

THE ZC1

NEW ZEALAND'S OWN WWII SET

IAN SANGSTER ZL1UAC AND GEORGE MCLEAN ZL2BGZ

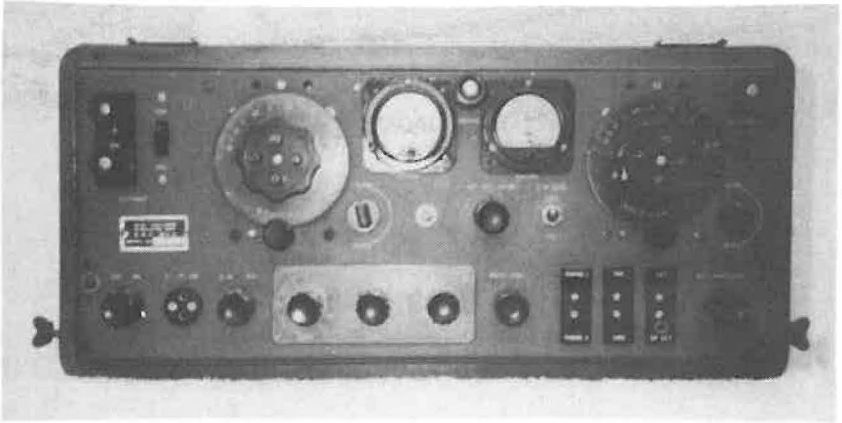
The ZC1 is a part of New Zealand's radio production history that deserves some further documentation. It is a set that provided work for many factories in WW II and in its requirements for tropicalisation and corrosion resistance may have instituted manufacturing processes that upgraded the quality of many post war domestic receivers. Now some fifty one years after its introduction in the field we will cover its models and their variants. Many aspects of its design and production were carried out under a cloak of secrecy and at the time. Many of the participants are no longer with us thus we can only report the facts we find.

Collier and Beale's 25th anniversary year booklet of 1951 under a heading"The War Years" states:-

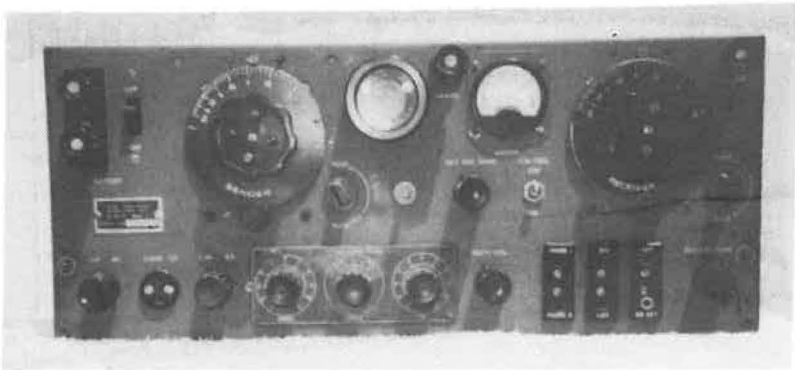
"In the preliminary stages of the war, and throughout its duration, we were greatly assisted by the interest and co-operation of the Post and Telegraph Department. This facilitated the production of an extensive range of special equipment's for the New Zealand and Overseas Authorities, and included the following: Radar Sets, Marine and other Communication Equipments for telegraphy and telephony, Ultra High Frequency Communication Sets, Radio-Telephone Terminal Apparatus, Public Address Systems, etc. Perhaps the best known of the special equipment produced during the period was a military transmitter and receiver set designed by us in the early war years and later known as the Z.C.1. The production of this set ultimately occupied the whole of the New Zealand radio manufacturing industry for the last three or four years of the war."

