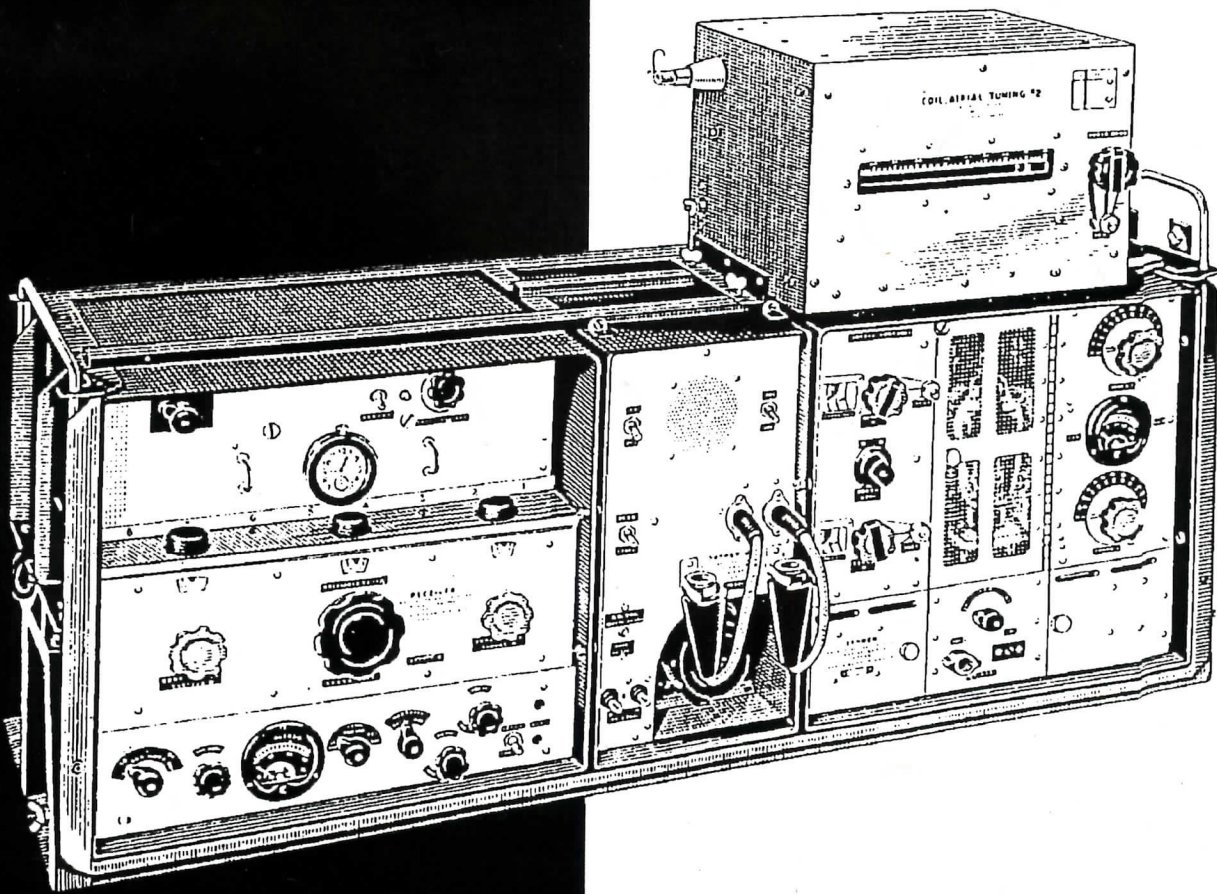


Jaargang 2, nummer 4, december 1993

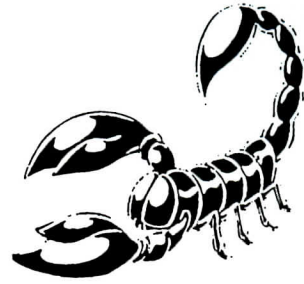
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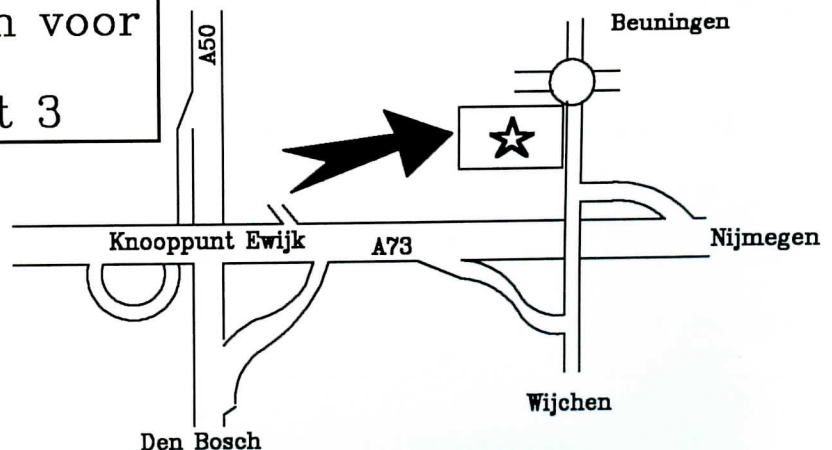
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Q-Five

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Why not join the IANA now ?

Owners of the USnamed AN/GRC9, AM/CW/MCW exmilitary HF radioset ('Angry Nine') and collectors of many other valveera military radioequipment, are banded together in the International Angry Nine Association (IANA). Anyone, who is interested in the technical-, historical- and user aspects of both military and vintage radio-communications equipment, can become a member.

The IANA organizes rallies, meetings, technical flee- and swop markets.

IANA-members meet every Sunday on the air at 08.15 UTC on 3530 KHz in CW and at 09.00 UTC on 3705 KHz in AM. One of the important activities of IANA is the publication of its qarterly Q-Five, in which we supply our members with an abundance of technical information, articles and tips on all sorts of military and vintage radioequipment. But we also reserve space for historical information and personal experiences of our members, either in days gone by or of recent date. Book and magazine reviews and clasified ads complete this magazine. Most of the IANA-activities are aimed

at our Dutch members, but in the short time IANA exists We have established contacts with a whole range of sister-organizations throughout the world. Depending on the speed by wich we will grow internationally in the future, plans are made to set up IANA-branches in other countries.

IANA already has Danish, Belgian, German, UK and US members and is looking in other countries of the world. to continue and expand its activities IANA needs membetrs, not only for the money to finance these activities, but to broaden its horizon and set up an exchange of interesting information, experiences and (perhaps) equipment amongst its members all over the world. Become an IANA-member is easy. Just fill out the application-form, send a cheque or international money-order for Hfl. 50,-; BFr. 1000,-; DM. 50,-; FF 160,-; Sterling 20,-; Dkr. 185,-; It. Lira 50.000,- or USD. 35,- to: IANA, P.O.Box 3170, NL-3502 GD Utrecht, The Netherlands and you'll receive your membership-card and the first coming issue of Q-Five A.S.A.P.

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THE NETHERLANDS**

CQ-Internationaal

DL1GPK

Het IANA-lid Peter Karrais, DL1GPK schreef ons: 'My GRC-9 ready to operate on 3576 Khz. (CW) in evenings for members traffic'.

Een prima gelegenheid om eens een 'outside Holland' dump-QSO te maken.

CROSEM

Mario, IK0MOZ uit Rome is zowel IANA-lid als ook de motor achter de Italiaanse dump-club CROSEM. Hij liet ons weten dat CROSEM een 80-meter een AM/CW-net opzet dat elke zaterdag in de lucht is vanaf 19.30 UTC rond 3600 Khz. Verbinden vanuit Nederland met de Italiaanse dumpstations zullen waarschijnlijk voorlopig niet lukken want Mario liet ons weten dat de 80-meterband in Italië op dit moment 'overcrowded' is met militaire verbindingen van de strijdende partijen in het voormalige Jugoslavië. Toch maar eens proberen een QSO te maken, want je weet maar nooit of er een gaatje is waardoor het opeens lukt. Zo heeft Mario op 10 juli jl. op 3.680 KHz. een CW verbinding gemaakt met Frank, PA3GEB. Frank gebruikte een GRC-3030 set en in zijn brief van 22 juli jl. vraagt Mario zich af: 'His signal was quite chirping, this is due to power supply or typical for 3030?'

CROSEM heeft elke zaterdag vanaf 12.00 uur UTC ook een LSB-net in de 40-meterband op 7045 KHz. Signalen van zowel standaard amateursets als dumpsets zijn in dit net welkom.

3820 KHz.

In Q-Five jaargang 1, no. 2 werd op pagina 23 het gebruik van de frequentie 3820 Khz in Noorwegen

al genoemd. We vroegen ons toen af of het een drukfout betrof of dat er iets anders aan de hand zou zijn. Het raadsel is inmiddels opgelost. In de zomermaanden is er correspondentie op gang gekomen tussen de IANA en Tore Moe, LA5CL van de Noorse vereniging voor radiohistorie. In zijn brief van 13 juli jl. schrijft Tore: *'The Norwegian Radiohistorical Society has several times "taken over" surplus radios from the army, mainly the AN/GRC-9 family. Through the years I think about 100 of these sets have been sold to our members. Many of the members are not licensed radioamateurs, and normally it is not legal to buy or own a radiotransmitter without a permit. Being a serious club with a lot of sympathy within the Telecomm. authorities (we also have many members there) we got a general permit for our members to possess historical transmitters and even use them at particular times at one particular frequency (3820 KHz.) This is a frequency allocated to several parties in this country, among them some major newspapers. However, very few use HF for communication nowadays, at least at a regular basis. So now we are more or less alone at this frequency. Every sunday the net is open. Some stations are on the air from early morning, and normally some of our people are there until the afternoon, when QRM from the continent becomes too severe. We are very careful of course not to destroy other legal communication. So far we have had no complaints, and our net is very disciplined. Only AM is used, and the power should be kept as low as possible and not exceed 10 Watts output. For call-signs we use NR*

(November Radio) + a number, normally three digits. The number is the same as our membership registration number.'

Een leuke uitdaging voor 'dump-luisterstations' om te proberen de Noorse AM-Low-Power stations te ontvangen. Mocht dit lukken, laat het de redactie van Q-Five dan even weten.

3885 KHz.

Voor de dump-liefhebber die veel met de BC-611 Handy-Talky heeft gespeeld klinkt de frequentie 3885 KHz. bekend in de oren. Inderdaad wanneer men in de dump een BC-611 op de kop tik dan staat in zeker negen van de tien gevallen de Handy-Talky ingesteld op deze frequentie. In de USA is bij de dump verzamelaar-amateurs deze frequentie dan ook geworden tot de dump-frequentie bij uitstek. Elke zaterdag is op deze frequentie dan ook een dump-net in de lucht. Voor ons in Europa ligt deze frequentie buiten de amateurbanden maar in Amerika loopt de 80-meterband door tot 4.000 KHz. zodat 3885 daar een normale amateurfrequentie is. Ook hier geldt: luisteren en QSL.

CORMMA/AROC

De CORMMA/AROC is de Franse club van dumpenthousiastelingen. Hun activiteiten spelen zich hoofdzakelijk af in het zuidelijk deel van Frankrijk.

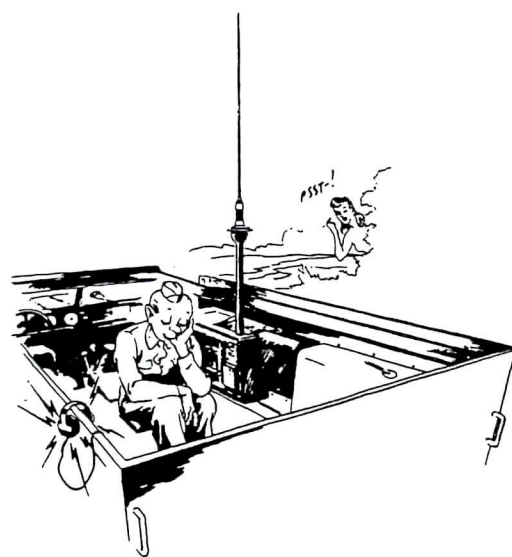
De CORMMA/AROC heeft een aantal z.g. Foxtrot-Frequenties vastgesteld voor hun leden die men moet zien als de voorkeurs frequenties waarop leden elkaar kunnen treffen. Deze frequenties zijn:

- Foxtrot 1: 29.100 Mhz.
- Foxtrot 2: 29.200 MHz.
- Foxtrot 4: 144.850 MHz.
- Foxtrot 6: 51.000 MHz.
- Foxtrot 8: 3.600 MHz.

De leden monitoren in het weekend tevens continue de frequentie 29.600 in FM. Omdat dit gebeurt in de buurt van Marseille zullen verbindingen vanuit Nederland alleen tijdens condities lukken. Wie op vakantie gaat naar Zuid-Frankrijk kan deze frequenties natuurlijk eens proberen. De CORMMA/AROC heeft ons laten weten dat IANA-leden bij hun altijd van harte welkom zijn.

MWARS

Medio 1993 is in Engeland de 'Military Wireless Amateur Radio Society' opgericht. Leden van deze MWARS ontmoeten elkaar 'on the air' iedere zaterdagochtend rond 08.30 UTC op een frequentie tussen 3605 - 3620 KHz. Ook in dit net hoofdzakelijk AM-signalen van oude legersets.



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P.M. Quakkelstein

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's maandags gesloten

Operating the WS-48 on 40 meters CW

By Mario Galasso, IK0MOZ,
IANA-93054, (I)

Introduction

The WS 48MkI was built by Emerson Radio & Phonograph during the period 1942 to 1944 and was used by the Canadian troupes during World War II. At the end of the war it was left by the allies to the Italian Army in large quantities where it was used as short range communication equipment up to 1955.

Around 1980 a lot of these sets appeared on the Italian surplus market and were immediately absorbed by collectors.

Today the WS 48 is no longer present in the dump stores but is however not considered as a rare set.

General description

The wireless set nr. 48 is housed in a ribbed steel case while the front of the case is closed by two

hinged metal flaps.

Transmitter, receiver, rod antenna and battery are all carried in the same case while the accessories (microphone, headphones, key, wire aerial) are packed in satchel. The set works in phone and CW and covers the frequency range from 6 to 9 MHz in one single band.

The transmitter contains 4 tubes. The signal frequency is generated by a master oscillator followed by a single power amplifier.

The antenna is coupled to the P.A. by aerial taps to a parallel tuned output circuit. This section has three tuning controls:

- master oscillator
- aerial tuning
- AE switch

The receiver employs 6 tubes in a superheterodyne circuit with an RF amplifier and BFO stages. Frequency coverage is similar to that of the transmitter with an I.F. of 455 kHz with a bandwidth of 17 kHz at -10 dB.

Power for the set is drawn from dry batteries or a hand generator type 10 Watts (Mark II).

The requirements are:

low voltage = 3 Volts (filament) with:

-0.32 Amp in TX phone

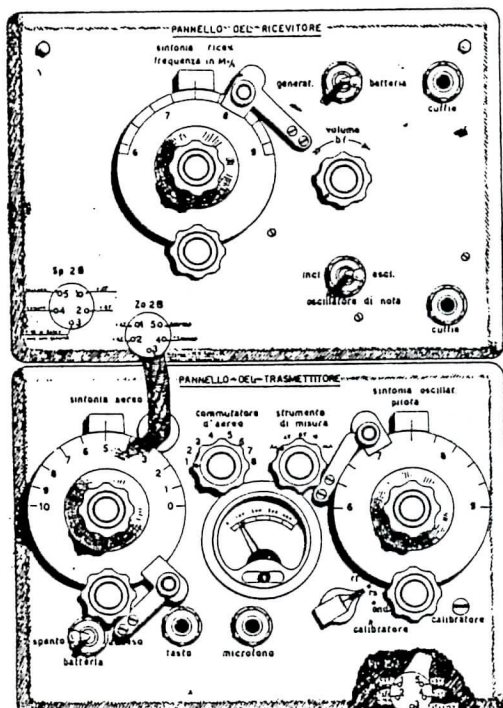
-0.25 Amp in TX CW

-0.15 Amp in RX

high voltage = 162 Volts (150 + 12; 12 Volts for relay)

Performance of the WS48 is greatly influenced by the antenna system used. The possible antennasystems are: rod antenna, groundantenna and end-fed horizontal wire.

Front view
WS-48, Italian
version.
Panels are
painted in
light grey
and with
Italian panel
markings.



The last mentioned set-up is recommended while the set has a maximum range.

My '48 story

Five years ago I bought two of these sets from a friend of mine. Both were fully equipped including a box of spares and several tubes. The appearance was good and internally the general condition seemed good as well.

It was my intention to use this set, if possible, on the amateur bands so I started to make some tests on 40 m. My doubts mainly concentrated on the receiver because the technical characteristics did not. In order to save time, instead of building an AC power supply I arranged a homebrew battery package supplying all the necessary voltages. Then the set was ready for some tests to evaluate its real possibilities for use on 40 m.

Tests and results

Test #1: Rod antenna (6 elements) Difficulties in tuning and small useful section of the band, low

sensitivity, with little practice you can work many local CW stations.

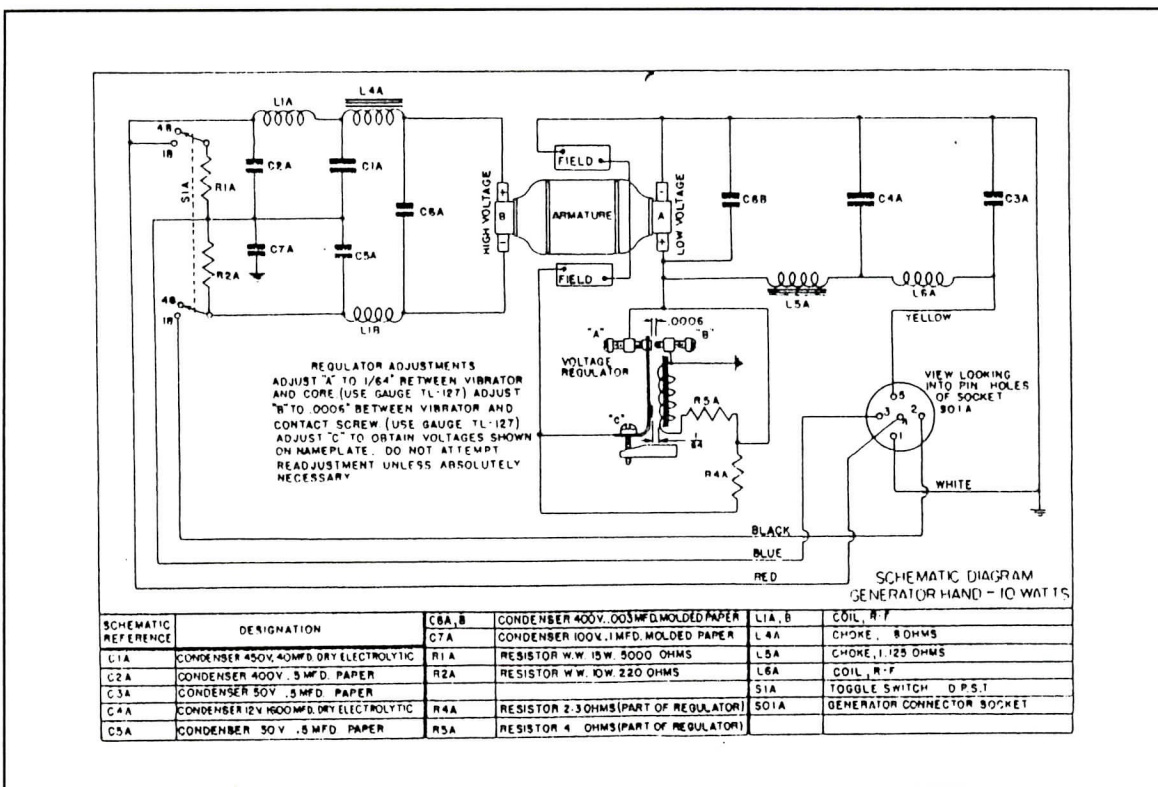
Test #2: Wire antenna

Five meters of wire out of the window gave the same tuning problems as with test no. 1. Sensitivity seems improved, it is possible to receive French and German stations in Italy, with the volume level turned to minimum it is also possible to receive SSB stations.

Test #3: Inverted V antenna

With this antenna (half wave for 40 meters) the receiver is completely "upset", it is not possible to make a net, incoming signals are bigger than the BFO injection. Replacement of the BFO tube did not give any improvement.

The TX section gave no problems in all situations described above. The antenna tuning was easy and fast, the quality of the signal in AM and CW was monitored by a receiver at 15 meters distance seemed good. After this the final test can only be an attempt to make a



Generator, Hand, 10 Watts, Mark II, Schematic diagram



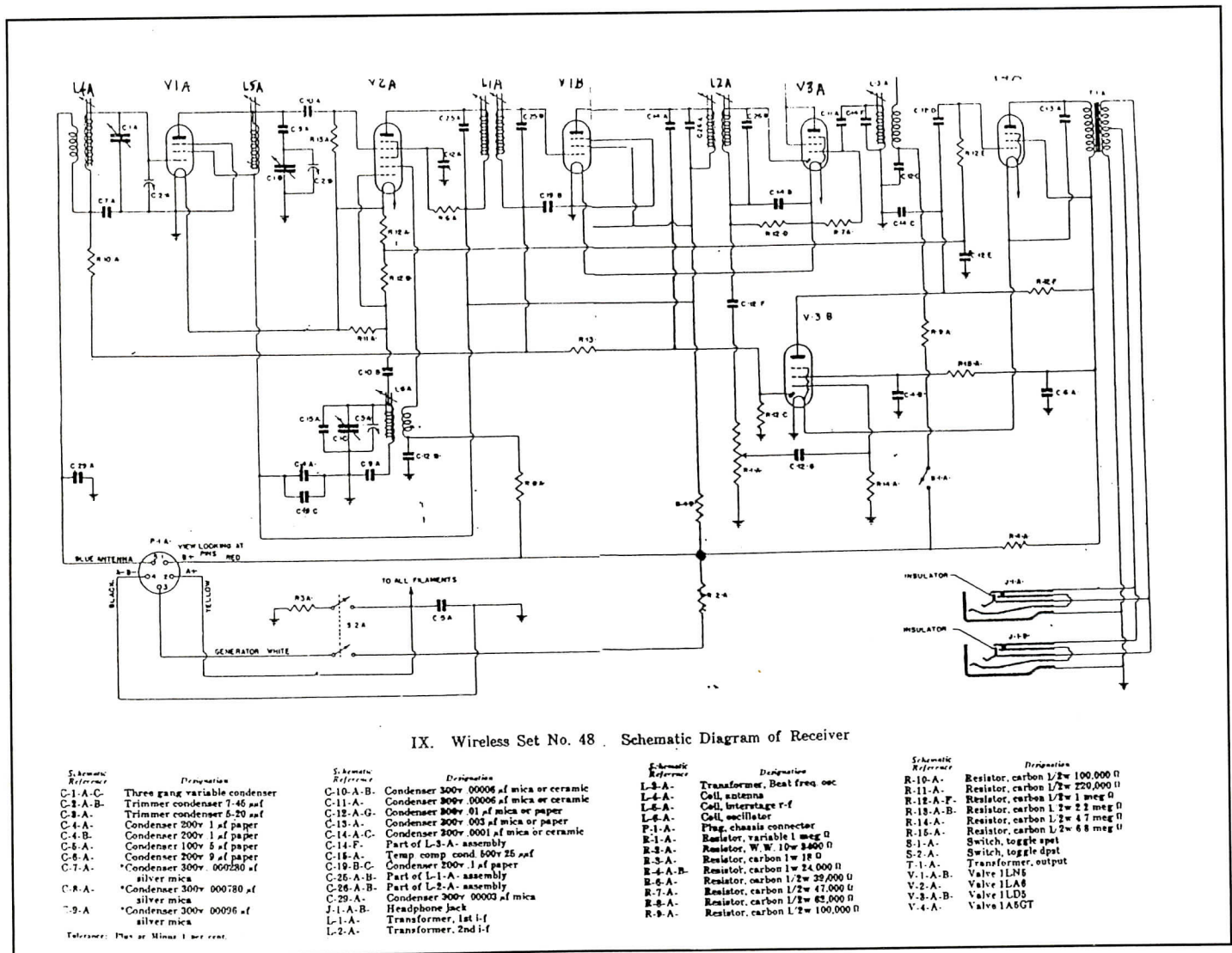
Mario field-operating his WS-48 during the summer holiday in 1992.

real QSO. To solve the receiver overload problem I decided to use two different antennas. An inverted V antenna for the transmitter and a 5 meter wire for the receiver. To minimize the pro-

blems of the set I have chosen a working day starting at at around 11 am when the propagation is short and the only stations audible in Rome are Italians.

