Technical Specification

of

100/125 Watts Coastal Telephony and H.F. Telephony Transmitter

Type A 261C

Frequency Range:

1)	1600	- 2000	kHz
2)	2000	- 2700	-
3)	2700	- 3800	-
4)	4063	- 4140	-
5)	6200	- 6211	-
6)	8195	- 8280	-
7)	12330	- 12421	-
8)	16460	- 16562	-
9)	22000	- 22100	-

Inside the transmitter 28 crystal sockets have been placed, making provision for a maximum of 28 channels provided adequate crystals, the frequencies of which may be placed anywhere within the ranges stated, are at hand.

In the front of the transmitter one crystal socket has been placed, intended for interchangeable crystals, the crystals normally being housed in the 24-socket storage placed on top of the transmitter cabinet.

Crystals:

Crystals provided according to customer's specifications. Crystals are working on the fundamental frequency (oscillating frequency same as transmitting frequency). Yet in the 16 MHz band 8 MHz crystals and in the 22 MHz band 11 MHz crystals are employed. Type HC6U, load capacitance 30 pF, tolerance ± in range 1600-3800 kHz: ±0,01%, in the HF ranges: better than ±0,005%. (Socket: 12,35 mm x 1,3 mm ø).

Type of Emission:

Telephony, simplex and duplex. Provision for connecting up of loud hailer. A maximum of 70 watts of A.F. power is available. Normally an attenuation network will have to be interposed between terminals and loud speaker (15 Ω).

R.F. Output:

In the coastal telephony frequency range 1600-3800kHz, 100 Watts of R.F. power is supplied to a standard aerial. In the H.F. range abt. 125 Watts may be supplied to the aerial on most frequencies. By throwing over a power switch, the power may be lowered to 1/10 (abt. 10 Watts).

Aerial:

The transmitter will tune to any aerial, which has a capacitance of 150 pF or higher and - according to frequency - a resistance of 5-2000 Ω.

Modulation:

Modulation takes place in the final R.F. stage as combined anode and screen grid modulation. Modulation percentage kept high, yet overmodulation prevented by a speech clipper. Input from modern 50 Ω carbon type microphone. A.F. range: 300-3000 Hz, the response falling off slowly below 300 Hz and very rapidly above 3000 Hz.

Harmonic and Spurious Emission:

All harmonics and spurious frequencies will be attenuated at least 40 dBs relative to the fundamental.

Power supply:

According to customer's specification equipped with power pack or converter for one of the following primary supply voltages:

110 or 220 volts AC 50/60 Hz, single phase
110 or 220 volts DC
24 volts battery.

Power Requirements:

On 110 or 220 volts AC:	abt.	750 VA
On 110 or 220 volts DC:	-	900 Watts
On 24 volts battery:	-	650 -

measured at full power, modulation percentage 95.

Tube Complement:

8 x 6159 B
4 x PL 84
2 x UF 80
1 x 90 C 1
1 x 0A 2
4 x 0B 2

Automatic Alarm Signal Transmitter:

An automatic alarm signal transmitter (keying device) has been built into the transmitter. It will, as long as the switch in question is set in position "Alarm", transmit the internationally approved two-tone telephony alarm signal on 2182 kHz, when the radio transmitter for the rest has been properly set.

Mechanical Design:

The transmitter is housed in an anticorrosion treated welded steel cabinet. The transmitter, modulator and keying device have been built on a heavy aluminium chassis in firm connection with a heavy aluminium front plate.

The chassis rests in a gliding mechanisme which allows the transmitter to be withdrawn as a drawer, either partly, or totally if a stop hook is released.

Electric connection to the transmitter takes place through plug- and socket connectors and ample length of multi-core cable, which allows the transmitter to be 9/10 withdrawn without breaking connection.

Interlock switches are provided for, which automatically break the dangerous high tension when the transmitter is withdrawn.