The ZC1 Mk I is a single band 2-6.5 MHz transmitter receiver in a steel case which is somewhat larger than the back pack sets, being suitable for jeep, truck or field base operation. Its power supply requirement is 12 volts at 4 to 6 amps. The maximum output power is 2.75 Watts. The purpose of the ZC1 wireless set as listed in its working instructions was as follows, " the ZC1 was designed because it was found that the types of sets available at the time were unsuitable for communication under the ranges at which it was required to operate in New Zealand". The range is listed at 25 to 35 miles, using the 34 foot rod aerial supplied, in rolling country. A following statement qualifies this " considerably greater ranges may be obtained by the use of horizontal aerials and sky wave working" something which subsequent service and civil operators would concur.

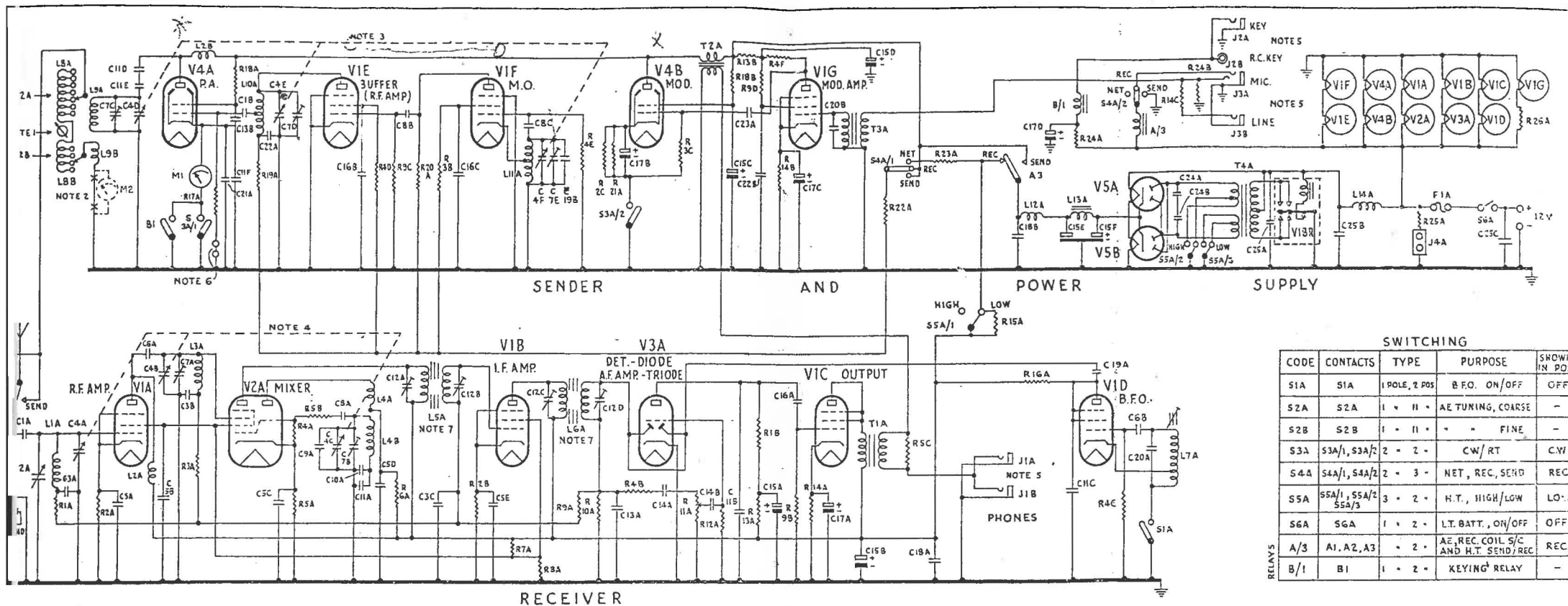
The receiver has a 6U7G RF, 6K8G mixer, 6U7G IF, 6Q7G detector and 1st audio, 6U7G output with 6U7G BFO. The transmitter uses 6U7G for master oscillator, 6U7G buffer, 6V6GT PA, 6V6GT modulator and 6U7G modulation amplifier. The power supply is vibrator with a pair of 6X5GT's as rectifiers and a tapped transformer to give two switchable HT voltages and thus two power outputs.