When I found a station calling CQ, I tuned the "NET" and then called. Immediately the station replied, but his comments were: signal strength good, but tone very poor (Russian style). I explained my working conditions and made a QSO for 10 minutes.

Later I tried to understand the reason for the poor tone and realized that the TX/REC switch operates the filament of the transmitter tubes and thus 2 or 3 seconds are necessary for warming up the tubes. If you push the key during

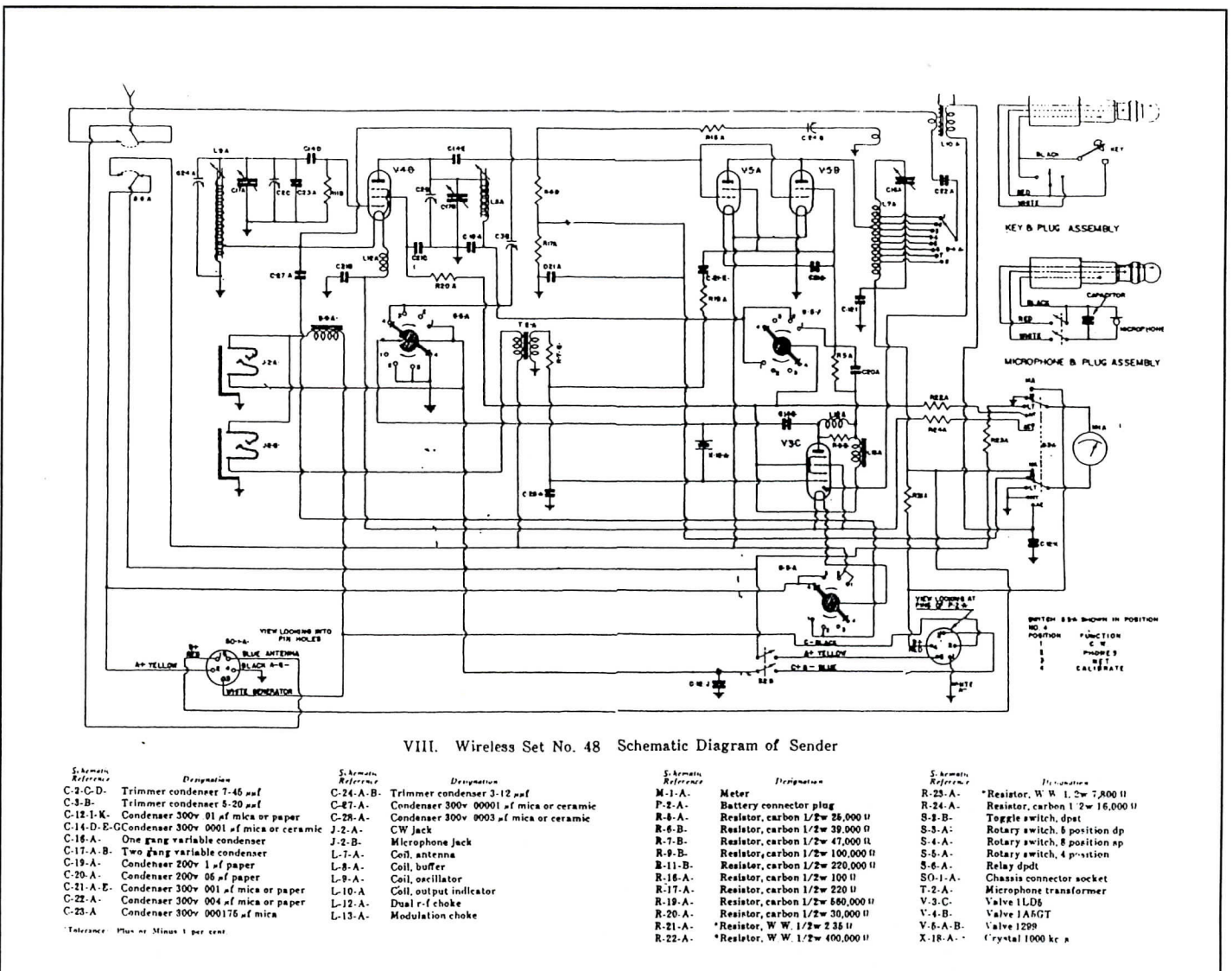


that time the signal is very bad. After this first contact I made hundreds of QSOs with this set, sometimes using the receiver of my FT277 in addition when the band was extremely crowded. In field operation I mainly used the double antenna setup.

Later, to enlarge the 40 m section, I put a 47 pF capacitor (one for each section) in parallel to the variable tuning capacitor with the result that 7 MHz is close to the beginning of the dial and the useful section is more than doubled. Of course the selectivity problem remained but now it is easier to tune.

Of course I am aware that today this set is not "state of the art" for working on the HAM bands, but I

think that with this kind of operation it is more challenging to receive a 59 than with a 4000 Watts station and a 6 element beam.

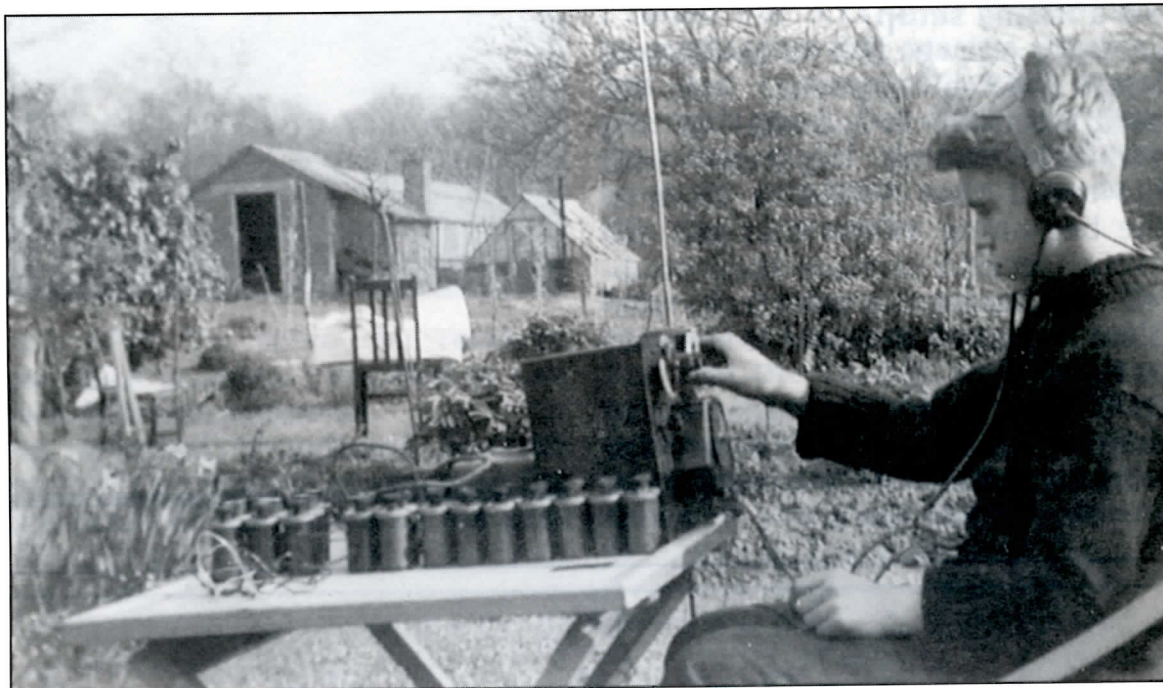


Larkspur radios never die...

By Tony Helm, G4BCX, IANA-93103,(UK)

use them, they were a pain in the neck in many cases. When I was a

Tony at the age of about 15. Experimenting with a R-1114 battery set receiver in the garden of his grandmother's house. For every freq. range two coils were needed. Coils can be seen next to the set, nearest to the camera.



This article is an excerpt from a long letter of the IANA-member Tony Helm to the editor.

And now for the subject of Larkspur radios. I know that they are very interesting to collectors, but to British soldiers who had to

sapper (pioneer) in a heavy bridge-building squadron, I used to carry an A-41 with the MSO-transport companies who camed the bridging sections. These were foreigners who were refeugees from communism, mainly Poles, Czechs and Hungarians. Then in the early 1960's, the A-41's were reliable. Except from the artillery, sappers were the biggest users of radio in the British army and we had many sets. When I first went to Germany, the Engineer Brigade rear link equipment in a Bedford QL-lorry (WW-II vehicle) was an AR-88 receiver with a 53-set sender. In the squadrons we had C-11 (really excellent piece of kit, but I did not work with this set myself), C-13 (too many components, not very good performer, dodgy C/O-relay), B-47 (excellent), C-42 (excellent), A-41 (OK) and A-40, wich was just a wast of metal and components. It was much more

Tony at the age of 26, repairing a R-1155 receiver. 'I was then a vehicle workshop bossat, would you belive, the army Appoentice College, Hamogate, where they taught radio-operators, technicians etc. Huge radioworks-hops with every piece of test-equipment you can think off.'



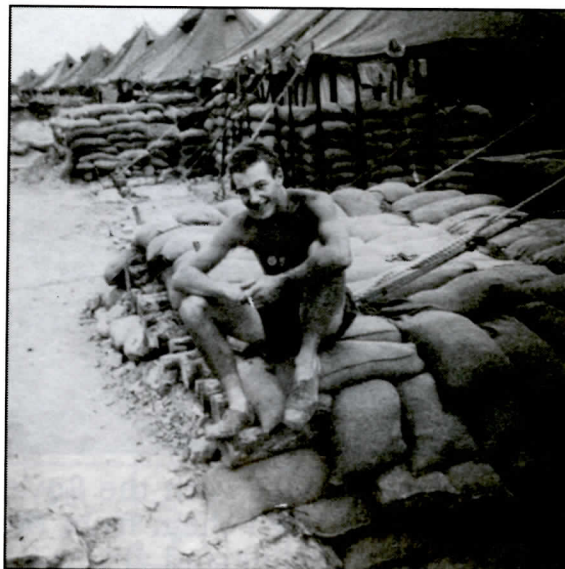
use and reliable to stand on top of a hill and wave flags. When there was a little terrorist war in the middle east (Aden, 1967) we had A-40 radios to keep in touch with our control in a camp which was in a flat place surrounded by hills (see drawing).

Guard points A to F had A-40 radios, control used a B-47 or C-42. These A-40's were so unreliable that we organized extra telephones and cables, buried the cables and had a perfect communications system. I have no doubt though, that radio amateurs will make A-40's work properly and get good results. Most soldiers do not treat radios with respect. If it will not work, kick it!

When the Larkspur was almost finished with, I remember walking miles with A-41, perhaps a group of eight on exercise for radios, and only about two of the sets would do both; send en receive. The rest only did one thing or nothing at all.

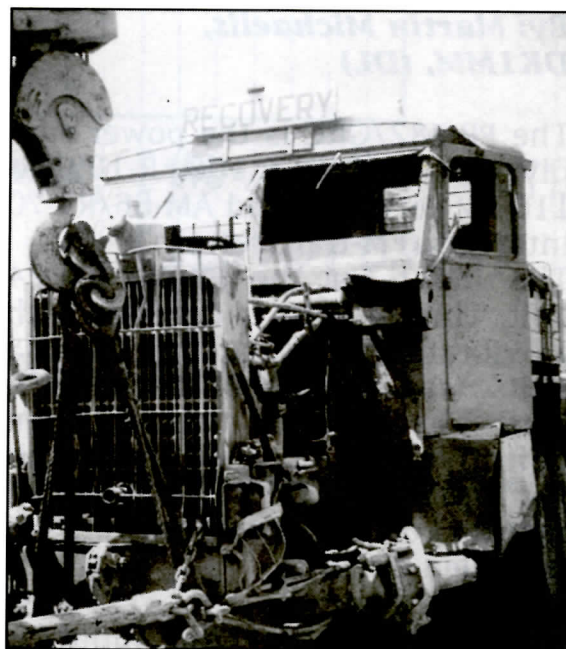
A friend of mine was told he was A-41 radio operator for an exercise. He parachuted into Germany, linked up with a German paratrooper company and his unit used their radio to keep in touch with their base. His A-41 did not receive a squeak and did not send one. He had to carry this dead set for at least two weeks. Not very good! When I have been with the German Army I only used their tank radios SEM-25 and 35.

The A-43 was another diabolical piece of equipment. My sister battalion in the middle 1970's was very heavily involved in air to ground work, and the PRC-344 had to be rushed into service very quickly for them because the A-43 was so unreliable. Crystal control wick was not controlled. A friend of mine repairs them for the cadets and he told me that once he had set them up, switched the set off and switch it on again later, the



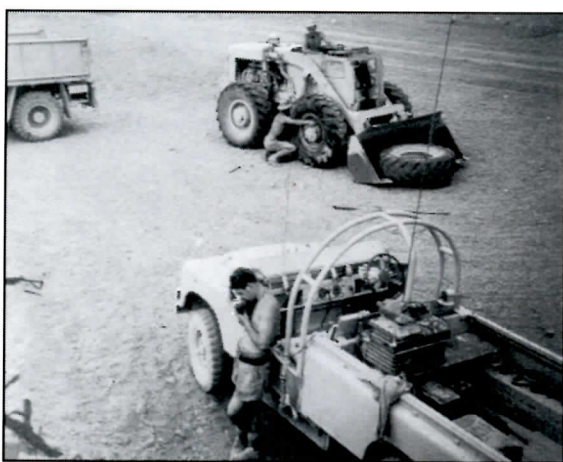
set came up on a different frequency.

When I was over to your home this summer (home of PA2GRC) you mentioned that your C-11 did not modulate very well. Your question about that has shaken a few heads here. Non has met the problem but the trouble is that military experience on the C-11 is very much in the past now, we've been using PRC-321 since about 1979, and technical records have faded. I was talking to another C-11 user a short while ago (ex-marine), he used them quite a bit on AM-voice and he doesn't remember any problem with them. Remembering



Aden 1967. Our camp in the Redfan mountains, north of Aden, base of the anti-terrorists operations and for building a 70 miles per hour taomac road trough the mountains. A firend of mine sits on the sandbags protecting us from bullets and bombs fired at us by the terrorists.

Aden, 1967. Typical damage done by the terrorists, using ex British Army WW-II Mark-5 anti-tankmines. All vehicles on the move outside the camp were escorted by anti-mine plated Landrovers equipped with C-42 radios.



Aden, 1967. Shovel loader breakdown out on the job. Note how the C-13radio in the Landrover is mounted back to front in order to make it possible to operate the set from the passengerseat. No persons were allowed in the back of the Landrover because that part was not anti-mine plated. Note also the special rollbar. The driver and passenger had 4-strapsex-parachute harnesses to hold in when the vehicle rolled on hitting a mine.

back to my service with the Royal Engineers, we used them from the Middle East to England on voice AM and around the Middle East and they didn't give any problems, except back to England. Not enough power and too much HF-electrical noise out there. We were issued with a D-11 to overcome the problem. On sept. 17th. I wrote a letter to the Royal Signals museum in Blandford asking them several questions about some sets. I also informed about the C-11 modulation. On oct. 21-ste they answerd my letter and I quote 'The local

REME Maintenance Advisory Group have checked their past records and have stated quite categorically that the C-11 (DSB) does not have a history of faults in the AM stages. The only fault that this set was known for was its tendency to overheat if on constant send i.e. working duplex on a long link as a sand in for a larger set.' On Remembrance Day in the Polish Forces Club I met an English radio operator, who with his team used to manpack C-11/R-210 up mountains in Hong Kong/New Territories with batteries etc. Some load.

Modifications on the PP-282/GRC PSU

**By: Martin Michaelis,
DK1MM, (DL)**

The PP-282/GRC is the power supply unit for the R-108, R-109, R-110 FM-receivers and AM-66/RT-70 intercom/FM-transceiver.

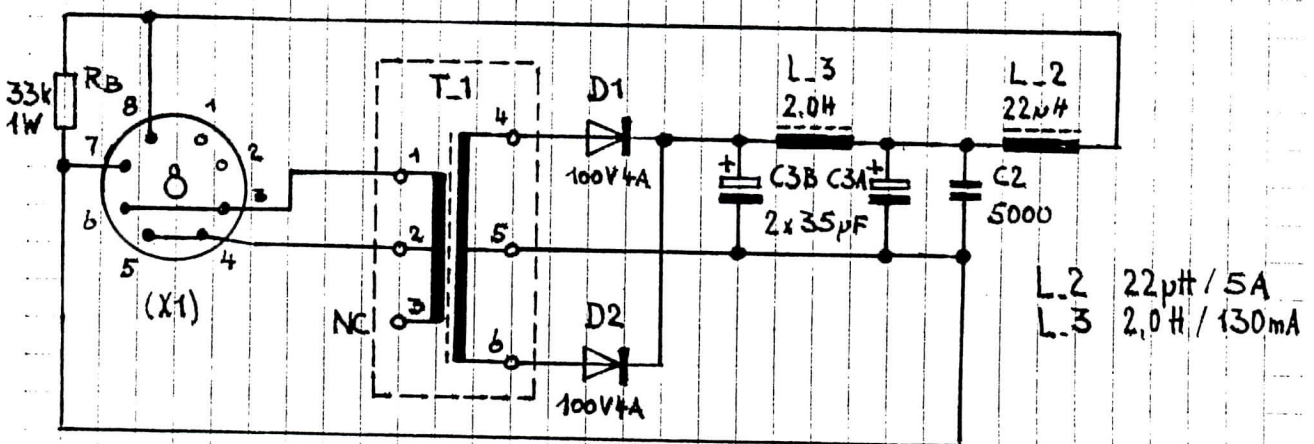
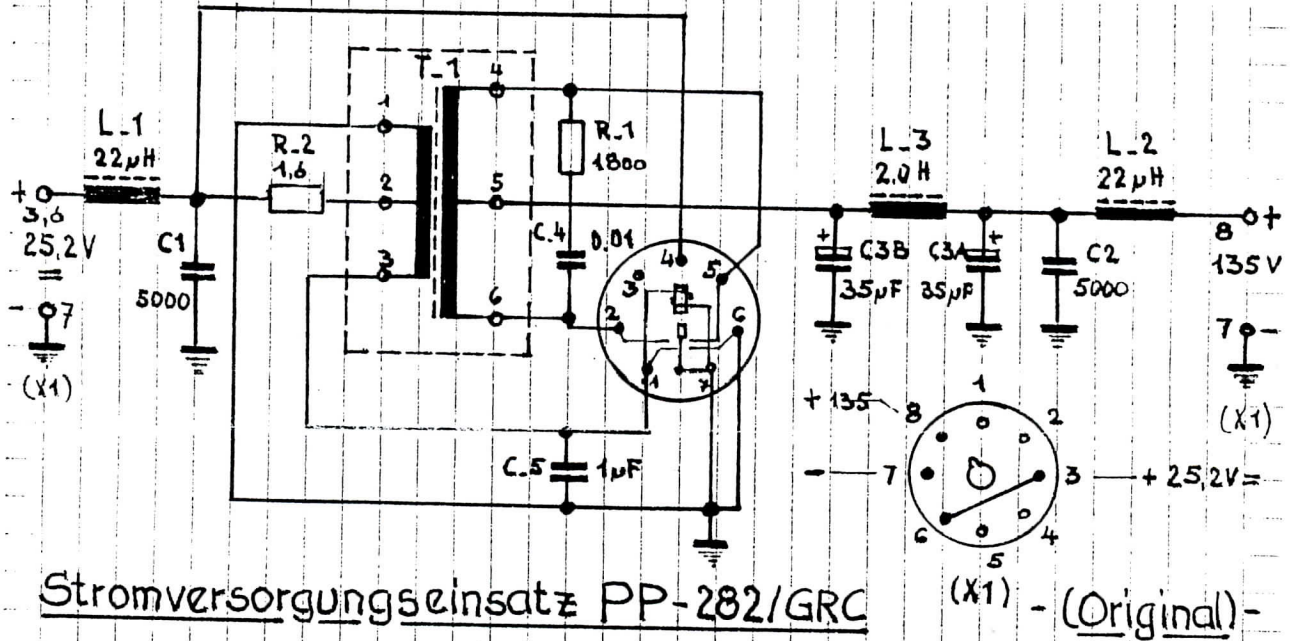
The input for the PP-282 is 24 Volt. This 24 Volts is covered with a vibrator type circuit to 135 Volts. (see drawing of original circuit) The vibrator unit is often defective so I modified the circuit for operation from 24 Volt AC instead of DC (see drawing of modified circuit).

After modification the input is

21...24 Volt / approx. 0,75 A. AC (at pin 5 and 6) and the output is 140 Volts/140 mA DC (at pin 7: -HT and pin 8: +HT).

The modified PP-282 works without any rimple. For several years I use (and enjoy) this powersupply for many surplus rigs.

Umrüsten PP-282/GRC auf Wechselstromspeisung 24V~



Ausgang: # 7: - UA; # 8: + UA; [140V / 140mA DC] [Erdfrei!].
Eingang: # 5 und # 6; [21,5V~ / 0,75A].

Geänderter Stromversorgungseinsatz PP-282 X / GRC

Bem: Anschluß 3 an T-1 = "NC" da Wicklung 2-3 gegen-
sinnig zu Wicklung 1-2.
Minuspol nicht an Gehäuse!