Calibration:

The transmitter has been provided with a very elaborate calibration system. A calibration chart in the front shows the frequencies of the 28 channels, to which the channel switch may be set. Vertically above each of the remaining tuning knobs, in a small aperture, a figure will show the setting of the knob in question, once the calibration has been made (during installation) making resetting an extraordinaly simple matter on all frequencies.

As to the interchangeable crystals in the front socket, calibration figures, showing the setting of all knobs, have (also during installation) been put down in the table of the crystal storage.

Dimensions:

The transmitter generally is associated with a receiver to make up a complete radiotelephone (the receiver may be combined with a rotable frame aerial for D.F.) The dimensions of the cabinet depends on the power supply and whether mains- or battery operation alone or change-over between mains and battery operation is provided for.

Dimensions are for 24, 110 or 220 volts D.C. operation:

Height: 610 mm
Width: 565 -
Depth: 390 -

For 110 or 220 volts A.C. operation:

Height: 870 mm
Width: 565 -
Depth: 390 -

For 110 or 220 volts D.C. plus 24 volts battery operation, including charging and change-over panel:

Height: 870 mm
Width: 565 -
Depth: 390 -

For 110 or 220 volts A.C. plus 24 volts battery opration, including charging and change-over panel:

Height: 1120 mm
Width: 565 -
Depth: 390 -

To all dimensions stated above add:

Height: 120 mm for fan on top
+40 - shock absorbers at the base.

Width: 2 times 20 mm earthing studs, one on either side

Depth: 60 mm hand grips
+40 - shock absorbers.

Description

of

100/125 Watts Coastal Telephony and H.F. Telephony Transmitter

Type A 261C

The transmitter in broad outline consists of a radio frequency part, a modulator and a automatic keying device built on a common chassis and a separate power supply unit or converter.

The transmitter itself consists of a crystal controlled Pierce oscillator with 28 crystal sockets placed annular round a 30 position switch. The crystals operate on the same frequency as the transmitting frequency. Yet in the 16 MHz band 8 MHz crystals and in the 22 MHz band 11 MHz crystals are employed. The frequencies may be chosen completely arbitraryly within the ranges stated in the specification. Thus for instance, there is no limit of the number of crystals in the coastal telephony range, apart from the total number of available crystals.

Besides the 28 crystal sockets placed internally, one single crystal holder has been placed in the front and labelled "EXTERNAL CRYSTAL". In this socket may be placed any (if any) of the crystals housed in a 24 socket crystal storage on top of the transmitter cabinet.

Instructions for operation of "EXTERNAL CRYSTAL" and setting of all knobs for the frequency concerned is stated in the calibration table of the crystal storage.

The plate circuit of the oscillator is connected directly to the grid of a receiver output tube PL 84 acting as a buffer, and resistance coupled to the R.F. driver stage. This stage is provided with a beam power tube 6159B and on the coastal telephony range 1600-3800 kHz and on the 4 and 6 MHz H.F. telephony bands transformer coupled to the power amplifier, while on the 8, 12, 16 and 22 MHz H.F. telephony bands coupled to the P.A. via a tuned circuit, which on these bands is cut in by a relay, instead of the transformer.

The R.F. power amplifier comprises 3 beam power tubes 6159B coupled in parallel (and provided with anti parasitics suppressors). The tank circuit has been formed as a pi-filter, consisting of an anode-cathode capacitor, a variable inductance coil and a coupling capacitor. The variable inductance is common to all ranges, while extra capacitors are coupled in parallel with the filter input and output capacitors on the lower frequencies.

The aerial circuit consists of the antenna proper and a matching network comprising a variable inductance, a fixed inductance and a number of fixed capacitors. By means of a switch "aerial coarse" these elements may be coupled in series and parallel, and will in connection with the 11 steps cariable coupling - when properly operated - match the P.A. circuit to any aerial, which is likely to be found onboard a ship. The lower limit of capacity of the antenna is about 150 pF on the lowest frequency (1600 kHz).

For optimum effeciency the P.A. has been provided with an automatic grid control device. Control of the grid drive (excitation) of the P.A. tubes is brought about by varying the screen grid voltage of the R.F. driver tube.