Mk 1 ZC I first model. The second was minus the RF meter. A plate covered the hole and a watchholder was attached to the plate.



Mk 1 ZC I third model.



NOTE 1. VERNIER ANT. C.T. TUNING CONTROL - METAL DISC ROTATABLE WITHIN FORMER OF AERIAL TUNING COILS.

BY BROKEN LINES AND CONNECTION SHOWN \times IS DELETED.

NOTE 3. C4D, E, F GANGED CONDENSERS - SENDER TUNING.

NOTE 5. MOUNTED IN PAIRS IN COMMON MOUNTINGS - PHONES, J1A, J1B - KEY & R.C. KEY, J2A, J2B - MIC & LINE, J3A, J3B.

NOTE 6. REMOVABLE LINK FOR INSERTION OF METER WHEN CHECKING ALIGNMENT OF SENDER.

NOTE 7. SETS AFTER SERIAL NO. 12000 (APPROX) WILL HAVE VARIABLE CORES IN L.F. TRANSFORMERS AND FIXED TUNING CONDENSERS, NOT FIXED CORES AND VARIABLE CONDENSERS AS SHOWN.

NOTE 2. R.F. AERIAL CURRENT METER IS SUPPLIED ONLY IN A FEW EARLIER SETS. WHEN SUPPLIED C.C.T. IS AS SHOWN

NOTE 4. C4A, B, C GANGED CONDENSERS - RECEIVER TUNING.

WIRELESS SET NO. ZCI MK. I - SCHEMATIC

FIG. 9

DRG. 336

The ZC1 Mk I has been found in three versions. The first as noted on the circuit has an aerial current meter M2. Early sets also had variable condensers in the IF transformers and fixed cores a situation which according to a note on the circuit diagram was reversed after serial number 12000. The second version of the Mk I has the hole where the aerial current meter was fitted covered with a plate on which is screwed the watch holder. The third and most commonly seen version has no extra meter hole and the watch holder screws directly on to the panel in the same position.

The ZC1 had matching ZA1 RF power amplifier available for long range or Air Support communications. This unit came in a case somewhat smaller than the ZC1 and used two 807s in parallel in class AB1 as an RF linear amplifier. A later version, the ZA1 Mk II was different in that it used a pair of 807s in parallel class C modulated by another pair of 807s with a 6V6 phase inverter and a 6U7 microphone pre-amplifier and was built into a modified Mk I case and chassis.

Dating a ZC1 or indeed attempting to estimate total production numbers using serial numbers is fraught with difficulty. George McLean has several Mk I ZC1s and for example the serial number of the third version, that is the one with no hole for the RF meter is 13476, whereas the number of the second version is 14455. The jumbling of serial numbers issued to each set was for security reasons in case of capture by enemy forces. Bob Long of Radio Ltd in Auckland, a ZC1 manufacturer estimates total production to be approximately 30,000, that is Mk I and II combined.

The ZC1 was issued at Guadalcanal and introduced to active service in the Pacific at Vella Lavella where the New Zealand troops landed at 8am on the 18th of September 1943. The history of the 3rd division 2nd NZEF states " Various types of wireless sets are used, each of which has a given range, but it was soon found that those ranges did not apply in the jungle. A New Zealand-made set, known as the ZC1, proved to be the most suitable". These were used in conjunction with No. 48 sets.

Ralph Slade of Philips, George Wooler of Akrad and Jim Eckford of SOS worked for the Ministry of Supply charged with coordinating the New Zealand radio manufacturers in production of the ZC1. Collier and Beale as the designers were manufacturers as were Radio Ltd in Auckland. Radio Corp, Philips, Akrad and the rest of the industry all played a part. Completed sets were exhaustively tested in environmental rooms to simulate tropical conditions, Army inspectors checked each set giving it a drop test to check for dry solder joints.

The Collier and Beale staff had acquired a rather grisly war memento, a Japanese skull which they called "Yorrick". This was sent to the meter luminising section, duly coated with luminous paint and then hidden in the darkened environmental test room just before Ralph Slade was due to make a visit, his reaction is unrecorded.