Modification Work Orders #8

door:
**Ruud van Lambalgen, PA0RVL,
IANA-93091,(NL)**

AM-modulatie op de KL/GRC 3035

Uit ontvangst rapporten in ons onvolprezen Angry-Nine Net blijkt dat de modulatie van de KL/GRC 3035 in originele staat aan de magere kant is.

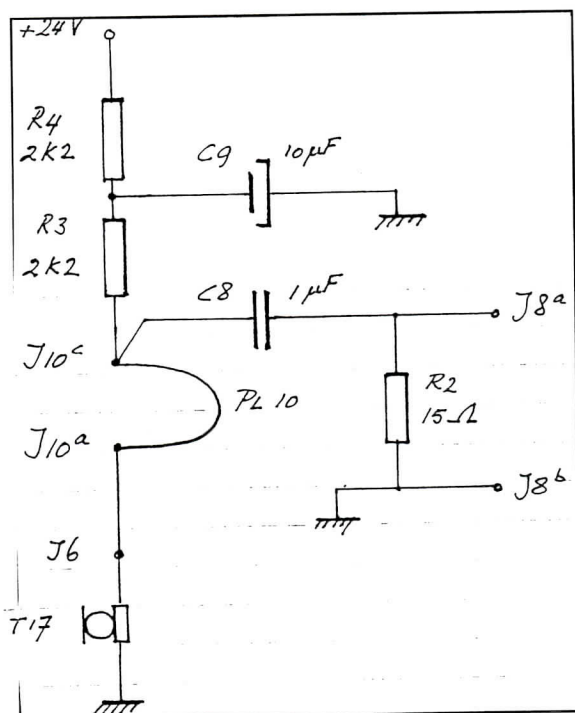
Bij door mij uitgevoerde metingen aan de zender bleek dat deze in orde is en voldoet aan de testseisen volgens TB-RA11-RD24.

Hierin geldt:

bij low power audio 1000 Hz	
6 mV modulatie diepte	50 %
60 mV	98 %

bij high power	
6 mV	70 %
60 mV	98 %

De harmonischen vervorming mag hierbij niet meer zijn dan 10%.



Figuur 1

J-3011

De conclusie is dan ook dat het modulatie probleem in de aansluit eenheid J-3011 moet worden gezocht. Helaas is hiervan geen schema beschikbaar. Er zat dus niets anders op dan de bedrading van deze aansluitkast te volgen om er achter te komen hoe een en ander in elkaar zit. (zie figuur 1. oude situatie)

De voorspanning op de microfoon loopt gezien vanaf de + 24 Volt zijde als volgt:

+ 24V, R4, R3, J10c-J10a rel-2, J6, microfoon, aarde. De condensator C9 dient voor extra afvlakking van de gelijkspanning.

De wisselspanning die ontstaat door de weerstandvariatie in de microfoon wordt uitgekoppeld via C8 naar J8a en gaat dan naar de zender. Op het punt (J8a) zit de weerstand R2 naar aarde als afsluiting. Alles bij elkaar vormt dit circuit een stevige spanningsdeler, ongeveer 15 keer bij 1000 Hz. Er blijft dus weinig over om de zender goed uit te sturen.

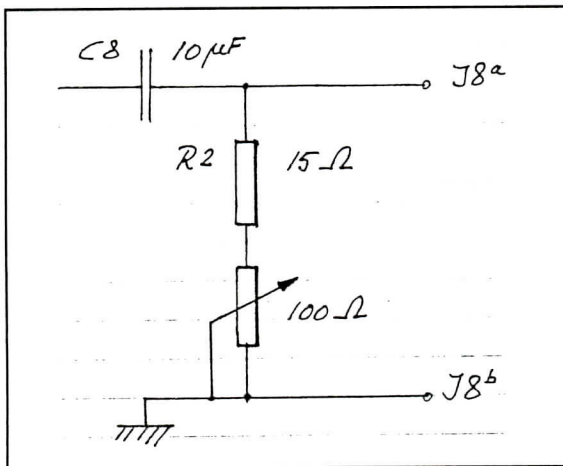
MWO #8

De modificatie bestaat uit het wijzigen van de waarde van C8 naar een waarde van 10 µF bipolar (*dus geen elco gebruiken*) met een werkspanning van 100 Volt en het opnemen van een instelpotmeter van 100 Ohm in serie met R2. (zie fig. 2. nieuwe situatie)

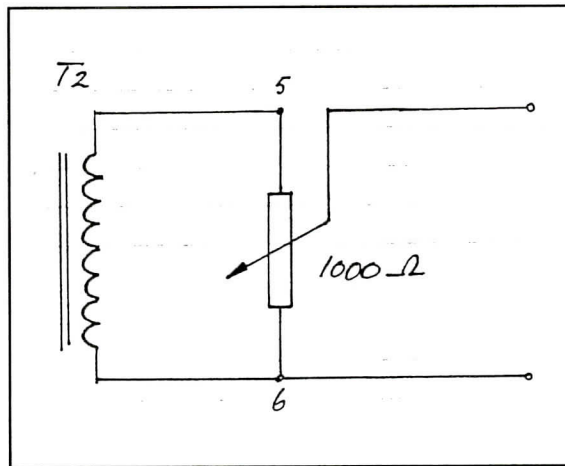
Side-tone

De side-tone is nu ook een stuk harder geworden; dit is te compenseren door in de zender een instelpotmeter op te nemen over de wikkeling van 5-6 van T2 op het audio chassis. (zie fig. 3)

De modulatie van de zender knapt van deze modificatie aanmerkelijk



Figuur 2



Figuur 3

op en in het net kreeg ik al reacties van een lid dat spijt heeft zijn

set te hebben opgeruimd vanwege de "slechte modulatie".

SNUFFELDUMP - GENNISSEN

Amsterdamsestraatweg 953, Utrecht tel: 030 - 445377

Het adres voor: winter/leger/base-ball jacks, flight jackets, body warmers, sokken, berg werkschoenen, handschoenen, wax-kleding, regenkleding, truien, bontpetten, mutsen, houthakkershempden, mag lite zaklantaarns, Zippo aanstekers, messen, luchtbusen, gereedschapkisten, aggregaten voor 12/24 en 220/380 Volt, Het adres in Utrecht voor radio-dumpapparatuur en onderdelen.

Verkoop en Verhuur van grote legertenten voor evenementen

Steeds wisselend aanbod, zolang de voorraad strekt. Voertuigantennesteun MP-50 Fl 40,- // SCR-625 mijndetectors, in originele kist Fl. 150,- // Deense SMB-dumpset, geheel compleet Fl. 495,- // Haspel DR-8 met veldtelefoonraad Fl. 25,- // Jaargangen electronicatijdschriften zoals Electuur, Radio Bulletin, ELO, UKW-Berichte, PTR, Electronica etc. etc. v.a. F 5,- tot F. 10,- /bundel (meestal een complete jaargang) // WO-II Engelse headset DRL-5 Fl 12,50 // Div. typen telemikes uitzoeken Fl 10,- // radioactiviteitsmeters, in zeer goede staat, compleet met tas en toebehoren. Werken op twee 1,5 Volt zaklantaarn batterijen. Twee types leverbaar: IM-3003 en IM-3004. Slechts Fl. 9,50/stuk // steeds wisselende voorraad originele manuals en TM's van voertuigen. va Fl 20,-

SNUFFELDUMP - GENNISSEN

Amsterdamsestraatweg 953, Utrecht tel: 030 - 445377

LM25XX-series voeding voor portable dumpapparatuur

door: Fred Marks, PAOMER,
IANA-93113,(NL)

LM25XX-serie

National Semiconductor heeft onlangs de LM25XX-serie op de markt gebracht. Met deze nieuwe serie IC's is het ontwerpen en bouwen van een voeding voor surplus batterij-sets aanzienlijk vereenvoudigt. Het IC bevat alle benodigde actieve componenten voor gebruik als schakelende voedingen en is in een standaard 5-polige TO220 behuizing ondergebracht. Er zijn twee uitvoeringen verkrijgbaar. De ene uitvoering geeft een regelbare (adjustable) uitgangsspanning en de andere uitvoering een vaste (fixed) uitgangsspanning. Deze IC's kunnen met een hoog rendement (80-90%) vrijwel elke gewenste uitgangsspanning maken van iedere ingangsspanning uit accu's, NiCad's of droge batterijen. Met dit IC kan men een enkelvoudige tot drievoudige uitgangsspanning creëren, zelfs met positief in plaats van negatief aan massa.

Men kan het ingangsspanningsbereik zodanig kiezen, dat de batterijen tot de laatste "zucht" kunnen worden ontladen met volledig behoud van de gewenste uitgangsspanning. De benodigde additionele componenten zijn op de vingers van een hand te tellen zodat de voeding weinig ruimte inneemt en er altijd wel een plaatsje te vinden is in het batterijcompartiment van de dumpset om de voeding en de batterijen in onder te brengen.

Het principe berust op een schakelendevoeding, naar keuze in de z.g. BUCK/BOOST of FLY-BACK

mode of combinaties hiervan. De gebruikte schakelfrequentie ligt rond de 50kHz; dus wel inblikken en goed ontkoppelen voor kortegolfsetjes die onder 5 MHz worden gebruikt (veel harmonischen door het niet-sinusvormige signaal).

Software

Het ontwerpen van een voeding met een LM25XX-serie IC wordt ondersteund door een gratis software programma dat op iedere standaard PC draait. Het programma geeft, nadat u uw gegevens hebt ingevoerd, het complete ontwerp inclusief een tekening van het schema en een lijst met componentwaarden.

Stelt u niet haalbare eisen (100V/1A), dan geeft de software dit aan.

De software is in de USA ontwikkeld waardoor de opgegeven componenten bijv. de benodigde storage choke's in Nederland niet altijd verkrijgbaar zijn. Dit probleem is op te lossen door in de software te kiezen voor 'N' bij de software vraag STANDARD VALUE Y/N. Men krijgt dan de waarde in uH en kan dan de spoel zelf wikkelen op een T68-26 ringkern. Altijd 26 kernmateriaal gebruiken. Dit materiaal is het meest geschikt. Eventueel mag wel een grotere kern worden toegepas).

Bij de software wordt een kopie van de inductance chart toegevoegd van AMIDON (t.b.v. de wikkelgegevens). De gebruikte zgn. FLYBACK diode moet altijd een Schottky of Fast Recovery diode zijn

Bij outputspanningen van meer dan 40 Volt wordt een trafo gebruikt i.p.v. een storage choke

(dit i.v.m. de maximale Vce van de schakeltransistor in de chip). Denk hierbij wel om de juiste draaddikte voor de spoel/trafo in relatie tot het vermogen.

Overigens moeten de elco's in de output lage ESR typen zijn (Equivalent Series Resistance). Dus geen tantaal elco's gebruiken ! In plaats van bijvoorbeeld 1 x 1000 uF kan men ook 4 x 250 uF toepassen met huis-tuin-en-keuken elco's.

Verkrijgbaar

Op de eerst volgende IANA-mee-ting (red. 20 februari 1994) zal ondergetekende met de software en een PC aanwezig zijn, zodat leden die een floppy meenemen een gratis kopie van de LM-25XX serie software kunnen krijgen.

Omdat voor ons gebruik de LM-2577TADJ het meest interessant is zal ondergetekende trachten deze via zijn werkgever (importeur NSC) te verkrijgen zodat IANA-leden die kunnen overnemen tegen inkoopprijs (ongv. Fl. 10,00 i.p.v. winkelwaarde Fl. 25,00).

Tevens zullen geschikte diodes, zoals bijvoorbeeld de SB 340 of de BYV 96 van G,) verkrijgbaar zijn (kwartjes werk.)

Ervaringen

In mijn QRP-transceiver 'Het Wiel' heb ik dit IC ook toegepast als voeding met een vaste uitgangsspanning van 15V. Zelfs citroenen met ingestoken elektrodes heb ik met succes als primaire spanningsbron gebruikt!

2OUTPUTFLYBACK CONVERTER

Circuit Parameters

Vinmin	4.00 V
Vinmax	6.00 V
Tamax	60.00 C
Tamin	0.00 C
Vout1	1.40 V
IImax1	0.30 A
IImin1	0.25 A
Diode1	Schottky
Vripple1	0.10 V
Vout2	103.00 V
IImax2	40.00 mA
IImin2	11.00 mA
Diode2	Schottky
Vripple2	1.03 V

Miscalculated information

Mode	Continuous
ESRmax1	46.68 mOhms
ESRmax2	8.24 Ohms
Lp leakage	980.00 nH
Peak switch current	2.83 A
Actual Vripple1	70.69 mV
Actual Vripple2	1.03 V
Crossover Freq	1.01 kHz
Phase margin	68.27 Deg

Component List

Cout1 : 680.00 uF	ESR: 33.00 mOhm
	Vmax: 100.00 V
	300JS681U100B: Cornell-Dubilier
Diode1 : 1.00 A	Vmax: 15.00 V
	MBR115P: Motorola
Cout2 : 3.64 uF	ESR: 8.24 Ohm
	Vmax: 124.00 V
Diode2 : 80.00 mA	Vmax: 379.52 V
Cin : 47.00 uF	Vmax: 9.00 V
Cin2 : 1.00 uF	Vmax: 9.00 V
Cc: 560.00 nF	
R1: 267.00 Ohm	Tolerance: 1.00 %
R2: 2.00 kOhm	Tolerance: 1.00 %
Rc: 1.10 kOhm	Tolerance: 5.00 %
U1:	LM2577T-ADJ : National Semiconductor
T1 : 2.00 Outputs	Lp: 49.00 uH
	N1: 0.29
	N2: 15.80
	Ipeak-primary: 3.40 A

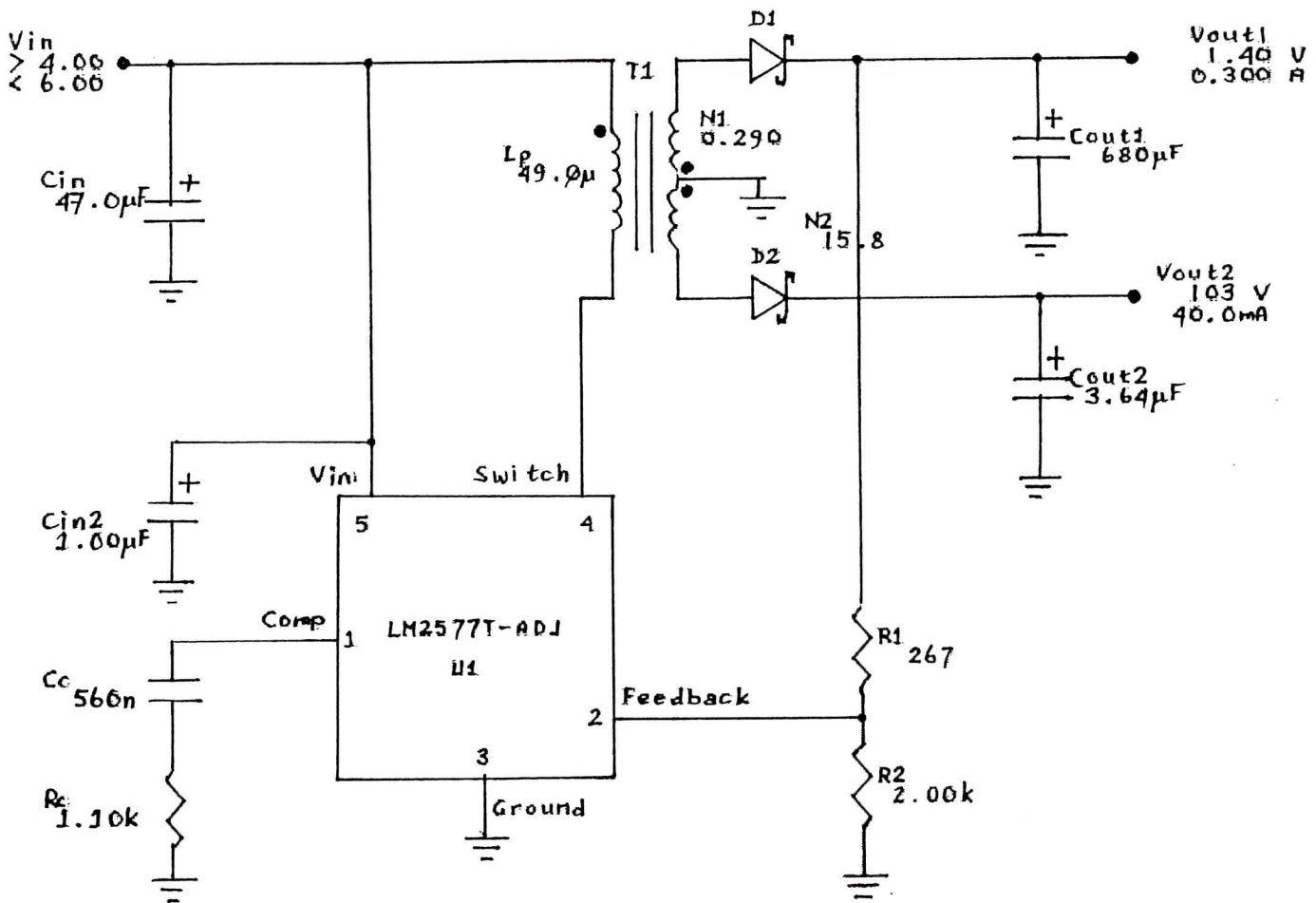
Bij Cor, PA0VYL waren we binnen een paar minuten klaar met het ontwerpen van een voeding voor de ER 40 en door het enthousiasme van Wim, PA3GFI heb ik besloten dit verhaal op papier te zetten voor publicatie in Q-Five.

Voorbeeld

Als illustratief voorbeeld het ontwerp van een voeding voor de BC-

611 Handy-Talky naar gegevens van PA0EZN.

Bij het ontwerpen van een voeding voor een dumpset onderzoekt men eerst welke beschikbare batterijen of accu's men in de set kwijt kan. In dit geval bleek een batterij (of accu) van 6 Volt de voorkeur te genieten.



Military surplus in France

**By: Albert Capdecemme,
F1DZZ, CORMMA/AROC, (Fr)**

Introduction

Radio communication equipment used by different parts of the French army (ground-air-sea-gendarmerie) is registered by the same "interweapon" nomenclature which is generally based on the frequency band for which it is used.

In France, due to a very strict administrative réglementation, only a special body is allowed to place retired equipment from the active service on the public market. This body is called the "Domaines" which is closely related to the Ministry of Finance.

In practise, when a civil or military administration wants to dump certain declassified or modified equipment (cars, transmitters, outfit etc) she is bound to offer the lot to the "Domaines" for public tender.

The sales are based on "lots" which comprise the same category of trade (which is mostly the case with cars). The tender is announced in public by the official bulletin of the "Domaines" which is only available by subscription. These precautions are taken to achieve a general regulation for all state sells and to guarantee equal rights and access to all interested persons. Rights are strictly respected but it is a theoretical advantage; the nature of the seller (the state) however caused by the economic dimension of the scale of these transactions.

Material

In France we are almost "ripped" of original US material which is

caused by our "inactive" engagement in the NATO organisation. We direct ourselves to the national production of radio equipment produced under licence, nevertheless indicated with legal proud.

Since some years the different forces in the east block were removed and several generations of legendary equipment e.g. AN/GRC-9, AN/PRC 8-9-10, RT 66-67-68, PRC-6, BC-659 etc. have appeared on the market. This equipment is mainly distributed by military surplus shops in different states of quality: used or absolutely new!

For the whole area we have four large retailers. ICP, LUBAN, MARGUERITE and SUD-AVENIR RADIO. They are very well informed about military radio and visit the sessions of the Domaines to buy equipment. These equipment is sold by the specialized surplus shops to the customers.

In these shops a model AN/PRC-6 or BC-659 is offered in excellent state for about 300 FF (\$ 50), for the other equipment quoted above FF 500 to FF 1000 is asked... Accessories and TM's are also available. As can be expected the special French versions are the most general types on our market. These versions are manufactured by our national industries e.g. THOMSON and TRT.

- The ER 56, very similar to the RT 67, only less flexible due to the separated control box.

- The ER 80 military radiotelephone used for light weight military vehicles operating in the 80 MHz band.

- TRPP 8 the local version of the AN/PRC 6 with switch for 6 frequencies (channels)

- AN/PRC 8-9-10/A Fr. with several small modifications of the standard US-versions.

Modification Work Orders #7

Door Jan M.A. van Oosterhout,
PA3CKX, IANA-93052,(NL)

Inleiding

In Q-Five, 1993, no 3, beschrijft Jan den Herder, PA2HRJ, een modificatie om de LV-80 synchroon met de GRC-3030 op "zenden" te zetten, bij het indrukken van de PTT-schakelaar op de microfoon. Het is een leuk ontwerp maar heeft het nadeel dat de LV-80 niet inschakelt in de stand telegrafie "RTGF".

De schakeling, die ik al enige tijd in gebruik heb, schakelt de LV-80 (en evenzo de RA-1) synchroon, galvanisch gescheiden met de GRC-3030, zowel in phone als in CW (full break-in).

Deze schakeling heeft verder het voordeel, dat er niets in de RT-3030 of in het aansluitkastje verandert hoeft te worden.

Men dient enkel een speciaal aansluitsnoertje te maken, dat aangesloten wordt op het chassisdeel

"uitgang" van het aansluitkastje. Dit is het chassisdeel waar normaal de plug met het bekende kettinkje op zit. Het andere deel van het snoertje wordt met een mono-plug aangesloten op de ingang "key" van de LV-80 (of RA-1).

Men kan voor het maken van het snoertje gebruik maken van de plug met het kettinkje, of, als men dit zonde vindt, zoeken in de dump naar een geschikte plug.

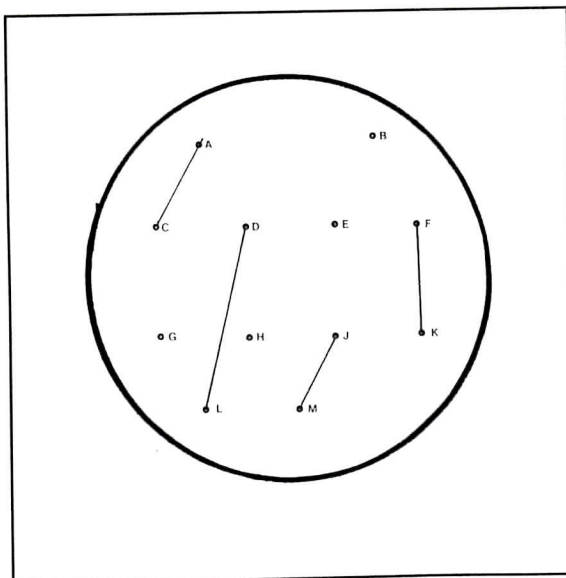
De bouw

Er wordt gebruik gemaakt van een miniatuur 24 volt relais met tenminste één maakcontact.

Dit relais wordt ondergebracht in de behuizing van de impedantie-transformator van de bekende HS-30 koptelefoon. We gaan er van uit, dat ieder zich zelf respecterend Angry Nine-lid wel een of meer niet functionerende impedantie-transformatoren heeft liggen. Zo niet, geen nood. In de dump zijn ze nog volop verkrijgbaar, al of niet werkend.

