastered. Sidetone is available to help CW sending, and good reports are the rule. The receiver gives good quality audio, and listening to broadcast stations is a pleasure. The whole thing just works so well.

One word of warning: the shank of the key is connected to the bias, so in the key up state it carries quite a voltage. Most keys have the shank connected to the case or base, and if the T/R switch is touched whilst holding the case, quite a shock is received. It is worthwhile obtaining the proper key.

[See over for Figs 5 and 6 – Ed]

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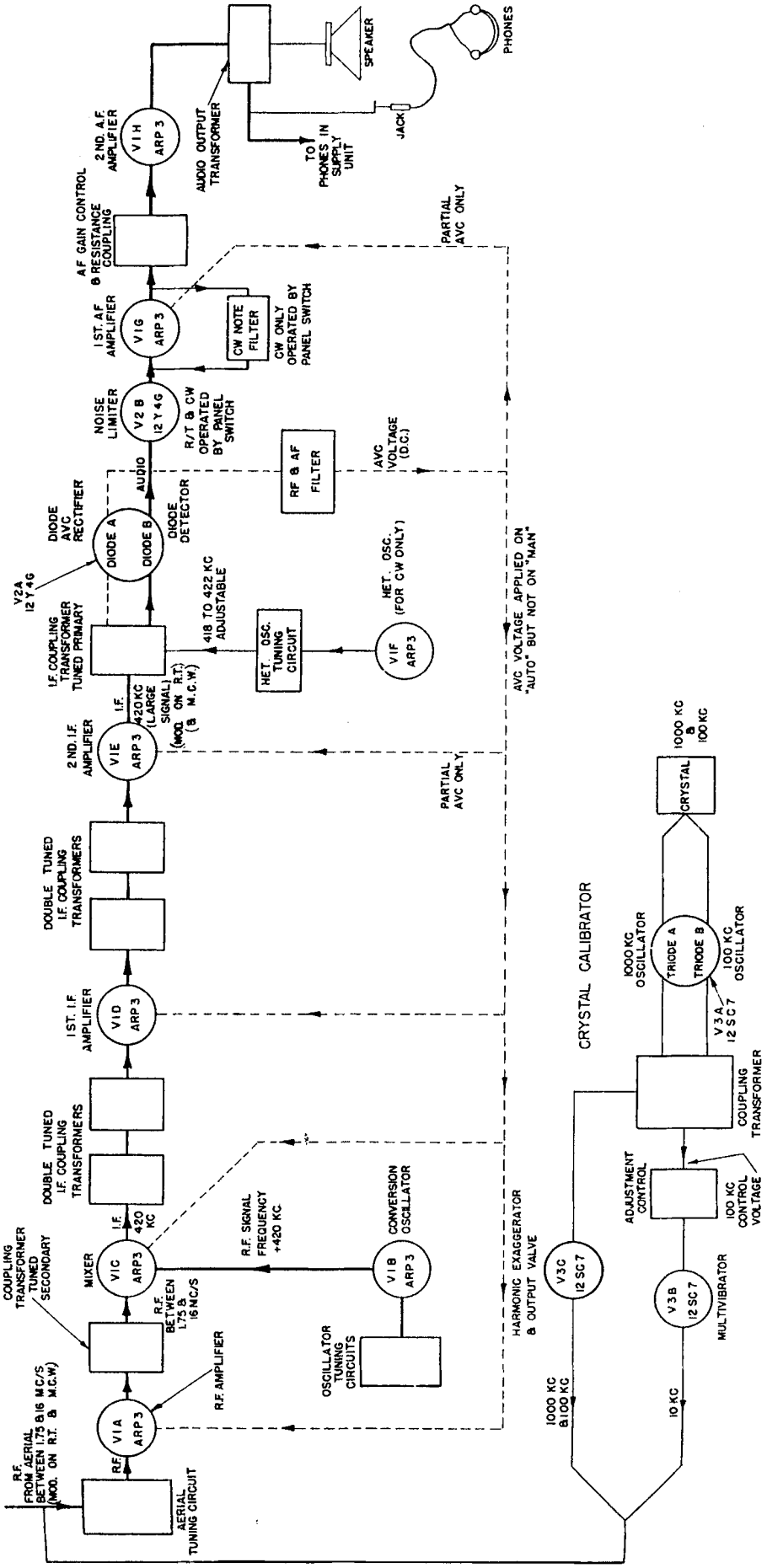
R.F. FROM AERIAL BETWEEN 1.75 & 16 MC/S (MOD. ON R.T. & M.C.W.)
AERIAL TUNING CIRCUIT
R.F.
V1A ARP3
R.F. AMPLIFIER
COUPLING TRANSFORMER TUNED SECONDARY
R.F. BETWEEN 1.75 & 16 MC/S
MIXER V1C ARP3
I.F. 420 KC
OSCILLATOR TUNING CIRCUITS
CONVERSION OSCILLATOR V1B ARP3
R.F. SIGNAL FREQUENCY +420 KC
DOUBLE TUNED I.F. COUPLING TRANSFORMERS
1ST. I.F. AMPLIFIER V1D ARP3
DOUBLE TUNED I.F. COUPLING TRANSFORMERS
2ND. I.F. AMPLIFIER V1E ARP3
I.F. 420 KC (LARGE SIGNAL) (MOD. ON R.T. & M.C.W.)
I.F. COUPLING TRANSFORMER TUNED PRIMARY
418 TO 422 KC ADJUSTABLE
HET. OSC. TUNING CIRCUIT
HET. OSC. (FOR C.W. ONLY) V1F ARP3
V2A 12Y4G
DIODE AVC RECTIFIER
DIODE A
DIODE B
DIODE DETECTOR
AUDIO
NOISE LIMITER V2B 12Y4G
R/T & C.W. OPERATED BY PANEL SWITCH
RF & AF FILTER
AVC VOLTAGE (D.C.)
1ST. A.F. AMPLIFIER V1G ARP3
CW NOTE FILTER
CW ONLY OPERATED BY PANEL SWITCH
A.F. GAIN CONTROL & RESISTANCE COUPLING
2ND. A.F. AMPLIFIER V1H ARP3
AUDIO OUTPUT TRANSFORMER
TO PHONES IN SUPPLY UNIT
JACK
SPEAKER
PHONES
PARTIAL AVC ONLY
AVC VOLTAGE APPLIED ON "AUTO" BUT NOT ON "MAN"
PARTIAL AVC ONLY
HARMONIC EXAGGERATOR & OUTPUT VALVE
V3C 12SG7
1000 KC & 100 KC
CRYSTAL
CRYSTAL CALIBRATOR
1000 KC OSCILLATOR
TRIODE A
TRIODE B
100 KC OSCILLATOR
V3A 12SG7
COUPLING TRANSFORMER
ADJUSTMENT CONTROL
100 KC CONTROL VOLTAGE
V3B 12SG7
MULTIVIBRATOR
1000 KC & 100 KC
10 KC