The design and development of the Mk I has been credited to Percy Collier and Bill Fever (ex ZL2AU) and when the time came for a design revision there may have been a contest to

REFERENCES

1926 to 1951 25th Anniversary Year Collier and Beale Limited.

Working Instructions New Zealand Wireless Set No. ZC1 Mk I. Part 1. General Description and Operation. First Line Maintenance.

Working Instructions New Zealand Wireless Set No. ZC1 Mk II. Part 1. General Description and Operation. First Line Maintenance.

Working Instructions New Zealand Wireless Set No. ZC1 Mk II Part II. Technical Description and Maintenance

Collier and Beale Index of Bulletins.

Headquarters. A Brief Outline of the Activities of Headquarters of the Third Division and the 8th and 14th Brigades in the Pacific.



A shelf of ZC1's in George McLean's ham shack. On the top shelf is a Mk I 1st version. Second shelf a Mk I 3rd version. Third shelf a Mk II and below that a ZA1 Mk. II RF Amplifier. Note the ZC1's run on a 12 volt car battery with original power supplies.

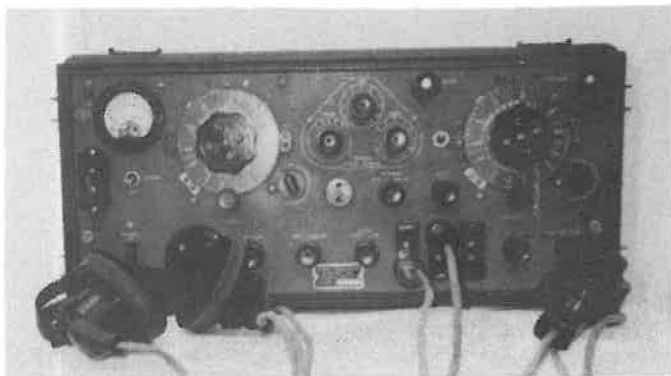
pick a replacement. The Mk II design is commonly regarded as the work of J. Orbell at Radio Ltd. The major change between the versions is that the Mk II is dual band having a LF band of 2-4 MHz and an HF band of 4-8 MHz. The 6X5 rectifiers were replaced by a synchronous vibrator power supply set-up and the switchable HT voltage feature was dispensed with.

During its life the Mk II remained relatively unchanged though a couple of points are of note. In George McLean's collection is a Mk II which has evidence of being an early pre-production version in that some of the front panel switch position lettering is missing, no dial clamps are fitted and internally pencil markings show where components were marked out for cutting. Some Mk IIs had rubber "flying leads" for the combined headset microphone as fitted to the No. 19 set and No. 62 set possibly for commonality among operators in the field.

In a 1956 "Break-In" advertisement Sine Wave George lists Mk I ZC 1s for fifteen pounds nineteen and six and in his description says that they are higher powered and offer better speech quality than the Mk II. Post war Collier and Beale put out a kit to convert the Mk II for marine use. This consisted of a coil set for the receiver to change the LF band to a broadcast band and the HF band to the marine band. The VFO was converted to crystal control. Various government departments including MOT and Forest Service used the ZC1 post war. An issue was made to Amateur Radio Emergency Corp.

Break-In published many articles on ZC1 conversion for amateur operation including one in February 1947 by Ralph Slade ZL2BK, who should have been familiar with the set. In the introduction Ralph's wartime job was listed as Controller of Radio Production.. If one is interested in using a ZC1 on the air again these are recommended reading, they are also helpful in understanding what was done to the ZC1 if one is returning an example to original.

The intent must have been to manufacture many ZC1s as in the post war surplus market Jim Eckford exported a quarter of a million 6U7Gs to the USA, yet the 6U7G is still the most common valve of its era encountered at junk sales. Another tale concerns four and a quarter tons of Mumetal transformer laminations left over from ZC1 microphone transformer production which were sold back to the USA, netting enough to see one of our members into a new car.



A ZC1 Mk II with headphones and microphone attached.