Het gaat ons nu om de behuizing, want na verwijdering van de transformator blijft er een mooi kamer-tje over, waarin, keurig op een printje gemonteerd, een miniatuurrelais kan worden ondergebracht. Neem voor dit relais liefst een gasdicht type, dat eveneens veelvuldig in de dump op sloopprinten wordt aangetroffen. (Nogmaals bedankt Wim, PA0VC)

De spoel van het relais wordt van spanning voorzien vanuit punt G van de aansluitplug (+24 volt) en de andere kant van de spoel wordt



De aansluit gegevens, zoals die op de achterzijde van de plug met het kettinkje te zien zijn.

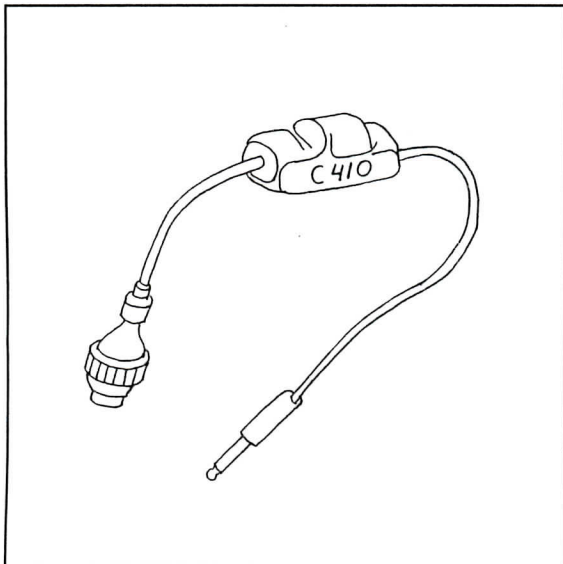
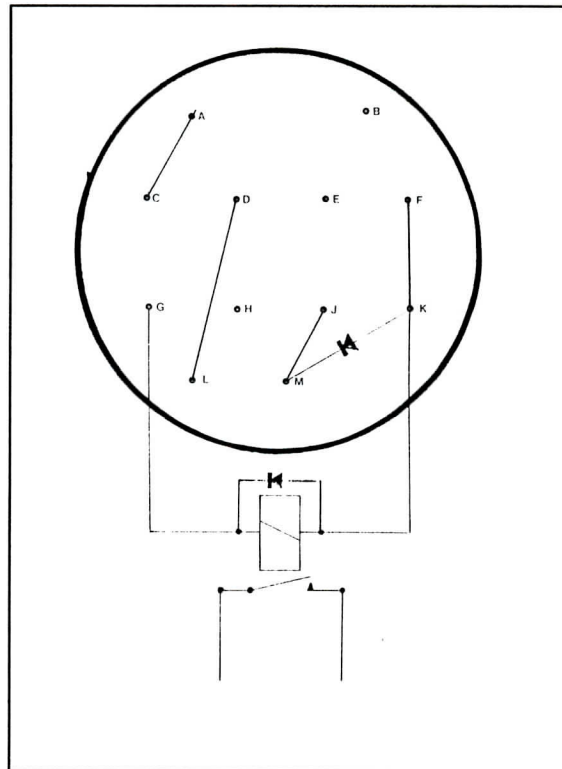


Fig. 3 toont een schets van het complete kabeltje.



Het geheel moet er nu uit zien als afgebeeld in fig. 2. Het maakcontact van het miniatur-relais wordt verbonden met een monoplug, die weer in de key-aansluiting van de LV-80 of RA-1 gaat.

aangesloten op punt F van de aansluitplug (ligt aan massa als de PTT-knop wordt ingedrukt). Vergeet niet een diode in omgekeerde richting over de spoel te plaatsen, "keurig op het printje", voor het opvangen van de inductiespanningen.

In de plug met het kettinkje zitten vier doorverbindingen (fig. 1), die men moet laten zitten.

Tussen doorverbinding F-K (massa als de PTT-schakelaar wordt ingeknepen) en doorverbinding J-M (massa als de seinsleutel wordt ingedrukt) komt een si-diode (1N4148), met de anode aan F-K. Kort verhitten bij het solderen! Deze diode zorgt er voor dat het relais bekrachtigd wordt in de stand telegrafie "RTGF" als de sleutel wordt ingedrukt.

Immers in deze stand ligt punt F niet meer aan aarde, zoals bij RTFN, maar punt M. Door de drempelspanning van de diode wordt in de stand RTFN voorkomen dat ook M aan de massa ligt, als de PTT-schakelaar wordt ingeknepen, waardoor de sidetoon dan door het AM-signaal heen te horen zou zijn. Met andere woorden, de diode blijft in deze stand gesperd.



ISRAEL, UNKNOWN SUPPLIER OF SURPLUS.

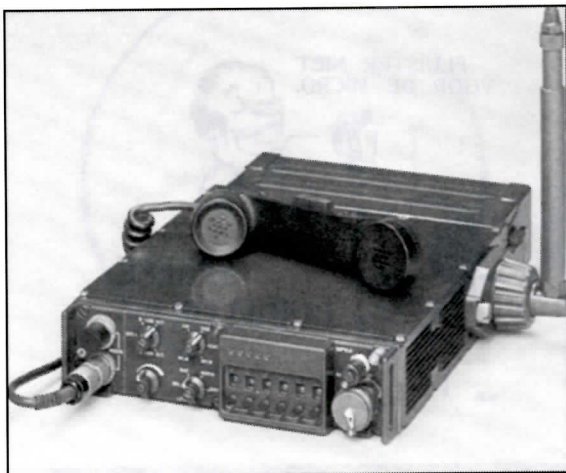
By Mark Roubos,
IANA-92024, (NL)

Introduction

Over four decas, the IDF (Israel Defense Forces) has fought four major wars (Independence 1948, Sinai 1956, the Six Days 1967 and Yom Kippur 1973), Two campaigns against terror organizations (Litani 1978, Peace for Galilee 1982) and thousands of actions against terrorists.

The same four decades have witnessed an unprecedented scientific and technological development in the art and weapons of war. The 1948 War of Independence was an amateurish scuffle fought over 15 months with the hardware and concepts of WW II, the three weeks of the 1973 Yom Kippur War were waged amid firepower, intensity and technology that not so long before were only to be found in the pages of science fiction.

The IDF and the Israel Military Industry know that new technologies are the key to achieve that slight edge that is, in conditions of numerical inferiority in battle, the difference between survival and extinction.



PRC-174
manpack
HF-SSB
radio set

Equipment

The IDF started their campaigns with WW-II British surplus. After that period they used the whole range of post-war developed US-equipment, by the time the 1973 Yom Kippur War started the IDF already used US manufactured VRC-12 radio's in their M60 tanks. Nowadays the main producer of communication equipment for the IDF is Tadiran. This firm has a total sales of 600 millions of US dollars and one of their six divisions develops and produces military communication equipment.

Tadiran started by US licence building of VHF VRC-12 and AN/PRC-77, they also build the HF AN/GRC-106.

Tadiran also constructed their own line of conventional HF and VHF radio's like the HF-700 series and special versions of the AN/PRC-77 like PRC-277 and PRC-377.

Their current production contains CNR 900 ECCM Frequency hop and the VHF 88 series, PRC-600 and the new HF 2000 series.

They also supply a wide range of communication security equipment, special configurations, remotecontrols and audio accessories.

Israel has also some small producers like the Motorola Military Electronics Division.

New communication equipment is exported world-wide to the US and other by Israel military trained and supported country's.

IDF surplus

Inside Israel there is no private surplus market because it is not allowed to Israeli citizen to buy or

sell military equipment. The IDF's military surplus is sold from Tel Aviv to US and other surplus buyers and to the governments of small country's.

You can find Israeli manufactured RT-524/VRC-12's on the German and US surplus market, small items like CVC helmets and cables are marked 'TAD' to originate their manufacturer.

For a few years you could find soviet equipment which was recovered from Egyptian and Syrian AFV's after combat.

Frequency range 2 - 30 Mhz.
Channels/spacing 28.000/100 Hz.
Modes USB,LSB,AM,NCW,WCW

Keying rate NCW 100 / WCW 300 wpm
Input voltage range 22 32 V. DC.
TXoutput SSB/AM 20 W.pep
TXoutput DATA/CW 20 W. average
Antenna 2,7 M. Whip / longwire/50 Ohm dipole.

RX sens, 0,7 micro V./10 dB SINAD
CW tone 1KHz.

Handset H-189/GR
Headset H-140B/U

Technical data
RT-936/
PRC-174



Israel Defense Forces M-113 APC armoured vehicle in full battle with VRC-12 radio installed inside



Israel Defense Forces M-151 jeep with VRC-12 radio

Radio-nets of the IANA

Introduction

Collection of historical radio equipment has recently become very popular. However, regular use of these "radios of the past" gives some owners additional satisfaction, especially as they encounter the unpredictable behaviour of their property.

Enthusiasts in our Association put a lot of effort and creativity to get their equipment working in anyway and mostly with modifications on old military equipment. Some members even prefer a total restauration in original state before they operate their "treasure".

This explains that during the average Network session a wide variety of equipment can be heard.

Just to give you an impression:

We meet an increasing number of users of the legendary WS-19 sets with or without the RF-amp. No.2 to boost the output power. Sometimes the well known Italian made Geloso transmitters can be heard communicating in AM with their Heathkit counterpart. Experiments are done with among others TSC-12, ARC-5, WS-62, WS-C-12 and T-1154/R-1155 sets. Two stations even use complete US-Army WW-II vintage SCR-399 stations (BC-610 TX and BC-342 RX) situated in the original shelter in their gardens. Two other regular participating stations use the WS-12/R-107 British wirelesssets with very good results.

Most of the participating stations however use the the famous AN/GRC-9. Very often the output of the GRC-9 is boosted by the original LV-80 or RA-1 amplifiers. Competing in popularity with the GRC-9 is the typically Dutch KL/GRC-3030 military rig or the

KL/GRC-3035, a Dutch army version of the British C-11/R-210 Larkspur HF-radio. Ofcourse also former "iron-curtain" equipment has appeared on the net such as the Russian R-104, R-130, SEG-15 (a) and SEG-100.

Often, during the Networks, many "hidden" secrets of these equipment can be observed such as the tone and volume of the AM-modulation. Often the background noise of the hard working dynamotors give the special flavour to their "warm" AM sound.

All these exciting sounds can be observed by listening (or even better participating) to the following IANA-radionets on which schedule we very strictly rely.

3707 KHz./AM

The main IANA-Network is on the air every sunday from 09:00 to 10:30 UTC on 80 meters. The modulation is AM although now and then CW-signals can be heard also from stations either to weak to use AM with succes or having problems with their modulation-stage of the rig. The frequency is about 3707 kHz. This was on januari 1992 for the first time on the air. Now, about two years later, every sunday over 25 stations tune their transmitters in and even more members tune their receivers to listen. Netleader is Wim, PA2GRC operating from the city of Utrecht. At first he used a GRC-9 with LV-80 power-amplifier, later replaced by an ERB-281 synthesized AM/SSB-set wich was in turn repalced for a short period by a Danish SMB-radioset followed by a KL/GRC-3030 with LV-80. This rig has been used for a long time and is only recently replaced by

an original Collins AN/GRC-19 transceiver pushing its power an inverted V-antenna.

3530 KHz./CW

For the CW-enthusiasts Piet, PA0CWF controls from the city of Bergen op Zoom the IANA CW-net every sunday morning.

This net is on the air between 08:15 and 9:15 h. UTC on the frequency 3530 kHz. Piet often works with his AN/GRC9 and LV80 with 80 Watts in an end fed longwire located in his backyard. Sometimes the uses his KL/GRC-3030 with LV-80.

When he is in a real nostalgic mood he operates his one of his WW-II vintage British sets like the WS-76 sender or the T-1154 RAF-bomber transmitter.

29,2 MHz./FM

Mostly in parallel to the 80 meters network, Frans PBOAKY controls from the city of Utrecht the 10-meter FM net on 29.200 kHz using the well-known RT-67 transceiver and a half wave vertical antenna.

3707KHz./AM-CW

Due to its popularity the main IANA-net on sundaymorning hardly offers the opportunity to emphasize the technical aspect of our hobby. Therefor a special IANA-testnet was raised.

It is on the air every first saturday of the month in the afternoon from 14:30 to 16:30 UTC on about 3707 kHz. Netcontrol is by Ton, PA0RTB from Almere (rig GRC-9 with AM-66 power amp) and Peter, PA0RLM (rig GRC-3030 with LV-80 power amp) from Driebergen both cities are more or less near the center of the country. The main purpose of the testnet is to give a common opportunity to tune and test military surplus equipment and discuss all kinds of technical matters. Most communication is in AM but ofcourse CW and LSB or

USB-signals from military-sets are also very welcome.

40-meters CW

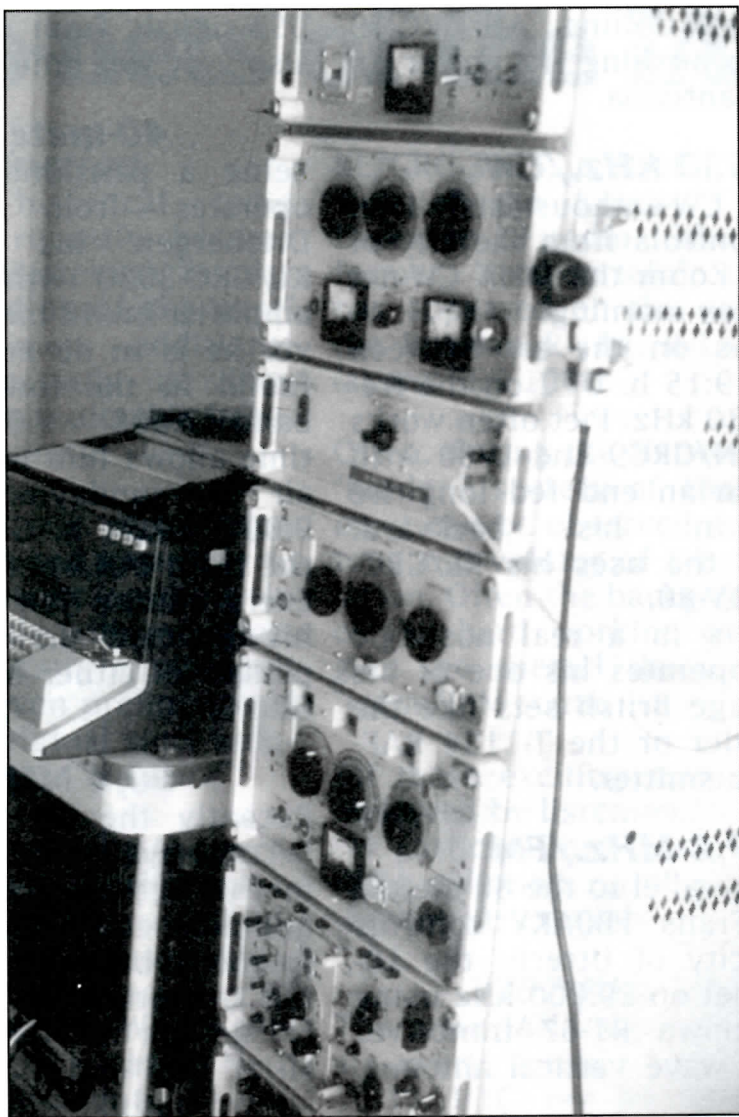
Being a pensioner, Jan, PA3FRY operates from the city of Driebergen his AN/GRC-9 or KL/GRC-3030 with a LV-80 power amplifier on 40-meters CW whenever he is in de mood. He can be found in the lower part of the band (7.005 - 7.010 KHz.) When time allows him he is also on the air on sundaymorning between 9.00 - 10.30 h. GMT, parrallel to the main IANA-net on 80- meters. Every station Jan works receives his QSL-card showing a full-color picture of either his GRC-9 or his GRC-3030.

50,4 MHz./FM

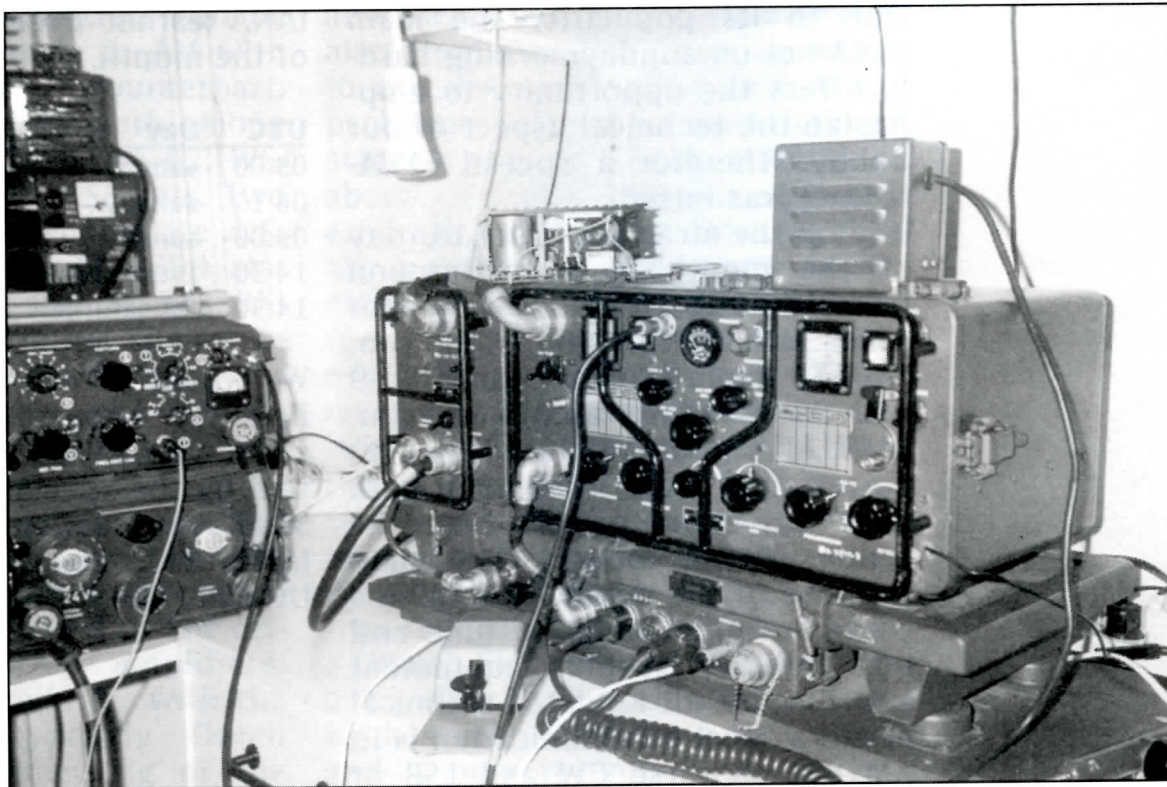
Recently the 50 MHz band has become available for all mode use in the Netherlands. As many ex-military equipment include this frequencyband we start in 1994 the operation of a country-wide FM net on the frequency of 50.4 MHz. Day and time are not yet known but experiments have started in parallel to the 80-meter IANA-testnet every first saturday of the month.

UTC	Day	Frequency	Mode
09:00	sunday	3707 kHz	AM
08:15	sunday	3530 kHz	CW
09:00	sunday	29200 kHz	FM
14:30	1stsaturday	3706 kHz	AM
14:30	1st saturday	50.4 MHz	FM

We would of be very grateful for listeners reports our transmissions which will of course be verified by the special IANA QSL-card. Send your listening reports to: IANA, P.O. Box 3170, 3502 GD, Utrecht, The Netherlands.



Russian Nikita (P-615) transceiver used by Henk, PA3ACC in Amsterdam to listen to the weekly IANA-CW net on 80-meters. On the background a Siemens T-100-B Teletype can be seen. Henk wrote to Q-Five about this set: "This set originates from a former East-German warship and incorporates about 40 electron-tubes. With every change of frequency about a dozen stages are retuned by a motorsystem. Input of the transmitter is about 250 Watts. The set can be used on AM, CW and SSB. Unfortunately the AM-mode does not function anymore but on CW it operates fine. If have heard quite a few stations with this set in the sundaymorning CW-net on 3530 KHz. Piet, PA0CWF keep up the good work!"



QSL-card of Jan, PA3FRY showing the KL/GRC-3030 radioset in his shack. On the left his LV-80 power amplifier can be seen. Jan operates mostly on 40-meters CW.

ERVARINGEN MET...

Door Jan Rijnders, PAOCHS,
IANA-92029, (NL)

De verbindingsopleiding op de SROKI

Het wapen der Infanterie

Even voorstellen: lichter 74-5. Plaats van handeling: eerste opleidingscompagnie van de Jan van Schaffelaarkazerne, de "SROKI", te Ermelo, de opleidingsschool voor reserve officieren en kader der Infanterie.

"Betrokkene" wordt hier geplaatst wegens zijn, naar het oordeel van de keuringsarts, uiterst solide onderstel en vervolgens ingedeeld bij de opleiding tot "sergeant-groepscommandant Infanterie Algemeen" (sgtinf alg). Weg droom van een gematste baan bij de Verbindingsdienst en dus ook geen kans op een telegrafie-opleiding.

Na onder de krijgstucht te zijn geplaatst bleek het cursusprogramma op de SROKI naast de opleiding tot "sgtinf alg" in vier delen uiteen te vallen:

1. de toppers ontvingen een opleiding tot sergeant-groepscommandant op de YP-408, een achtwielig gepantserd personeelsvoertuig van DAF.

2. de iets minder gelukkigen werden opgeleid tot groepscommandant op de AMX-PRI, eveneens een gepantserd personeelsvoertuig maar dan voorzien van rupstractie.

Dit voertuig was berucht wegens het onbedwingbare verlangen

van de motor om op de meest cruciale momenten tot spontane zelfontbranding over te gaan.

3. De mortieropleiding, waar voor-



Bevordering tot korporaal met de AN/PRC 10A op de man (nov. 74)

al sterke armspieren waren gewenst om de 120mm-granaat op te tillen en in de loop te laten zakken.

4. last but not least de verkenningsopleiding. Deze bood als grootste voordeel uiteindelijk uitzicht op een van rijkswege bekostigde rijopleiding op de Nekaf-jeep, met als slotapothecose een tegen een burgerrijbewijs inwisselbaar militairrijbewijs.

Van Heutz

Dan de opleiding groepscommandant Infanterie-algemeen: voorbestemd leiding te geven aan de "bloem der natie", lieden die elders binnen de krijgsmacht door hun te verwachten onaangepast gedrag minder geschikt werden geacht voor plaatsing bij meer beschaafde landmachtonderdelen. Voor deze ruwe bolstertjes werd plaatsing bij de Infanteriebeveiligingscompagnieën van het roemruchte Regiment Van Heutz (U weet wel: KNIL en klewang) als heilzaam voor lijf en geest beschouwd. Voor betrokkene was dus geen technische job weg-

gelegd maar een functie in het meest elementaire infanteriegedoe als maar mogelijk was. Elementair wil in dit geval zeggen: opwindende zaken als objectbewaking, gebiedsbeveiliging, het zuiveren van oorden etc. (en alle verplaatsingen uiteraard te voet alsof er nog geen voertuigen waren uitgevonden).