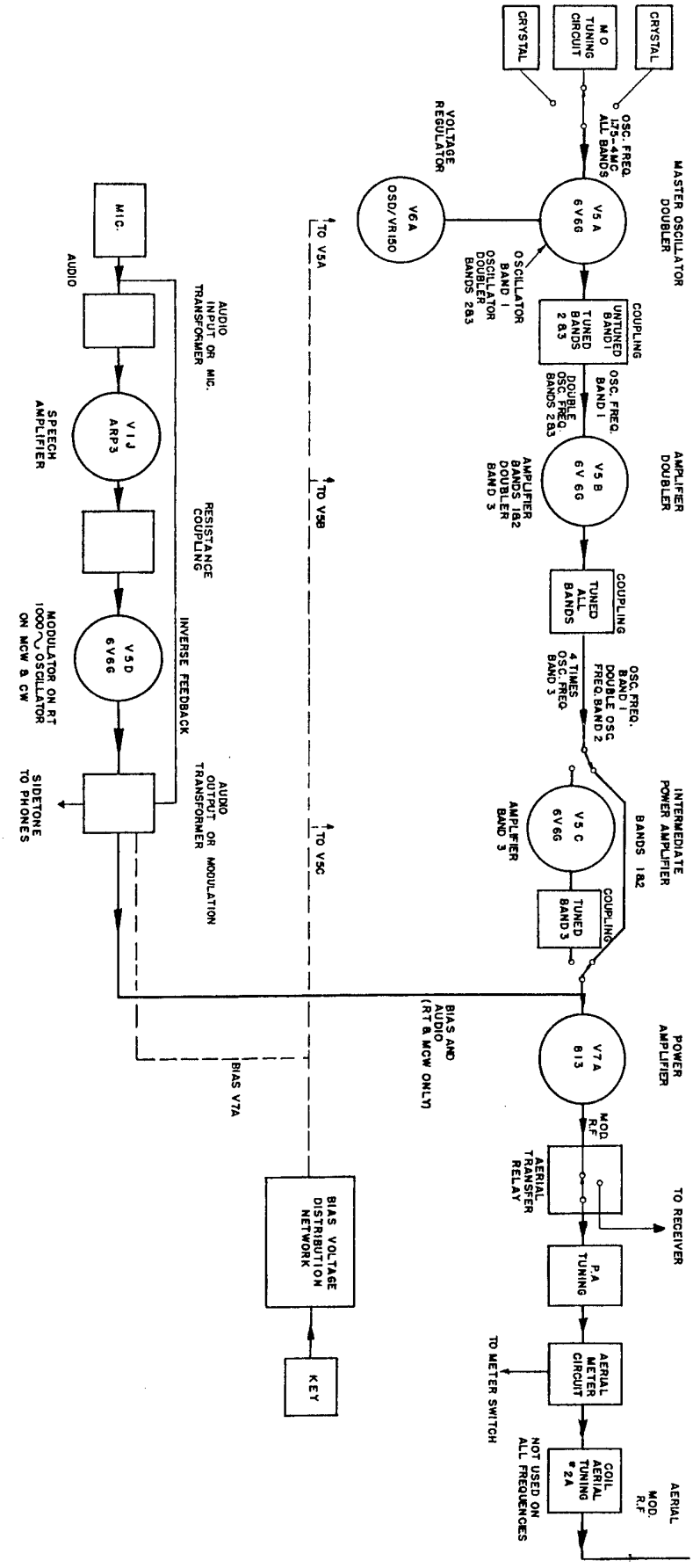

Fig.6: WS52 transmitter block diagram