De heren militaire psychologen hadden overigens bedacht dat dienstplichtige kaderleden met een iets meer dan gemiddelde lengte een kalmerende invloed zouden kunnen hebben op hun toekomstige, wellicht een tikje primair reagerende, onderdanen. De gemiddelde lengte van de aspirant kaderleden bij deze opleiding bedroeg dan ook een meter negentig, met een gewichtsklasse die de 0.1 ton benaderde.

De opleiding tot "sgt-inf-alg":

De opleiding duurde een half jaar en in die tijd werden globaal de volgende onderwerpen behandeld:

1e deel

- velddienst (de "wapentechnische vorming")
- schietopleiding lichte wapens (FAL MAG UZI PTL LAW)
- eerste hulp (ZHKH)
- NBC
- verbindingen
- krijgstucht

2e deel

- omscholing naar de "oude wapens"
- Voortgezette schietopleiding
- omscholing naar de "oude verbindingsmiddelen"
- Organisatie en werkwijze van de compagnieën "Van Heutz"
- Velddienst

Voorts werd aandacht besteed aan leiderschapsvorming en instructiebekwaamheid. (Voorgaand overzicht is uiteraard bij lange na niet volledig)

Van de geluksvogels die waren voorbestemd bij "Van Heutz" te mogen dienen, werd in het tweede deel van de opleiding het persoonlijk wapen van moderne snit ingenomen en vervangen door



**De
schietbaan
op
Harskamp
(1974)**

een model dat, naar boze tongen beweerden, in 1944 bij Normandie aan land was gespoeld.

De schietopleiding werd vervolgens voortgezet met een scala van "oude" wapens, die overigens nog als de beste schoten.

Voor de geïnteresseerden onder ons volgt de lijst van deze "klassiekers":

Het geweer Garand, de jungle karabijn, de mitrailleur Bren, de terugstootloze vuurmond van 57 mm, de mortier van 2" en de raketwerper 3,5". Echte veteranen dus en tijdgenoten van verbindingsmiddelen zoals de 19 set, BC-611, BC-1306 etc.

De verbindingsopleiding

Dit brengt ons bij de verbindingsopleiding bij de SROKI, die was gericht op het kunnen gebruiken van de apparatuur: de opleiding tot "knoppenist" zoals dat werd genoemd.

Onze groepsinstructeur, een beroepssergeant-1, verzorgde de instructie. Tijdens het eerste deel van de opleiding werd begonnen met lijnverbindingen:

de veldtelefoon EE-8, het switchboard SB-18, een zeer eenvoudige veldcentrale bestaande uit een montageplaat met gaten die per abonnee kon worden voorzien van doorzichtige stekers waarin zich een neonlampje bevond. De wekgenerator van de aanvragende veldtelefoonabonnee liet het corresponderende neonlampje oplichten. De centralist plaatste vervolgens deze stekker op de stekker van de gewenste abonnee en zo werd de verbinding tot stand gebracht (een bijzonder grappig ding).

Voorts werden behandeld handelemicrofoon TS-10, veldtelefoonkabel WD-1/TT en het kabellegtoestel RL-39. *(Zoals u ziet stammen de meeste van de hierboven genoemde verbindingsmiddelen uit*

de 2e wereldoorlog)

Er werd "aanschouwelijk" onderwijs gegeven: de apparatuur werd gedemonstreerd en per koppel van twee man stap voor stap met de instructeur "meegedaan". De opgedane kennis werd door middel van een schriftelijke test gecontroleerd en uiteindelijk tijdens een velddiensttoefening in de praktijk gebracht.

Radio

De opleidingsmethodiek op het gebied van "radio" (*een zend-ontvanger, onverschillig van welk type, heet in het militaire vakjargon een "radio"*) hield gelijke tred met die van de wapenleer: eerst instructie op het gebied van de moderne radio's. Hiermee werden de Philips RT-3600 en de RT-3610 bedoeld, in 1974 hypermoderne apparaten, die voorzover mij bekend vanaf 1972/73 op grote schaal bij de K.L. instroomden.

De RT-3600 familie

De RT-3600 en de RT-3610 zijn volledig solid-state uitgevoerde draagbare zend/ontvangers die ook heden ten dage nog bij de krijgsmacht in gebruik zijn.

De 3600 werkt in twee bereiken van 20 tot 67 MHz, output 2 watt, 50 kHz raster en is FM gemoduleerd. De 3600-familie bestaat uit tal van apparaten waaronder een voertuigmounting, een 30 watt h.f.-eindversterker, een voertuigvoedingsunit etc.

De 3610 is kleiner van afmetingen en is duidelijk bestemd als manportable voor korte afstandscommunicatie. Het frequentiebereik is van 47 tot 56.950 MHz en evenals de 3600 FM gemoduleerd, in een 50 khz raster met een output van ongeveer 1 watt.

Tegelijk met de bedieningsinstructie van deze apparatuur werd aangevangen met lessen in de zgn. radiotelefonieprocedure.

Genoemde procedure, eigenlijk kunnen we beter spreken van een drill, was bedoeld om een mondeling bericht met behulp van een standaardmethode via lijn en "radio" kort en bondig te verzenden.

Onder leiding van de groepsinstructeur werd droog geoefend in het verzenden van berichten die meestal betrekking hadden op fictieve waarnemingen van Warschaupakt voertuigen.

Als voldoende droog was geoefend werd op het kazerneterrein de RT-3610 ingezet om de training meer realistisch te doen lijken. Ten slotte volgden kaartlees oefeningen te voet en per jeep (uitgerust met een RT-3600 en een 30 watt eindversterker) om volledig vertrouwd te raken met zowel de apparatuur als de procedures.

Zover ik mij kan herinneren voldeden de RT-3600 en de RT-3610 vrij goed. Omdat de oefeningen over het algemeen in dicht bebost terrein werden gehouden werden de van "rijkswege" opgegeven afstanden meestal niet gehaald. Een andere oorzaak werd gevormd door de gebruiker die zich vaak onvoldoende realiseerde dat een iets andere opstelling de ontvangst geweldig kan verbeteren.

Een groot tactisch voordeel van de 3600-serie was de digitale frequentie-instelling, in een tijd waarin de RT-67-familie weliswaar op zijn retour was maar nog algemeen werd ingezet.

Afgesproken frequentiewisselingen konden zonder poespas worden doorgevoerd. Een letterlijk in het oog springend voordeel van de 3600 compleet met eindversterker etc. was het feit dat het geheel zo weinig ruimte in nam dat in een Nekaf-jeep net voldoende ruimte overbleef voor een vierkoppige bemanning.

Bij de draagbare uitvoering veroorzaakten de nicad-accu's enige

problemen: door ondeskundigheid niet voldoende geladen, zeer veel gebruikt en dus snel leeg.

De 3600 was in elk geval bijzonder populair vanwege zijn frequentiebereik: daarbinnen lag tv kanaal 4, dus muziek in de tent! Tot groot enthousiasme van de Marechaussee probeerden stoute jongetjes uit wat het zenden op kanaal 4 voor effect teweeg zou brengen op de tv-ontvangst. (Uiteraard met een vermogen van 30 watt!)

Na enige negatieve publicaties hierover in de pers werd iedereen met hel en verdoemenis bedreigd indien hij met opzet de ontvangst van kanaal-4 zou storen.

De AN/PRC-10A

Het tweede deel van de opleiding werd de RT-3600 serie ingewisseld tegen de AN/PRC-10A, volgens het handboek een "lichte, FM gemoduleerde zend-ontvanger" met een output van 0,9 watt en een frequentiebereik tussen 38.0 en 54.9 MHz. Gewicht 12 kilo. Dat was even slikken: geen digitale frequentie-instelling dus calibreren, buizen dus fikse anodeblokken, kortom een tamelijk groot en zwaar apparaat. Door nieuwsgierigheid gedreven heb ik uiteraard onmiddellijk na ontvangst van de 10A's een set geopend. De eerste indruk: het is een (fraai) geminiaturiseerd neefje van de BC-1000.

De mechanische opbouw

De 10A is gebouwd voor massaproductie en snelle service: een simpel gezet en gestanst aluminium chassis, met daarop gemakkelijk toegankelijke componenten. Het onderhoud van de set werd eenvoudig gehouden door de toepassing van luchtdicht gesealde versterkertrappen voorzien van een 9-pens voet die snel waren te vervangen.

De kast en de frontplaat zijn gemaakt van een gietaluminiumlegering. In de batterijkast die onder het toestel kan worden geklemd hoorde een batterij van het type BA-279/u.

De opleiding

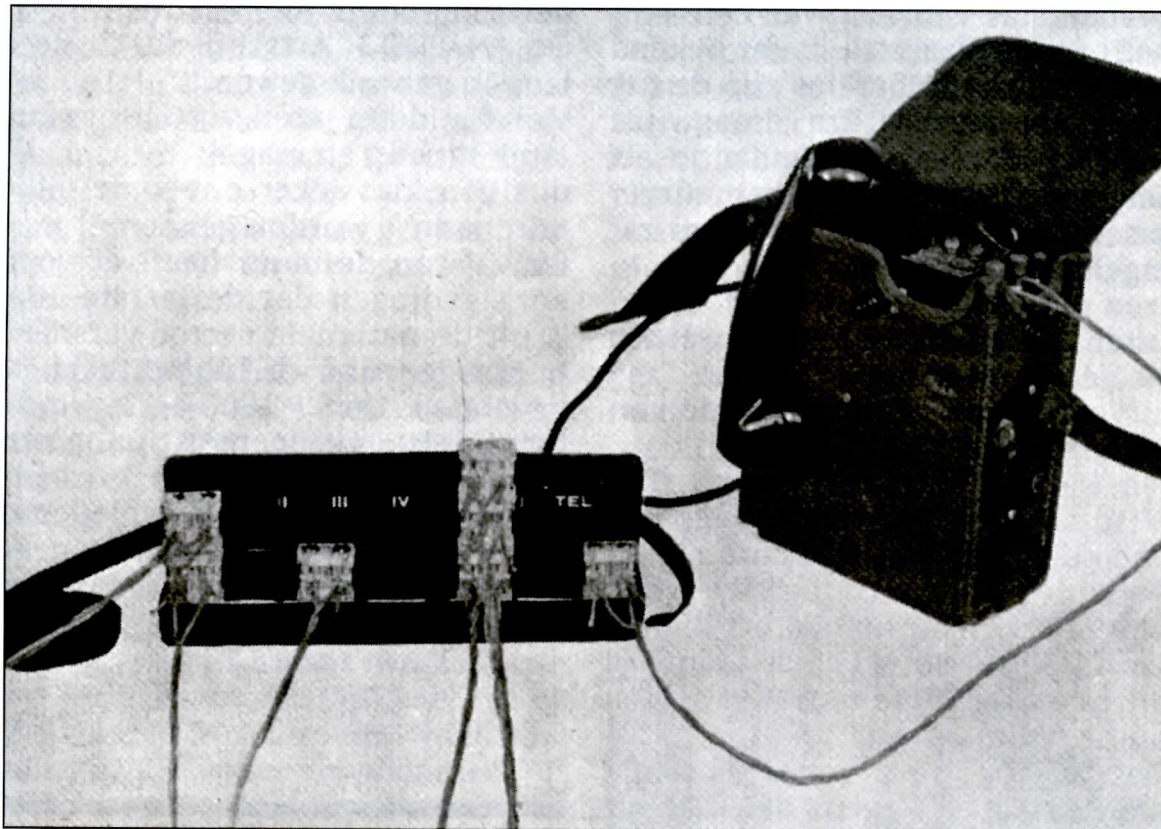
De analoge schaal aanduiding maakte het calibreren van de schaal noodzakelijk. Elke 2.15 Mhz bevindt zich een ijkpunt op de schaal, dat door middel van de aan/uit schakelaar kon worden bediend.

De calibratie, in het militaire vakjargon influiten genaamd, vormde het zwakste punt van de AN/PRC-10. De instructeurs wisten eigenlijk zelf niet precies wat ze deden, maar hamerden erop "het influiten" zorgvuldig uit te voeren omdat daarmee de verbinding op lange afstand viel of stond. De gemiddelde dienstplichtige was dat alles globaal worst en draaide naar harte lust aan de afstemknop en de calibratie om e.e.a. nog even na te regelen. Het voorafgaande

gekoppeld aan de kwaliteit van de batterijen bezorgde de 10A niet een echt goede naam. In de hitte van de strijd vergat de gebruiker tijdens het zenden vaak ook nog enige seconden te wachten om de gloeidraad van zendbuis op te laten warmen en de oscillator te laten locken. Het eerste deel van het bericht werd dientengevolge natuurlijk niet uitgezonden.

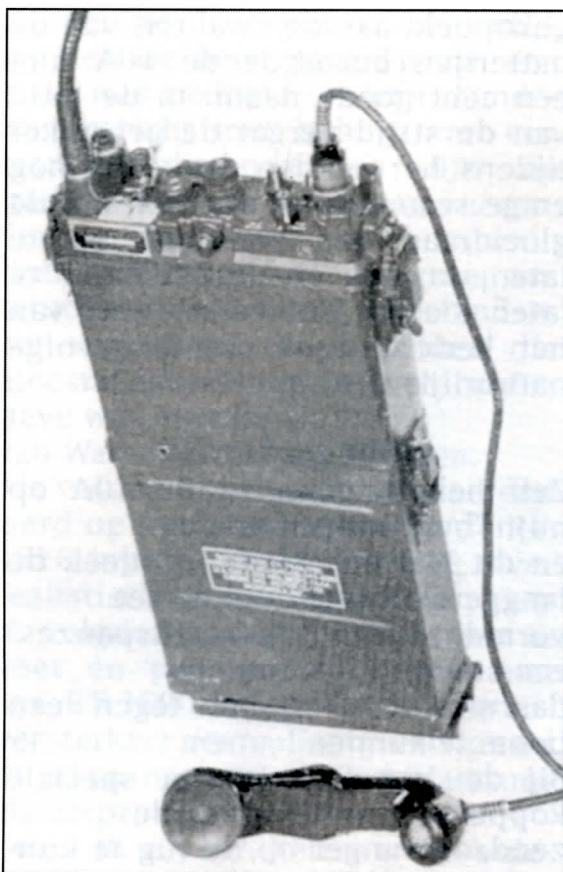
Het gebruik

Zelf heb ik geregeld de 10A op mijn "bult" mogen dragen en dit had een klein voordeel: de langgerekte vorm van de set vormde tijdens "gevechtspauzes" een stevige rugsteun om daarmee comfortabel tegen een boom te kunnen leunen. Bij de 10A hoorde een speciale koppel met webbing om de zend/ontvanger op de rug te kunnen dragen. Het gewicht van het apparaat was echter zodanig dat tijdens verplaatsingen de set begon "af te zakken" en de koppel zo ongeveer onder je armen zat in plaats van rond je



**Veldtelefoon-
centrale
SB-18/GT**

**Radio-
installatie
AN/PRC-10(A)**



middel. Na een stevige mars met een 10A op je rug was rugpijn een standaard gegeven. De set kon ook op de buik worden gedragen, waarbij de zgn. dekenrol bestaande uit de gevechtstas voorzien van een tenthelm en de slaapzak, beter bekend onder de naam "berelul", op de rug werd vervoerd. Deze draagwijze was erg onplezierig omdat je als een soort wandelende hamburger tussen de 10A en de dekenrol zat ingeklemd.

Later tijdens de opleiding werden we geoefend in het uitvoeren van gemotoriseerde verkenningen in YA 126's (de Daf-1-tonner). De canvas huid werd daartoe verwijderd en de voorruit neergeklapt. Daarop werd houten plank uit de laadruimte bevestigd die op zijn beurt diende als ondergrond voor de door de bijrijder bediende mitrailleur Bren op de voorsteunen. De PRC-10A werd vervolgens met mantelriemen tegen het achter-

schot vastgesnoerd. Compleet met de zwaar gecamoufleerde 10 koppige bemanning zag het er allemaal tamelijk krijgshaftig uit, maar ik kan U verzekeren dat het een frisse bedoening was.

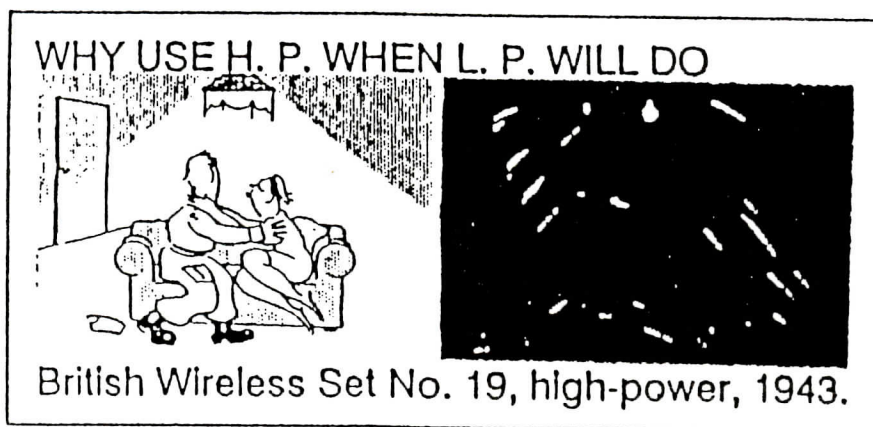
Het snel uitstijgen, dwz vanaf de zijkant van het voertuig springen, was met een 10A op je rug tezamen met de rest van de uitrusting een interessante bezigheid die je onmiddellijk van koude voeten afhielp.

Antennes

Bij de uitrusting hoorde een lange antenne van ongeveer 3 meter en een korte van ongeveer 1 meter lengte. De lange antenne mocht uitsluitend worden geplaatst tijdens stops.

De resultaten met deze antenne vielen in de praktijk tegen: een afstandsbereik van acht kilometer, zoals vermeld in het instructieboekje, hebben we daarmee nooit gehaald. Over het algemeen werd de korte antenne gebruikt, waarbij afhankelijk van het terrein en de conditie van de batterijen afstanden van ongeveer 2 km overbruggen (niet om te juichen dus). De AN/PRC-10A is bij de KL heel lang in gebruik geweest: vanaf midden jaren vijftig tot eind jaren tachtig en mag dus een klassieker onder de militaire radio's worden genoemd.

De val van de muur heeft er voor zorg gedragen dat de laatste 10A's uit de nationale sector versneld hun weg naar de dump hebben gevonden. De RT-3600 serie wordt inmiddels eveneens op grote schaal afgestoten en treedt zodoende ook toe tot de gelederen der veteranen, zodat malloten er nostalgische verhalen over kunnen schrijven !



WIRELESS SETS No. 9, No. 109 and No. 52

By *Louis Meulstee*,
PAOPCR, IANA-93046, (NL)

Summary

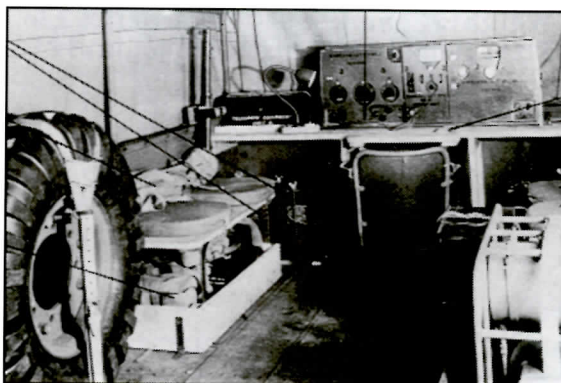
The evolution of the British Wireless Set No. 9 to the very successful Canadian Wireless Set No. 52 is shown in this technical and historical treatise. Although developed as a tank set, with virtually no weight limits (being set-up in a tank turret as a part counter balance of the gun), its size limited its use in smaller tanks only. It was later only used as general purpose vehicle (truck) station and ground station.

Historical development

Neither the "MA", "MB" and "MC" tank and "AFV" (armoured fighting vehicle) sets, developed during the late twenties, nor the Wireless Sets No.2 and 7 (designed early 1930's) were very successful.

In 1934, at a conference at the War Office, specifications were drawn up for a new tank radio-set, to be designated Wireless Set No.9. The design, a further development of Wireless Sets No.2 and No.7 with a

large number of improvements, was put in hand at SEE (Signals Experimental Establishment) Two experimental shop models were made and tried in July 1935. The design proved satisfactory and an order for the manufacture of 250 sets as "ease of manufacture" was given to Messrs. Standard Telephones and Cables, Ltd. The first batch of 50 sets were tried in the summer of 1937, minor modifications were made to the second production lot of 200. Other modifications, which could not be incorporated to the sets being in production, were made to the next order of 700 sets. Additional changes were incorporated in later models.



Wireless Set No. 9 Mk1* mounted in a 30 cwt General Service Truck. (1940) Note the fitting of guard plates over the front panels of the three set units.

The 550 Watt Charging Set No.1 and Switchboard Charging are mounted in the rear off-side and normally used at a distance from the vehicle.

Production ceased in 1941, after a total of about 4000 sets were manufactured. Disadvantages of the No. 9 set were a restricted frequency range (which prevented long range working with sky waves at some times of the day), difficult netting procedure ^{*}), heavy, bulky and difficult to manufacture in quantities.

Together with the Wireless Set No. 11 it formed the backbone of short and medium range radio communication in the first years of World War 2. Notably in the Western Desert campaign the No. 9 and 11 sets proved their worth in the defeat of the Italian army in the winter of 1940/41. Through the war years the No. 9 set gave very good service and, despite its obsolete design, was known to be very reliable. It was eventually superseded by Wireless Set No.19.

^{*}) Netting is the tuning of a group

of stations to a common frequency, thus forming a network. "Automatic" netting was successfully tried with a modified No. 9 set in the 1930s. In this circuit the vfo of the receiver is also the master oscillator control for the transmitter. Therefore the transmitter frequency is automatically tuned to the receiver frequency.

The design of the No. 11 set and that of the No. 19 set were based on this principle. It provided a considerable improvement in communication and ease of operation.

General description:

Wireless Set No. 9 was developed for use in tanks and other armoured fighting vehicles. However, due to the unsuitability of the set for medium and small tanks, it was later primarily used as a general purpose vehicle station e.g. in Trucks, 15-cwt., 4-wheeled, Wireless, from which it could be

DATA SUMMARY

Purpose: Medium range communication for AFV and Divisional Signals, vehicle station in truck and ground station.

System: AM R/T, MCW and CW

Frequency Coverage: 1.875 - 5 MHz.

Receiver IF: 420 kHz.

Range: (miles)	Aerial	CW	MCW	RT
On the move	6' rod	15/20	10/12	8/10
Stationary/ground	6' rod	35	25	15

Type of aerial: Vertical rod, roof aerial and horizontal wire.

Power output: 10 watt CW, 5 watt R/T.

Power supply: 12 V, 125 Ah accumulator, feeding 80 watt rotary transformer 1100 V to transmitter and Anode Converter 200 V to both transmitter and receiver.

Power consumption: Receive 3.2 A, transmit 22 A.

Weight: Complete set on carrier 192 lb. Complete station 420 lb.

Size: Height 16", length 41", width 12".

Valves:	Transmitter	Receiver	
	Master oscillator AT20	RF amplifier	ARP3
	Power amplifier ATS70	Local oscillator	ARP3
	Modulator AT20	Mixer	ARP3
		IF amplifier (3x)	ARP3
		Detector/AVC	ARDD1
		Beat frequency osc.	ARP3
		AF amplifier	ARP3

extracted to be used as a ground station.

Mechanically and electrically the set showed good craftsmanship, but with the drawbacks of being very expensive and difficult to manufacture in large quantities. This was painfully realised at the start of World War 2 when large quantities of radio equipment were required.

The No. 9 set comprised three basic units, Receiver, Transmitter and Supply Unit, each unit built in an aluminium alloy framework and fitted with a detachable guard plate over the front panel.

The three units were mounted in a steel frame, "Wireless Set No. 9 Carrier No. 1", (units fitted side by side) or "Carrier No.2" (receiver mounted on top of the transmitter and supply unit). The carrier consisted of two parts, a mounting frame for the three units, supported by a rubber suspended cradle frame.

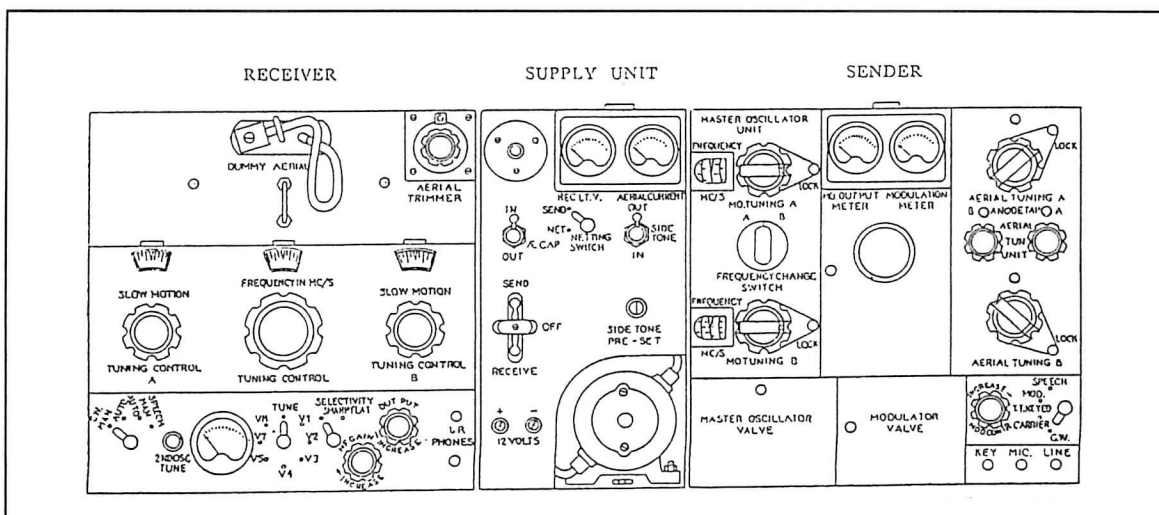
The connections between the various units were made by means of sockets on the back of each unit and plugs, attached and wired in the carrier. When using the units out of the carrier, connections between the transmitter, receiver and supply unit were made by Connector Plug No.5. The set operates on 12 volt DC. Normally, the power supply was provided by two "Batteries, secondary, porta-

ble, 6V, 100/125 Ah, Mk.IV", connected in series and charged from the vehicle generator. This arrangement allowed quick transformation from vehicle station to ground station.

The SUPPLY UNIT housed two rotary converters providing HT for transmitter and receiver. Two meters, mounted on top of the front panel of the supply unit allowed the measurement of LT voltage and RF aerial current. Also mounted on the supply unit were an Aerial socket and a large receive-off-transmit switch. A "Lamp, Operator, No.1" fitted in the socket of the 12 volt LT connector No.17.

The TRANSMITTER UNIT consisted of four detachable sub-units: master oscillator, RF power amplifier, aerial tuning and modulator, mounted in a frame. The valves were easily accessible from the front behind doors and the entire RF power amplifier unit slid on a tray with automatic disengagement of connectors. The transmitter had two identical master oscillator (MO) and aerial tuning circuits which could be set to different frequencies. A quick change from "A" to "B" frequency could thus be made by a two position switch (also called "flick" mechanism).

Controls of Wireless Set No. 9 Mk.I". This model, from the last batch produced, had a revised layout of the Supply Unit control panel and lacked the MO/Crystal switches and crystal tuning controls on the transmitter unit. The exclusion of crystal control in later models was justified by the excellent frequency stability of the transmitter master oscillator.



To prevent mistakes in tuning, the controls of the "A channel" were coloured red and those of the "B channel" blue. Additionally, an indication lamp of the channel in use lit up.

At the time when the set was developed it was thought that in a moving vehicle, crystal control was the only means by which a frequency could be stabilised. As it turned out that the frequency of the production models was sufficiently constant, it was decided to provide crystals on a very limited scale for calibration of control sets only.

The RECEIVER, built as a single unit, covered the frequency band from 1,875 to 5,000 kHz in one range. Tuning was accomplished by a special mechanical drive, providing the pre-selection of two frequencies or channels by means of two adjustable "click" positions on a "flick frequency" mechanism. When either click position was engaged, a special vernier fine tuning dial was brought into use and the appropriate vernier dial lighted up. The positions of the click mechanism were named "A" and "B" similar to the arrangement

in the transmitter. During normal tuning or searching the flick mechanism could be disengaged. A Dummy Aerial, for tuning and testing the transmitter without radiating, thus causing no interference or interception by the enemy, was mounted in the receiver unit.

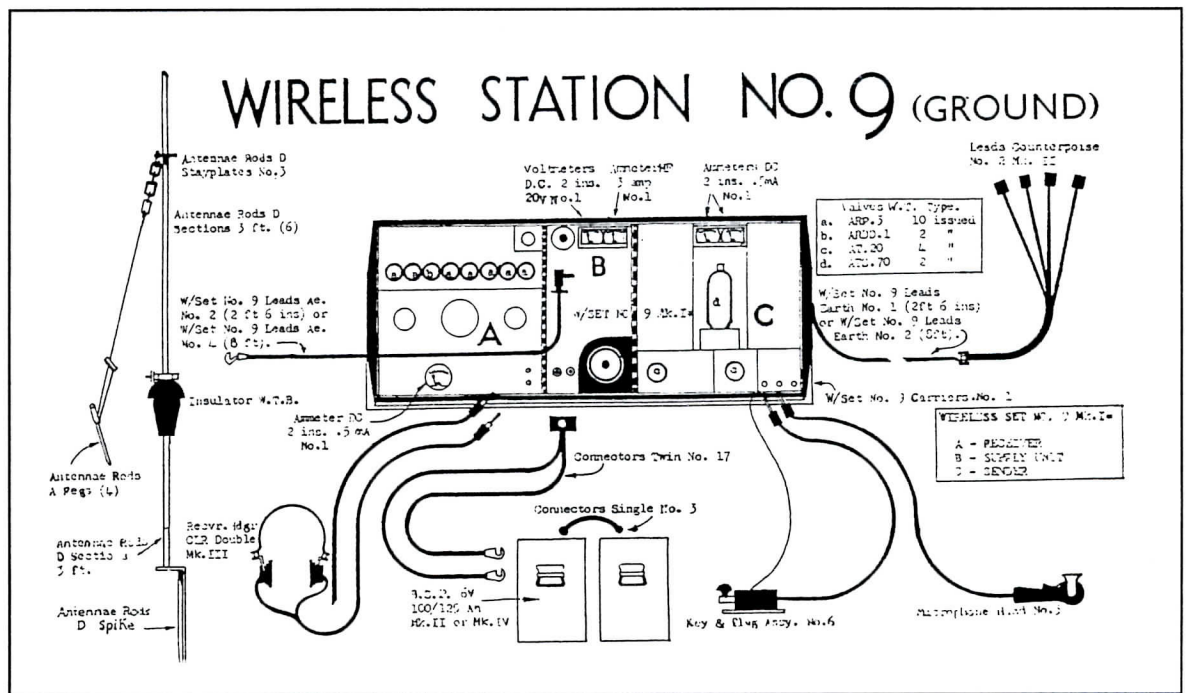
Circuit description

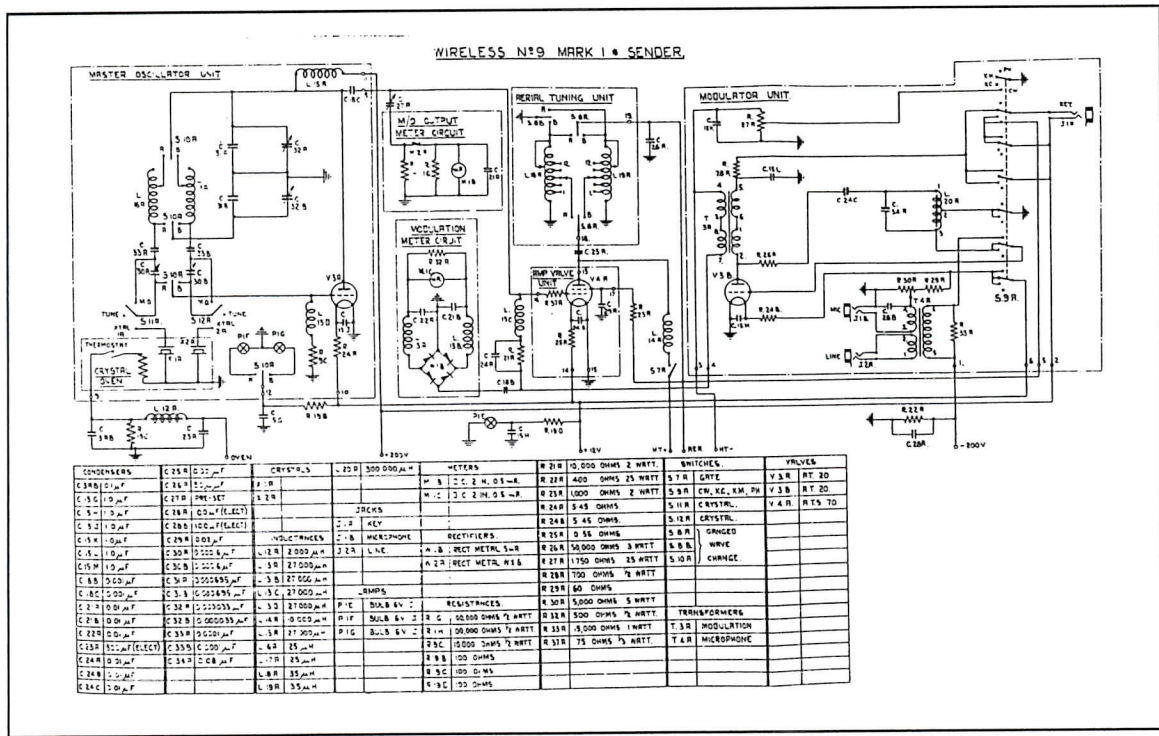
The transmitter employed three valves: master oscillator V3a (AT20), RF power amplifier V4a (ATS70) and modulator V3b (AT20). Duplicate tuned circuits (tunable through the whole frequency range of the set) were provided to set up two pre-selected channels as so to permit rapid changing from "A" to "B" frequency.

The Colpitt master oscillator was tuned by varying the inductance of a silver-plated coil. A rotating slider arm spiralled along the inside of the coil to vary the inductance. The master oscillator was also arranged for crystal control. Two crystals, mounted in an oven were maintained at a temperature 60 degrees C.

A proportion of the master oscillator output was rectified and

Components Wireless Station No. 9 (ground). The set, table and batteries could easily be taken out of the vehicle to form a ground station.





Circuit diagram of Wireless Set No. 9 Mk I transmitter unit.

applied to a meter indicating the relative master oscillator output and crystal current. Reducing the master oscillator level, indicated by this meter, was strictly necessary due to the liability of breakdown of the crystal.

The output of the master oscillator drove the RF power amplifier valve, a type ATS 70 tetrode, operating with an anode voltage of 1100 V, working under class A-B conditions at R/T and class A on CW.

The RF power amplifier was tuned in the aerial tuning unit. Tuning was accomplished by the anode tap switch and a variable aerial tap. This again was duplicated, each coil tuned to the frequency of the selected channel, the switching being ganged with the master oscillator tuning circuits. The aerial coil not in use was short circuited to prevent interaction.

The RF power amplifier valve was grid modulated in series with the bias voltage. On MCW the modulation amplifier was connected as an audio oscillator. On R/T, the microphone signal was amplified in the modulator amplifier valve

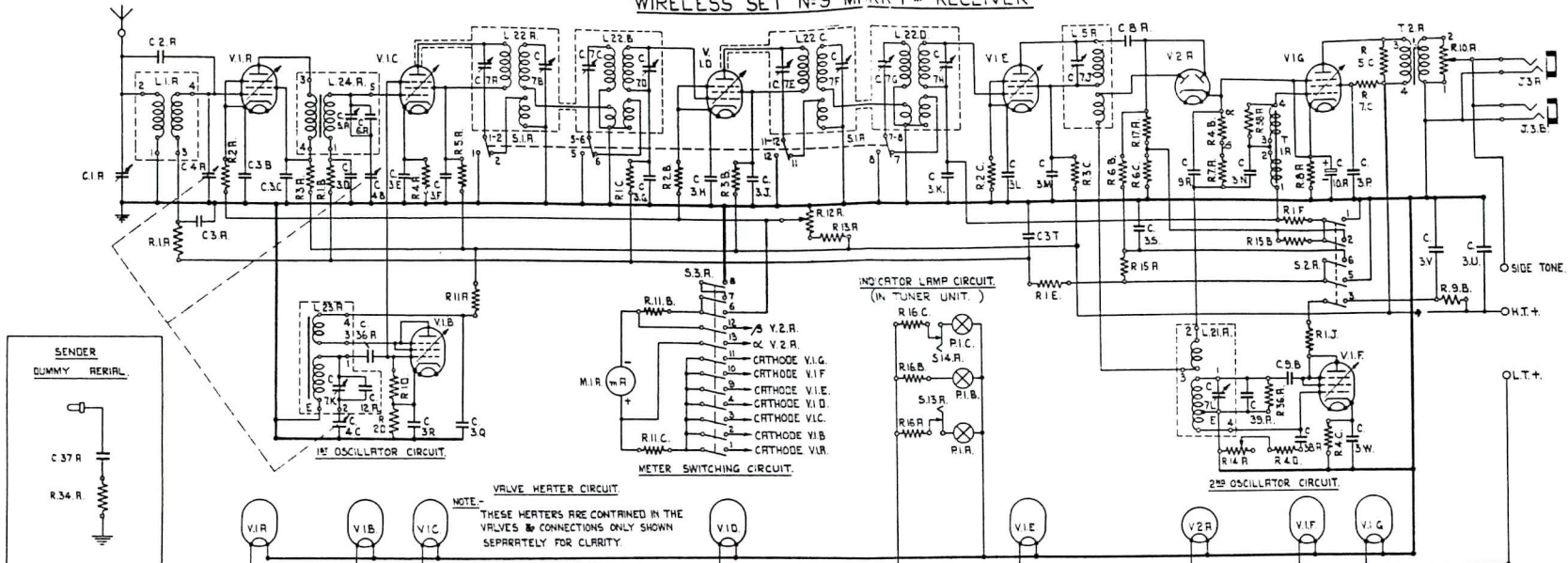
V4a and connected to the modulation transformer. A small portion of the modulation voltage was fed to the modulation meter to indicate the level of modulation.

The receiver had a conventional superheterodyne circuit with one RF stage, frequency changer with separate local oscillator, 2 stages IF (frequency 420 kHz), diode detector, AVC, AF output and provision of a BFO for reception of CW signals. The selectivity could be changed from "flat" (band width 10kHz) to "sharp" (band width 5kHz) by varying the inductive coupling in the IF filters. Provision was made for normal and delayed AVC or MVC by operating the RF volume control.

A meter circuit enabled the operator to monitor various receiver test points and was used as tuning meter when connected across the diode load resistor.

In the Supply Unit a small part of the modulated RF output was connected to a bridge rectifier to provide sidetone (hearing of own signals) connected to the receiver phones.

WIRELESS SET N^o9 MARK I * RECEIVER



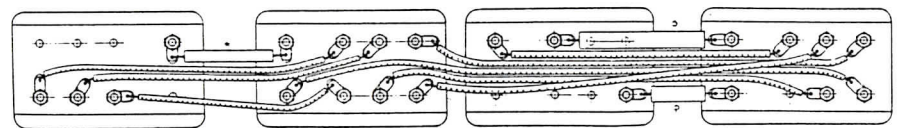
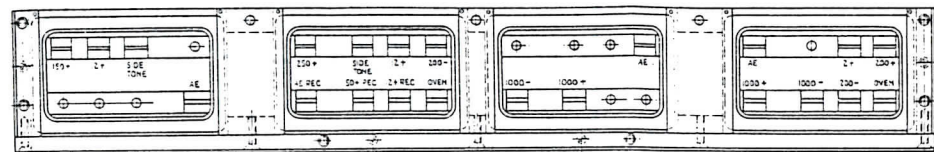
S 1 R SPRING POSITION table with columns for POSITION (1-12) and SPRING No.

S 2 R SPRING POSITION table with columns for SPRING No., PHONES, and C/W.

S 3 R SPRING ANODE CURRENTS OF table with columns for SPRING No. and various current types.

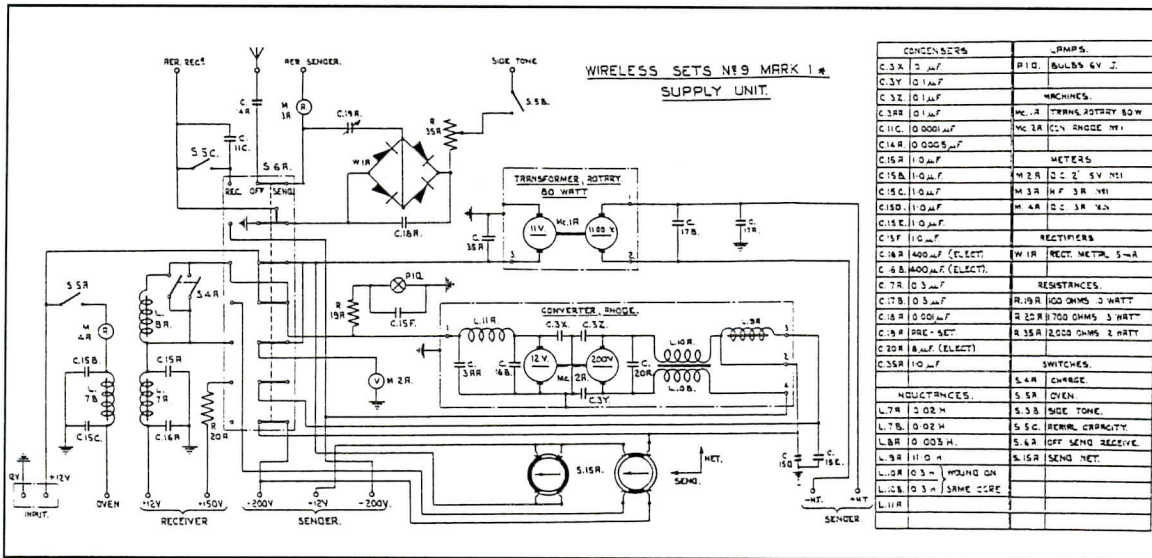
RAMP table with columns for P1A, P1B, and P1C.

Parts list table with columns for Component Name, Value, and Remarks. Categories include CONDENSERS, RESISTANCES, INDUCTANCES, JACKS, TRANSFORMERS, and SWITCHES.



WIRING NOTE - LEADS MARKED 'HUS + ' TO BE 1/31'000' SLIP BACK WIRE STRIPPED OF... LEADS MARKED 'HUS + ' TO BE 4/160' HT DOWNTON FLEX 400... THESE LEADS TO BE KEPT WELL CLEAR OF EACH OTHER & ALL OTHER LEADS.

Circuit diagram of Wireless Set No. 9 Mk I* receiver unit and wiring diagram of unit connections in Carrier No. 1.



Circuit diagram of Wireless Set No. 9 Mk I* Supply Unit.

Fitting Wireless Set No. 9 in vehicles

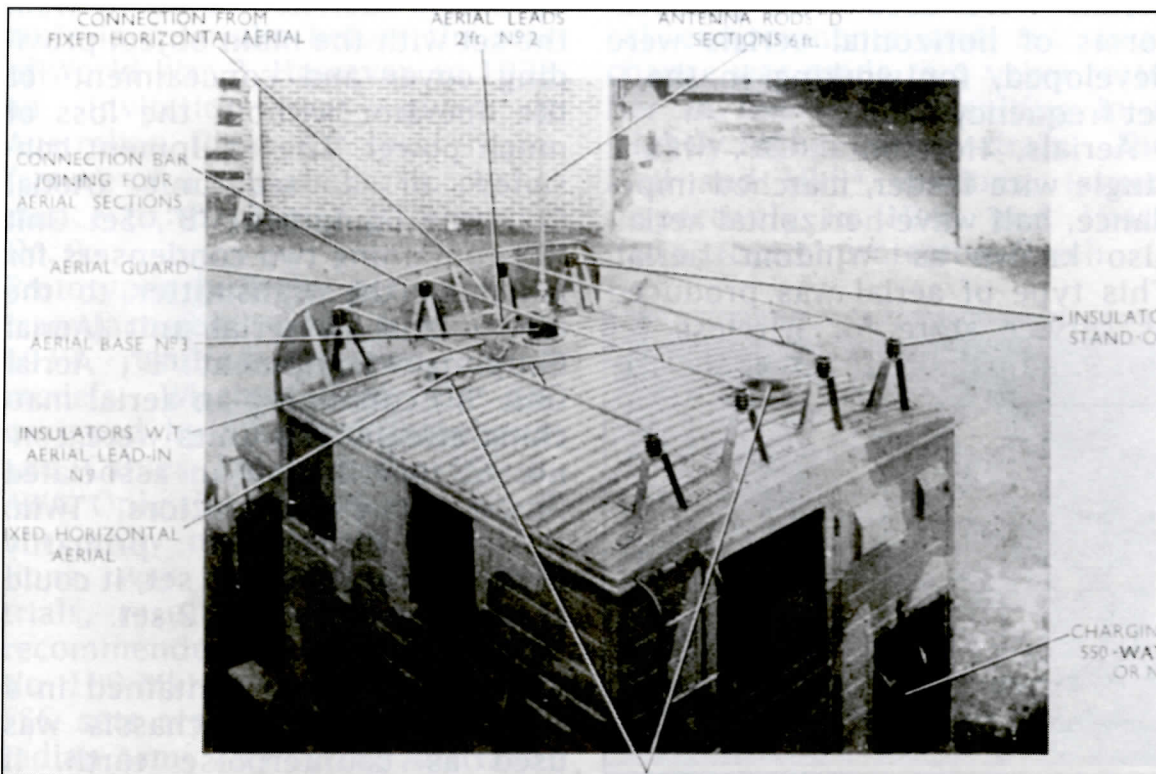
In the early war years, different models of more or less standard wireless vehicles had been equipped with No. 9 sets. Before the war a special wooden body was designed, mounted on a 15-cwt. Morris 6 cylinder chassis. It was fitted with a collapsible roof aerial No. 2 and complete battery charging facilities as to make the station self-supporting for a long period. The No. 9 set was normally con-

nected to the roof aerial but when stationary a vertical rod or wire aerial could be used. In later issues of the station the collapsible type roof aerial was replaced by a fixed roof aerial. Eventually, roof aeralis were totally dispensed with being considered as too conspicuous.

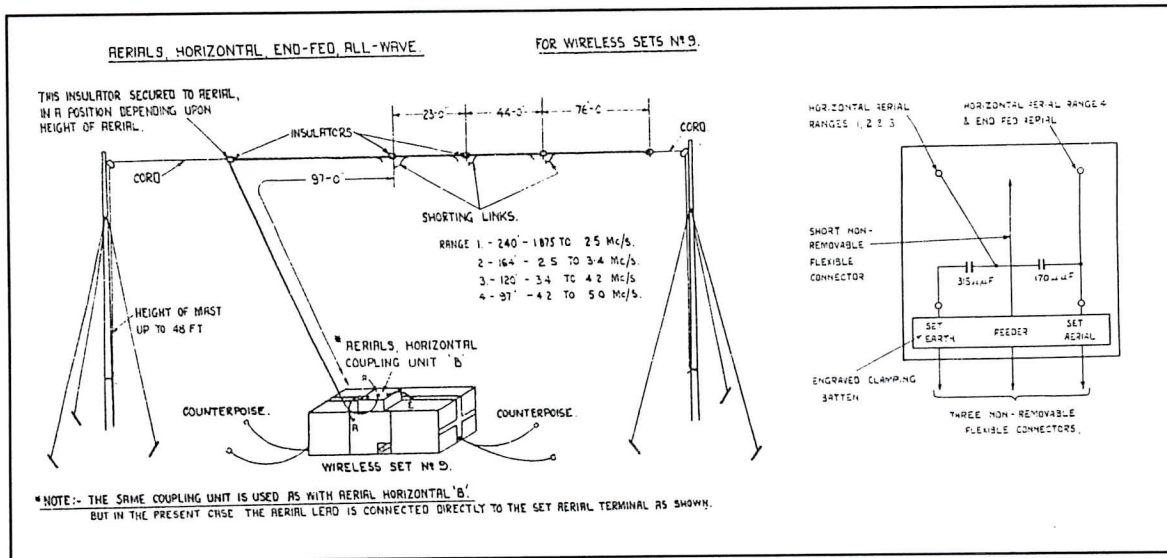
Aerials

Various types aerials were employed with a No. 9 set station, depending the use, type of vehicle or range required.

Truck, 15 cwt, 4 wheeled, Wireless, No. 1, MkII, with fixed roof aerial No.5, fitted with Wireless Set No. 9. Later issues of the station have been mounted in similar 15 cwt., Mk IV, G.S. trucks or in G.S. trucks, 30 cwt. Bedford OSX chassis. These vehicles had not a wooden "house" type body but a canvas hood fitted with a 6 or 9ft. rod aerial mounted on a No. 2 or 3 aerial base.



**Aerial
Horizontal
"B" (Windom)
and Coupling
Unit "B"
for Wireless
Set No. 9.**



- Vertical ROD aerials were in general use with tanks, armoured cars and reconnaissance cars using 6 or 9 ft. rods, made up from 3 and 6 ft. "D" types rods, mounted on a No. 2 or No. 3 aerial base.
- Ground stations usually had 24 or 22 ft. D rods, mounted on an insulator.
- Truck stations used No. 2 or No. 5 roof aerials (later issues 6 or 9 ft. rods) on the move and 24 ft. D rods whilst stationary.
- For long range working WIRE aerials were used. Two practical forms of horizontal aerials were developed, for working in the 9 set frequency band.
- Aerials, Horizontal, "B", was a single wire feeder, matched impedance, half wave horizontal aerial, also known as "Windom" aerial. This type of aerial was produced as service store for Wireless Set No. 9, adjustable to cover the fre-

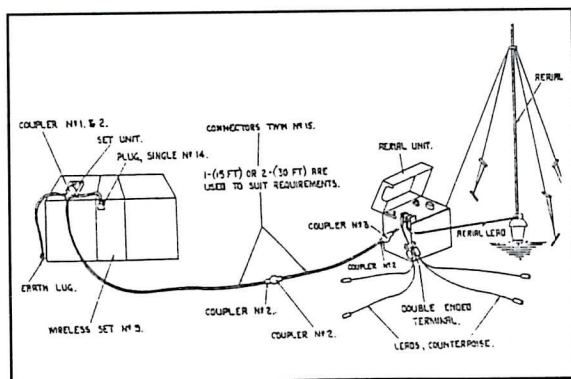
quency range of the set.

- An End-fed, half wave horizontal aerial was made locally by units according to the frequency used. A special unit for coupling a horizontal aerial (either Windom or End-fed) to the No. 9 set was provided known as "Aerials, Horizontal, Coupling Unit "B"". It consisted of two capacitors and connection cables in a metal box.

Aerial Coupling Equipment "B".

Aerial Coupling equipment enabled the setting up of an aerial at a maximum distance of 30 ft. from the set with the main object providing cover and concealment for the operator without the loss of much power. The equipment consisted of a set unit (Aerial Coupling Equipment "B", Set Unit "B") containing two condensers for matching the transmitter to the feeder, and an aerial unit (Aerial Coupling Equipment "B", Aerial Unit "B") containing an aerial matching circuit. The units were connected together by an associated feeder cable (Connectors, Twin, No. 15). Though primarily designed for the No. 9 set, it could also used with the No. 2 set.

**Diagram of
connections,
Aerial
Coupling
Equipment B.**



When the set was contained in a truck, the vehicle's chassis was used as counterpoise earth. If

used as a ground station or with Aerial Coupling Equipment B, "Lead Counterpoise No. 2 MkII" was employed.

Remote Control Unit "B".

Wireless Remote Control Units "B" allowed the connection of Wireless Set No. 9 to a telephone exchange and enabled the set to be worked by a second operator situated up to 400 metres from the set. A Wireless Remote Control Unit is basically a local battery telephone set with magneto generator calling, extended with a relay circuit and Morse Key. Two units are required, one near the set: the "Local" Unit and at the remote operation point the "Remote" Unit. Wireless Control Units "B" were also used with Wireless Sets No. 2 and 3.

Similar sets manufactured in Commonwealth countries

Australia

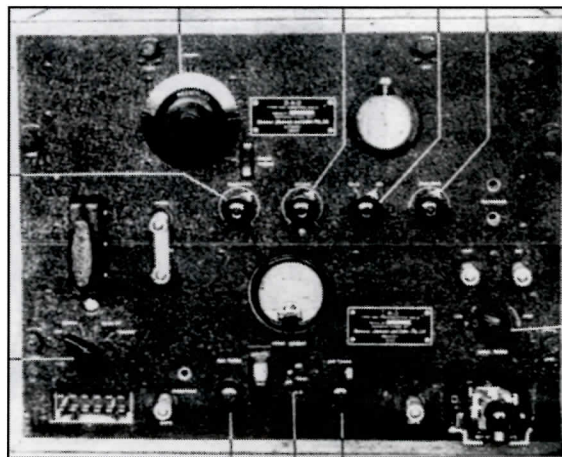
Virtually no Army radio equipment was manufactured on a large scale in Australia before the start of World War 2. However, in 1938, an invitation was given to Australian firms for local manufacture of a set, similar in performance to the British Wireless Set No. 9.

Prototypes built by a number of manufacturers and tried early 1939 resulted in two usable models: Wireless Sets No. 109 designed by Standard Telephones and Cables Ltd and the FS6 by AWA. Only the No. 109 set, though not really meeting the specifications, was accepted. After field trials, resulting in a number of recommended modifications, the No. 109 MkI went into production. FS6 sets were purchased by the Indian Army and by the Australian

Army in late 1941 and 1942.

The general layout of the Australian No. 109 set differed in virtually all aspects from the British set, its frequency range was slightly smaller: 2.5-5 MHz (1.875-5 MHz for the No. 9 set) and the RF power output approximately 7 watt. It was, however, much lighter and its power consumption about 50 % less. The No. 109 set consisted basically of a transmitter/receiver unit in a single steel case and a separate power supply unit. The transmitter may be crystal controlled, but this feature does not appear to have been used very often. The complete equipment operated from a 6 volt 150 Ah battery, drawing 2.5-5 Amp on receive and 16-21 Amp on transmit, depending on the model of power supply unit and type of transmission.

The main deficiency of the initial 1939 MkI issues of the No. 109 set was a unreliable synchronous vibrator in the power supply unit, later solved by a normal vibrator and a selenium rectifier in the MkII model. This arrangement was found to be not reliable in tropical environments and the final change was made to a valve rectifier in the MkII*, resulting in a slightly higher battery drain. The MkII and MkII* versions, issued respectively in 1940 and 1941, had a tropical protective finish.



Australian Wireless Set No. 109 MkII. The receiver unit is mounted above the transmitter unit and interconnected by means of plugs and connectors in the case.

Despite these disadvantages, the set was very successful and much used by the Australians throughout the war.

CANADA

Manufacture of the No. 9 set in Canada led to Wireless Set, Canadian No. 9. Production of an improved and more widely used MkI model started in 1943.

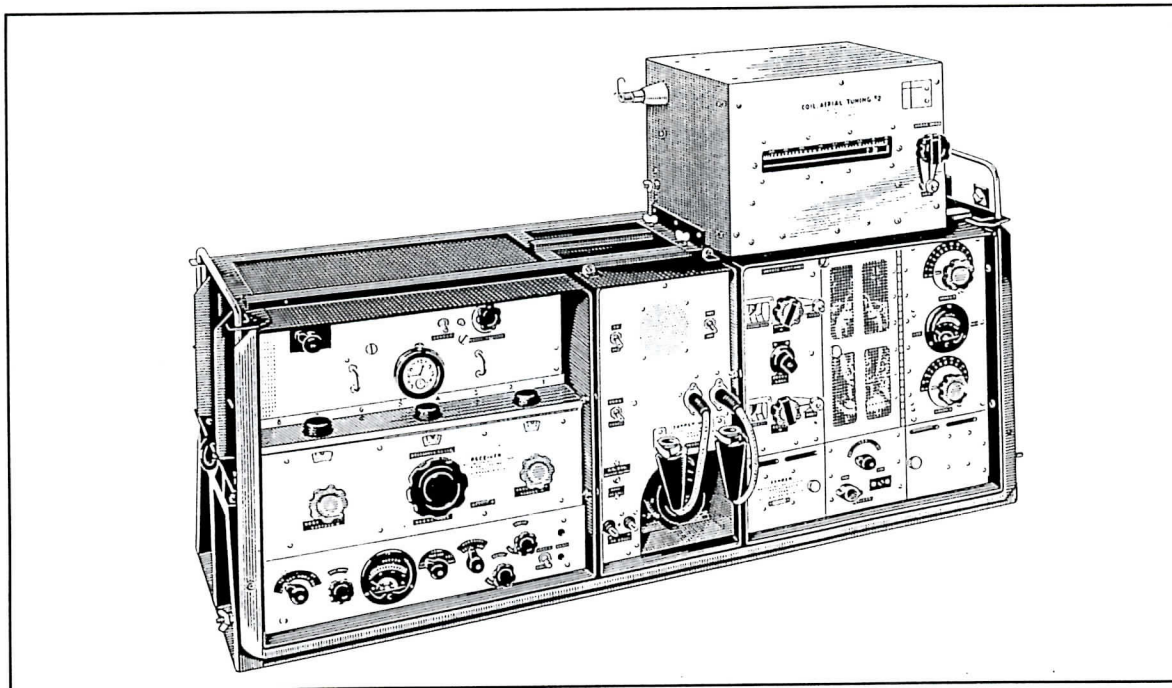
A number of modifications and the re-design of the basic units enabled the set to be used with Canadian and British type valves and to use Canadian and USA manufactured components. However, the basic circuit of both receiver and transmitter unit (e.g. the duplication of both MO and aerial tuning circuits) remained virtually unaltered as well as much of the fundamental mechanical construction of the set. The chief difference between British No. 9 MkI and Canadian No. 9 MkI sets consisted of a separate mounted external aerial tuning inductance, the addition of a crystal calibrator and a built-in loudspeaker (on top of the Supply Unit). Other extra facilities of the Canadian set were low/high RF power output by a single switch

and a pressel switch on the microphone operating the switching from receive to transmit. The performance of the Canadian set which employed modern type valves and better components, notably the transmitter, was a considerable advance on the British set.

The set had five basic units: Receiver, Supply Unit, Transmitter Unit, Aerial Tuning Coil No. 2 and a steel Carrier No. 3. The Aerial Tuning Coil may be fitted either on top or on the right hand side of the Carrier. The actual position of the contact wheel of the coil can be seen through a window against a calibrated scale.

The Canadian No. 9 MkI set delivered about 50 watts RF output at CW and 15 watts on RT. No provision was made for crystal control. Two five-point snatch plugs were mounted on the Power Supply Unit allowing the use of two sets of Microphone and Receiver Headgear No. 1. The weight of the set was 250 lb, approximately 70 lb more than the British set.

The receiver valve line-up was similar as the British parent set, still using an IF with the unusual frequency of 420 kHz. The transmitter used a 6V6G and 813, con-



Wireless Set,
Canadian,
No. 9 MkI.

temporary modern valves, resulting in almost the double RF output power.

The crystal calibrator which allowed rapid and accurate "netting" without radiating any power, was a novel innovation in Army sets at the time. The set was powered from 12 volt DC, the Supply Unit had two dynamotors of one was only running on transmit.

Though dimensions and positions of mounting holes were identical of the mounting holes with those of the British No. 9 MkI set, neither the transmitter, receiver, supply unit nor carrier could be interchanged with it.

Canadian No. 52 set

The main operational disadvantage of both British and Canadian No. 9 and No. 9 MkI sets, being their limited frequency range covering 1.875 to 5 MHz was remedied in a new development:

Wireless Set Canadian No. 9 MkII, later re-designated Wireless Set Canadian No. 52.-

The C52 set can be considered as one of the most successful medium range radios of World War 2. Development continued until 1943; production started in 1944.

It is similar in size and shape to the British and Canadian No. 9 MkI sets, but with a considerably better performance and many improvements.

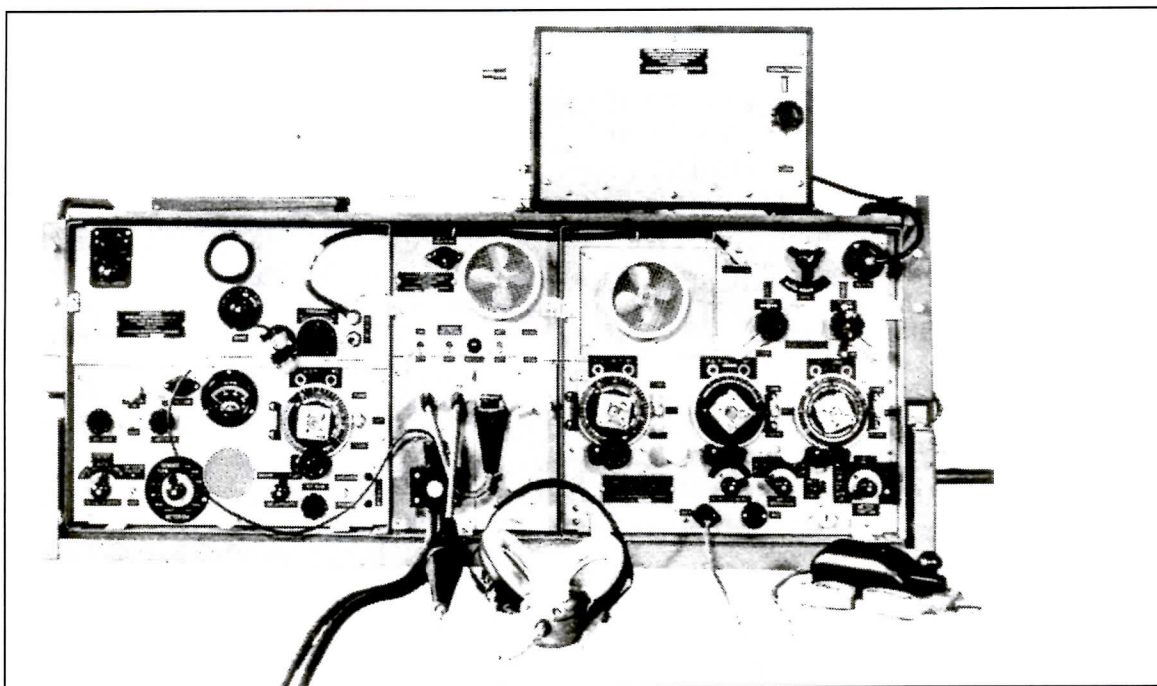
The general appearance of the set has a great resemblance to the Canadian No. 9 MkI set. The Aerial Tuning Coil (actually similar to the C9 MkI, but having a mechanical counter in place of the window) may be fitted on the side or on top of the Carrier as shown in picture. The frequency range covered 1.75 to 16 MHz in three ranges, the RF power output on CW was about 100 watts and 30 watts on R/T.

The tuning control of both master oscillator and RF power amplifier by a variable inductor or "roller coaster", a feature of both British and Canadian No. 9 sets, was dispensed with and, except for the Aerial Tuning Unit, variable condensers were used in the C52 set. Two crystal sockets and a three position switch which selects master oscillator or either of the two crystals were located on the transmitter chassis behind the panel door.

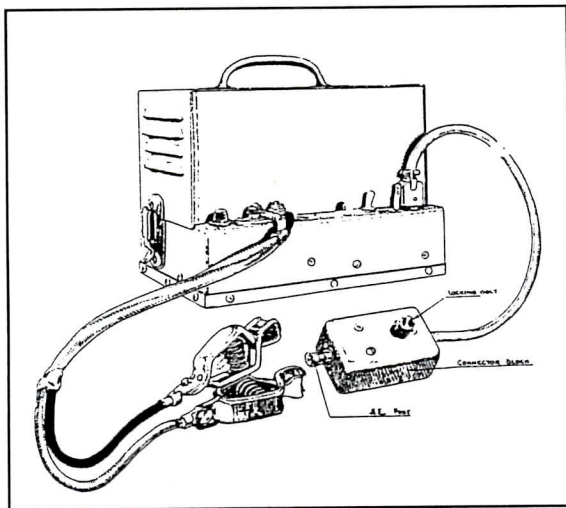
Although the set was similar in shape and general layout as the British and Canadian No. 9 Mk I

Wireless Set Canadian No. 52 comprised five units: Receiver Unit (left), Supply Unit (centre), Transmitter Unit (left) and Aerial Tuning Coil No. 2A (top), contained in Carrier No. 4.

"...on the panel is fastened a watch holder which contains quite a good watch. Be sure that you do not remove it accidentally..." (Working Instructions, Wireless Set, Canadian, No. 52)



**Supply Unit
ZE-12**



sets, (even the mounting holes for the Carrier were the same), only a very few parts such as the headgear, could be interchanged.

Remote Receiver

Remote Control facilities of the Canadian No 9 MkI or No. 52 were provided by using two Wireless Remote Control Units No. 1 (Canadian).

In either case a separate Remote Receiver was included in the remote station kit enabling the remote operator to monitor his own signals and to make minor frequency adjustments. The remote receiver was identical to the receiver units of the Canadian No. 9 MkI and No. 52 set and used in conjunction with Supply Unit ZE-12. Supply Unit ZE-12 provides power for the remote receiver of Wireless Set Canadian No. 9 MkI or No. 52 from either 12 volt DC or 110/230 volt AC mains. A special connector block (Plug Connectors No.1) locks into a socket at the rear of the receiver. The aerial terminal (for C9 MkI only) was located on the connector block.

Finally

A very small number of British No. 9 sets survive today, for the obvious reasons that not very many were made, numerous sets were lost or destroyed at the retreat of the BEF at Dunkirk in 1940,

and chiefly because the set became obsolete and replaced quite early on in World War 2.

Quite a few Canadian No. 9 MkI sets may be found today as well as Canadian No. 52 sets which remained in service for many years after the war. Although it is fairly easy to get a C52 and C9 MkI receiver unit operational, unfortunately the extremely heavy load on 12 volts prevents any attempt to use the transmitter with its original Power Supply Unit without using a massive accumulator.

This article is an excerpt from the manuscript of volume 1 in a proposed series of standard reference books on the technical history of British Army radio communication ranging from the very early start in 1899, until the introduction of the Larkspur range of radios in the early 1950s.

ACKNOWLEDGEMENTS

The author wishes to thank the Deputy Director, Curator and Staff of the Royal Signals Museum, Blandford Camp, Dorset for their help and for the permission to publish various pictures and drawings used in this article. Both British and Canadian No. 9 MkI sets and a Canadian No. 52 set are on permanent display in the Royal Signals Museum, amongst numerous other signalling equipment. This manuscript was read by John Taylor, GOAKN, and changed according to his valuable advice.

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- Pamphlet No.25, Wireless Set No.9, Supplement 1941, Dec. 1941.
- Pamphlet No.25, Wireless Set No.9, Amendments (No.1), Jan. 1942.
- Australian Pamphlet No. 4, Wireless Sets, No. 109 Mark II* and Mark II**, 1941.
- Wireless Set, Canadian, No.9 Mk.I, vehicle and ground station, Working Instructions, Aug. 1943.
- Wireless Set, Canadian No. 52, vehicle and ground stations, Working Instructions, May 1944.
- SRDE Report No. 889, Report on Canadian Wireless Set No. 9, MkI, July 1943.

The Bookshelf

By **Wim Kramer,**
PA2GRC, IANA-91001, (NL)

Short Wave Magazine, july, 1993

In a one page article called 'The Canadian '58' Set' (p.18) Ron Ham describes this WW-II vintage HF-packset.

The 58-Set operates in the frequentie range 6 - 9 Mhz. Both RX and TX can be continious tuned within this range and use permeability tuning (changing the coil inductance) instead of the more traditional tuningcapacitor technique.

Electronics World + Wireless World, sept. 1993

The article 'The secret radio that kept Resistance lielines open' (p.772-776) is a must for every collector of WW-II radiosets. This interesting and very good written article describes the famous British S-Phone UHF-radioset. The author Charles Bovill has been involved in the development of the airborne homing S-Phone himself and he knows what he is talking about. The S-Phone is a portable full duplex radioset operating in the 450 MHz. band. It was designed for air-ground communication and to be used specially for parachute drops of wapons and other materials for resistance groups in occupied countries. The output of 200 mW made it possible to talk with an aircraft at a distance of about 20 miles. The aircraftcrew used the signal of the ground S-Phone to home to the dropping zone.

Radio Bygones, oct./nov. 1993, No. 25
This issue of this very interesting magazine contains the Louis Meulstee article 'Wireless Set No. 18, part 2' (p.15-20). In this second article about the famous British WW-II packset technical aspects and extensive allignment procedures are given. With the help of the information given in this article your WS-18 will be 'on the air' again for sure.

Pat Hawker, G3VA contributes to the knowledge of WW-II clandestine radio with his article

The Polish Radio Centre, Stanmore'(p.10-11). The Poles, escaped from their occup-

ied country and living in England, had their own radioworkshop at Stanmore where they developed many types of clandestine radiosets. The article gives a list of types of sets that were developed and produced. As an example of the sets the technical diagram of the OP-3 receiver is reproduced. Much detailed and historically very interesting information is given about the operational aspects of the Polish communications network.

'Racal and the RA.17 HF

Communications Receiver Part 1' (p.4-9) is the title of the first part of an article by Keith R. Thrower about this marvalous receiver using the Barlow Wadely Loop tuningsystem.

Radio Bygones, Christmas 1993, No. 26

This issue of RB gives part 3 of the story of the WS-No. 18 by Louis Meulstee (p.4-11). This part gives detailed information on all accessories for the 18-Set. Also in short the WS-68, WS-58, WS-48, and WS-108 are described.

In this issue also the second part of the Racal & The RA-17 article by Keith Thrower.

HRSA Newsletter, oct. 1993, No. 46

'Larkspur' (p.3-11) is the English version of the article with the same title by Louis Meulstee first published in Q-Five Vol. 2, No.1, feb. 1993. Larkspur is the name of a family of British radiosets from the '50-'60s. This family includes VHF packsets A-40, A-41, A-42, the VHF low-power vehicularsets B-47 and B-48, the VHF highpower vehicularsets C-42 and C-45 and the HF-vehicularsets C-13 and C-11/R-210. The article gives historical information about the development and an overall description of these sets.

'Radio Compass AN/ARN-6'

(p.12-15) is an article by John Mackesy about this well know airplane radiocompass equipment. This set must have been in use voor many years in airplaes all over the world after WW-II. Even today it is possible to buy parts of ARN-6 equipment in surplus stores. Mackesy gives a brief technical description and a overview of parts nessesary to complete the ARN-6 installation. At the end of his article he states that the ARN-6 was in use from 1950-onward. From my information however I'm quite sure that the ARN-6 was already in general use with the USAF during WW-II.

OTB. Vol. 34, nov. 1993

In this issue of OTB the English version of the Louis Meulstee 'Larkspur' article is published too (p.35- 40).

G-Nove, Vol. 2.1

G-Nove is the magazine of the Italian army-rig operators club CROSEM. This second issue of their magazine (14 pages) was published in september and contains short articles about the AM-66-A, a power amp. for the AN/GRC-9, a home brew design for a mains powersupply unit that can be used to power the the BC-1000, PRC-9 or PRC-6 radios, The manpack HF-set PRC-1099 a 1,6 - 30 MHz. syntesized SSB, 20 Watt radio, and the WW-II Italian army transceiver RF1CA using 6 RV and 6 TP Italian made tubes.

G-Nove, Vol. 3.1

The third issue of this magazine is published in early november and has 18 pages. It contains short articles about the Dutch KL/GRC-3030 HF-set, AN/GRC-9 instructions for use, The Russian R-104 HF-set (excerpt from an article in Q-Five, Vol.1, No. 2, dec. 1992), information about the frequncymeters of the Navy LM-series, the receiver AN/URR-71 (freq. range 19,0 - 157,5 MHz. mode AM/CW/FM) and an article to modify the DY-88 dynamotor PSU for the GRC-9 to 220 V AC use. Ofcourse G-Nove gives also CROSEM club news.

CHIRP, No. 6, autumn 1993

CHIRP is the magazine of the French Army Operators Club (CORMMA/AROC). This issue gives information about members and rigs they use, reports about the visits of some members to Germany, searching for surpuls gear, maintenance instructions for the PRC 8, 9 & 10 VHF-packsets, some info on the GRC-series VHF radios (GRC-3 - 8) and six pages of reprints from a book with lists of tubes giving military/civilian equivalents.

The AWA Review Vol. 8, 1993

The AWA (Antique Wireless Association, Inc.) publishes anual the AWA-Review. The 1993 review contains about nine articles and over 150 pages. The largest article is written by the Dutch IANA-member Louis Meulstee and is about morse keys used with military radiosets. The title is 'Unusual **Military Morse Keys**' (p.1-45). In his article Louis tells about all kinds of keys in use with WW-II spy sets, military sets, airborne sets, navy sets, Ex USSR-

sets and even WW-I sparktransmitters. More than 107 photos and drawings complete this very well written article. A must for everyone who has an interest in miliatry radios or morsekeys.

Other articles are Rare tubes: How to recognize them, and why they are rare, A new bibliography of Reginald A. Fessenden, "Federal" as a telephone company, The KFS-Federal-Mackay story: From CW arc to Silicon Valley, Joseph T. Fetsch: Vacuum-tube engineer and collector, A history of the National Electrical Supply Co., Navy electronics directory and A glimpse at old-time transmitter development.

The AWA-Review vol. 8 can be obtained by sending \$ 14 to the AWA, 44 East Mainstreet, Flemington, NY 08822-1224, USA.



WANTED: Powerpack for MCR-1 Receiver; powerpack for ER-40; HF-Receiver R-109 (prepared to exchange against 19-set). Rein de Vlieg, phone 02202 - 1726

WANTED: All kinds of parts to rebuild 19-set such as connectorsn, parts for UHF-'B'-unit, control cables, dynamotorunit, variometer, headset, etc. documentation for 19-Set and GRC-3030, R-209, R-210. F. de Rooy, PBOAKY, phone 03465-71081

WANTED: Vibrator type 24 Volt/115 C.P.S. M150 3S for AM-598/U (=PSU unit for PRC-9), Documentation German WW-II receiver type:E-382 bP (Telefunken), F. v.d. Eynde, Panoramalaan 48, B-3012 Wilsele, Belgium, phone 016-206985

WANTED: T-17 mic. spare box BX-53, headset HS-30 and documentation for RT-77/GRC-9, org. speaker for GRC-3030 and long cable to connect PSU to set or plugs to make such a cable, plug for LV-80, H. Hilbink, PAOHTT, phone 05291-51195

WANTED: Collins receiver type R-392 (RX part of AN/GRC-19), P. v.d. Heijden, phone 02975-62854

WANTED: parts for X-tal cal. unit GRC-3030: X-tal 1 MHz., X-tal 100 KHz., switch

S-202, socket for V-201. Parts for GRC-3030 set: all C's and L's of TX-tankcircuit, switch S-2, topcap and socket for CV-124 to make TX work again, mic. M29A/U, speaker LS-3021, lamp MX-3027 and who can help me to repair my GRC-3030, A. Maarse, phone 02977-21175

WANTED: For C-42 radio, doc, schematics, controlboxes CU-31, CU-34, CU-30 and JD-9, headset, mic, cables etc. AN/GRC-19 (Collins TX T-195 / RX R-392) complete or parts of this instalation, R. Lambalgen, PAORVL, phone 02152-62980

FOR SALE: Several parts for GRC-3030 en GRC-9 sets; robust metal table 100 bij 200 cm; EISEMANN aggregaat 13-24-36 V, regelaar, V- en A-meters, 20 meter cable; Siemens telex T-100A met ponsbandlezer en maker, incl. rollen papier/ponsbanden. F. Koop, PAOFKP, phone 02240 - 14551

FOR SALE: RT-68 + PSU PP-112 and mounting FL. 75,-, F. de Rooy, PBOAKY, phone 03465-71081

FOR SALE: Complete installation KL/GRC-3035 consisting of RX R-210/R-3004, TC C-11/T-3011, ATU No. 7/TN-3001, mounting, in good working condition Fl. 700,- (without RX Fl. 500,-), TX TCS-12 including homemade mains power supply, working condition (proved by operation in Angry-Nine 80-meters Net) Fl. 185,- H. Hilbink, PAOHTT, phone 05291-51195

FOR SALE: AN/GRC-9 station complete with 3 TX/RX, USA-, German- and French model; BC-1306 incl. vibrator PSU, H. Kanon, PAOHTR, phone 02230-24648

FOR SALE: Drake 4 line consisting of Receiver SPR-4, Synthesizer DGS-1, Transmitter TX-4-C, PSU and loudspeakerbox MN-4 incl. doc and spareparts, R. Lambalgen, PAORVL, 02152-62980

FOR SALE: AN/GRC-9 in original, good working condition Fl. 175,-, Original trailer 1/4 ton for NEKAF or Willy's jeep incl. cover Fl. 600,-, Phone after 18.00 h. 030 - 281083

Original AN/GRC-9 and WS-19 T-Shirts

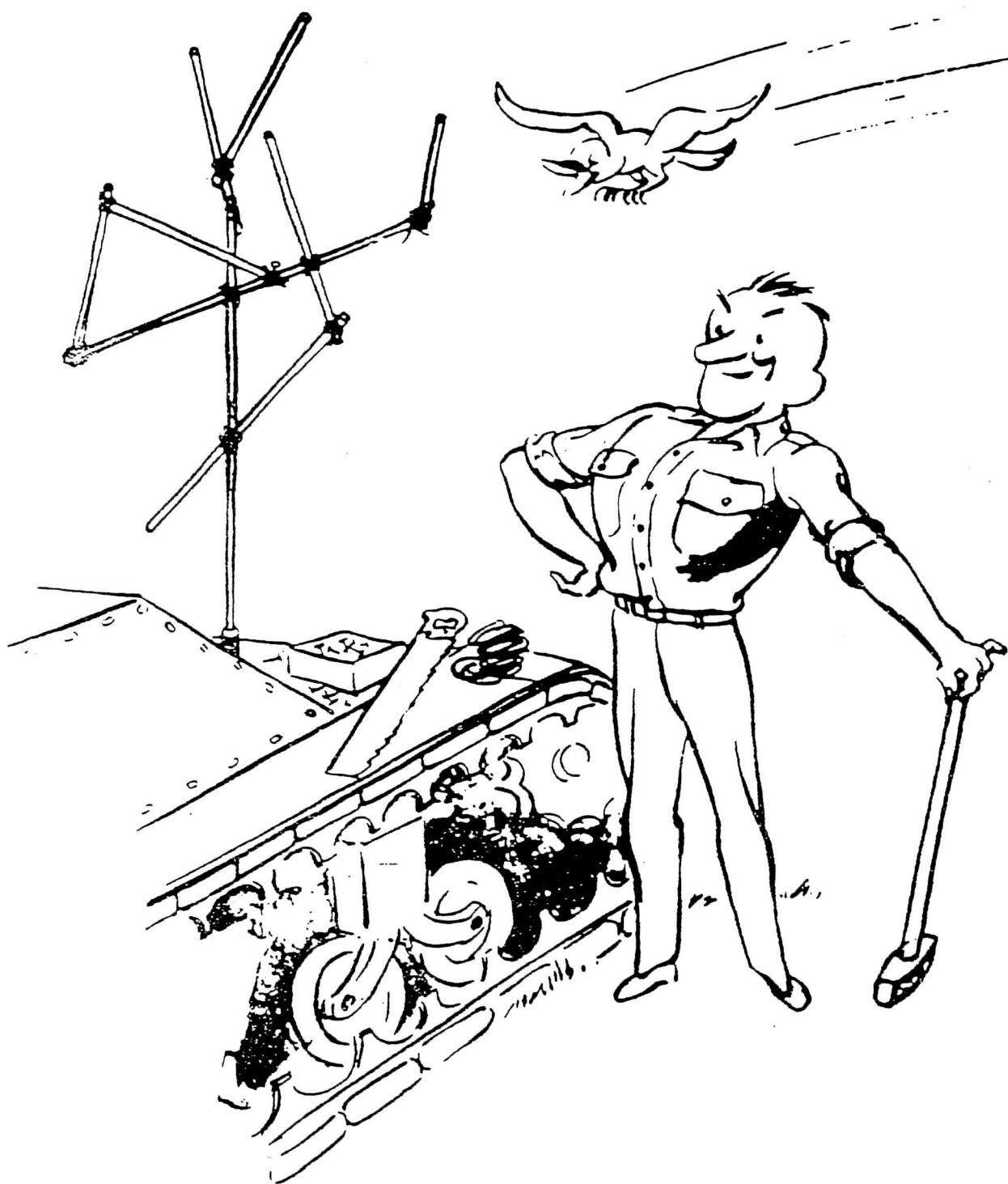
The IANA-member Cor Moerman, PA0VYL is also the founder and motor behind the 'Foundation the WS-19'. The main goal of this foundation is to realize a museum devoted to the history of Dutch amateur-radio. Although the foundation is working very hard for many years now the lack of money for a building to house their collection is one of the main reasons it is all still a dream. One thing is for real. The foundation owns a very large en unique collection of amateur-radio equipment and materials. Homebrew, kit-sets and factory-manufactured amateursets and testequipment as well as documentation and amateur-radiomagazines dating as far back as the 1920's are in storerooms, waiting to be shown to the public.

To raise some money the foundation has produced T-Shirts (white) showing either an AN/GRC-9 or a WS-19 on the front. Realy a must for every IANA-member or collector of military radiosets. The coast is only DFl. 20,-

To obtain one of these unique T-shirts is very easy: Write or send money (DFl. 20,- + DFl. 7,50 postage) to: Foundation The WS-19, Broekkant 1, 6021 CR Budel, The Netherlands. Phone (+)31 4958-94448. Please indicate if you like GRC-9 or WS-19 picture and size: Large/Medium/Small.



IANA-president Wim Kramer, PA2GRC proudly shows his GRC-9 T-shirt.



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ANTENNE MATCHER, past langdraad antenne aan op coax m.b.v. eenringkern. Komt bij de antenne met coax naar binnen, hierdoor minder storing etc. nu *f* 49,00.

BATTERIJEN, 45 volt blokjes, prima voor de leger sets *f* 2,50 per stuk, hxlxb 8,5x7,5x4 cm.

BUIZEN, nieuwe 2C39 nu *f* 25,00.

DEMAGNETISEUR, voor cassette/bandrecorderkoppen, nu ruisvrij geluid, *f* 7,50.

DIGITALE AMPERE TANG, ACA 0-200-2000 A \pm 2%; ACV 0-750 V; DCV 0-1000V; weerstand 0-200-K Ω , **Isolatie** tester hiervoor meet bij 500 volt; 100 K - 20 M Ω \pm 2%; 10 M - 1999 M Ω \pm 4%, Samen nu *f* 149,00.

DOORVOER C's, zakje met 10 stuks, 1000 Pt, 100 Volt, soldeertype, *f* 1,50.

VELDTELEFOONS, inductor type's o.a. de EE8 35,- p.st., per stel *f* 59,-.

EMI NETSTORINGFILTERS, 8 A, 250 V, *f* 17,50.

BUIZENTESTERS, A.V.O., CT160, de bekende koffers, incl. boeken *f* 245,-.

INFRAROED FILTERS, doorsnede 17 cm., *f* 20,00.

LUIDSPREKER, type LS 3 hoog OHMIG 600 of 4000 OHM. Prima voor de leger sets, nieuw *f* 34,00.

NICAD ACCU'S, C-cel Panasonic, nieuw, 2,2 Amp., *f* 7,95. D-cel, ex-leger, goede staat, 4,0 Amp., *f* 7,95.

ONTVANGERS, R210, 2-16MHz, 7 prachtig gespreide banden, AM-CW-SSB, 24 Volt, incl. aansluitplug en schema, filmschaal, *f* 195,-.

ONTVANGERS, R 278, militaire luchtvaart. 200-400 Mhz 1750 kanalen, 220 volt (wordt niet verstuurd), *f* 100,00.

PRC 9, 27-38 MC met draagstel, antennes, tele mike, speciaal voor 10 meter (let op HDTP BEP), *f* 75,00.

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RADIO-ACTIVITEITSMETER, IM3003, van 1-500 Mr, compleet met gevoelige glasvenster-sonde, bijv. om al uw apparatuur op straling te controleren, nu getest, met instructiekaart, *f* 59,-.

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RADIO ACTIVITEITSMETER, Gamma straling uitlezing d.m.v. Led Bar, *f* 89,00.

RHODE + SCHWARZ, militaire lichtvaart ontvanger, ED80, 200-400 Mc, 220 V, *f* 185,-.

SCHEIDINGSTRAFO, 220-110, 220 Watt, in fraaie en stevige metalen kast, gescheiden wikkeling, nieuw *f* 39,-.

SIGNAAL GENERATORS, ROHDE EN SCHWARZ, SMBI 1.7-5 GHz, AM-FM moduleerbaar, mech. dig. afstemming, output + 5dBm-140dBm, grotendeels transistors, incl. DOC, *f* 750,-.

VARIACS REGELTRAFO'S, inbouwmodel, 250 watt, 0-220 volt, nieuw *f* 45,-.

SPRIETANTENNES, voertuigmodel, keramische voet, en opschroefbare delen, lengte ca. 3½ meter, *f* 25,-, voertuig-bevestigingsbeugel MP50 *f* 25,-.

STORNO, professionele hand mikro's, nieuw *f* 19,00.

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TESTSETJE voor de PRC 26 radio, nieuw *f* 25,-.

VOEDING, voor de radio-set PRC 8-9-10, werkt op 24 Volt, de radio wordt er bovenop geklemd, met verbindingkabel, *f* 75,-.

VOERTUIGRADIO'S, PRC 10 transceiver, incl. 24 Volt, omvormer voeding, telemikro, *f* 95,-.

WATERKOLOM-MANOMETERS, in houten frame, zelf vullen met water of zoiets, een rareiteit, *f* 20,-.

WEERBALLON, \pm IM \varnothing 4,50.

WEERSONDE, bevat o.a. Hygro-, Temp-, Baro-opnemers, 27 MC, *f* 19,95.

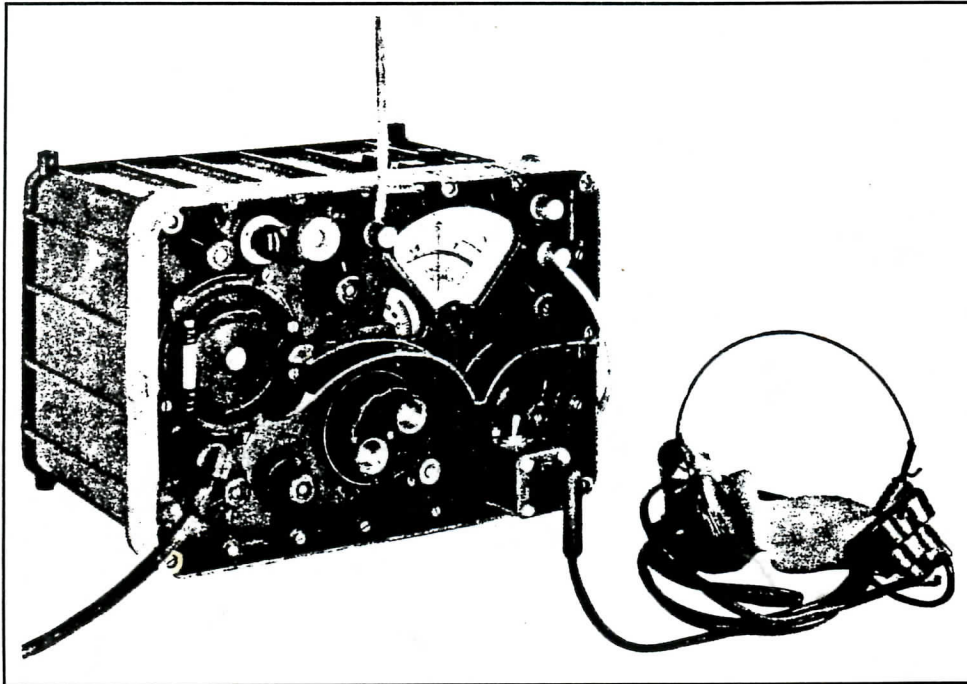
Bestellingen kunnen schriftelijk of telefonisch gedaan worden. Zendingen geschieden onder vooruitbetaling op giro 2700151 t.n.v. Smit Baco of onder rembours. Voor de exacte verzendkosten kunt u even contact met ons opnemen.

Kromhoutstraat 36-38 - IJmuiden - telefoon 02550-11612. Fax: 17664. Geopend: maandag 13.30 t/m 18.00 uur.

Dinsdag t/m vrijdag: 9.00 t/m 12.30 uur - 13.30 t/m 18.00 uur. Zaterdag: 9.00 t/m 17.00 uur.

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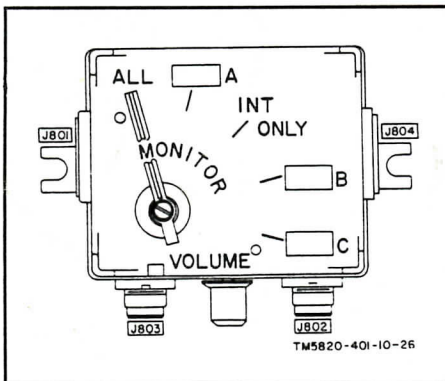
Legerontvanger R209 MkII, werkt op 12 V. DC, 1-20 Mhz in 4 banden, incl. tas, snoer, headset, van Belgische leger FI 198,-

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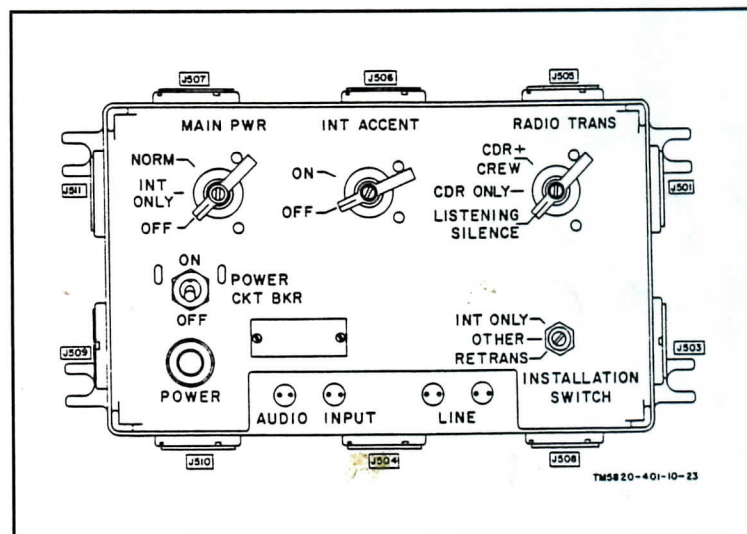


Controlbox C2298 incl. headset en switchbox nieuw FI 98,-

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