The principle is: The screen grid of the R.F. driver tube is fed from plus 600 volts through an 50 kiloohms resistor, and from screen grid to neutral (cathode) a penthode PL 84 (tube no. 8) is connected up. When the grid voltage of this tube is varied the tube acts as a variable resistance between screen grid and cathode of the driver tube thus lowering or raising the screen grid voltage according to the grid bias.

The grid bias of the no. 8 tube, PL 84, is - via an D.C. amplifying stage, containing an UF 80, tube no. 7 - controlled by the grid current of the P.A. tubes. The grids ofthe P.A. tubes are via the resistance element of a potentiometer P1 connected to a bias of -90 volts. The voltage drop across the potentiometer, caused by the grid current, is via the moving contact of the potentiometer led to the grid of the D.C. amplifier, tube no. 7, as grid bias, in such a way that the higher the grid current, the higher (numerically) the grid bias of the D.C. amplifier becomes, and consequently the smaller the voltage drop across the anode resistor of the D.C. amplifier becomes, and the smaller the grid bias of the control tube, tube no. 8, and the higher the anode current of this tube and consequently the lower the screen grid voltage of the driver tube.

By suitable choice of components a balance will occur and on account of the amplifying properties of the circuit the grid current of the P.A. tubes will be very nearly constant irrespectively of the working conditions of the P.A. tubes for the rest.

The optimum grid current of the P.A. tubes is set by the above mentioned potentiometer P1 labelled "PA ig1 Control".

For preventing excessive voltage on the screen grid of the R.F. driver tube in "key up" condition (push button in handset not pressed during simplex operation) a neon stabilizer OA2, tube no. 14, has been connected between the screen grid and neutral. The stabilizer will limit the screen grid voltage to 150 volts.

If by some reason the automatic grid drive control device should get out of order, tubes nos. 7 and 8 simply may be withdrawn from their holders. The transmitter will still work, but operating conditions of the P.A. tubes will be incorrect.

For quick and safe resetting of tuning knobs the transmitter has been provided with a very elaborate calibrating system.

A series of gear-wheels (with white sidewalls) mounted behind the front plate and operated directly by the frequency switch, will in an aperture above each knob - when once calibrated during installation of transmitter - indicate the setting of the knob concerned.

Although this calibrating and resetting system should make maladjustment little probable the transmitter is provided with a safety device, which will prevent ruining the P.A. tubes, should the plate circuit of same not be correctly tuned ("Band" and "Trimmer" incorrectly set).

The principle is that a pentode tube PL 84, tube no. 9, is connected between the screen grids of the P.A. tubes and neutral (cathodes). The grid of the PL 84 tube is connected to neutral through a resistor and will thus - with zero grid bias - draw a high anode current. This anode current passes the common screen grid resistor of the P.A. tubes, and the screen grid voltage consequently will fall to a very low value, thus limiting the anode current of the P.A. tubes to a value, which will do no harm to the tubes even if the tank circuit is detuned.

To raise the screen grid voltage of the P.A. tubes to normal operating condition, the grid bias of the PL 84 tube is increased to anode current cut-off, as soon as correct tuning of the aerial circuit is carried out. For this purpose a toroidal broad band R.F. transformer has been placed round the wire leading from the coupling capacitor to the aerial circuit proper. The R.F. output of this transformer is rectified by a silicon rectifier, filtered and led to the grid of the PL 84 tube in such a way as to increase (numerically) the grid bias of the PL 84 to cut off - or beyond.

If the safety device should get out of order (for instance by burn-out of a diode) the no. 9 tube should be withdrawn from its holder. The transmitter then will operate correctly, but great care should be taken during tuning, and it is strongly recommended to switch to 1/10 power, when setting knob "Trimmer".

Modulation takes place as amplitude modulation in the R.F. power amplifier and is carried out as combined anode and screen grid modulation. The complete A.F. system comprises microphone, A.F. amplifier and clipper, and the A.F. power stage. The microphone is part of the handset which also comprises earpiece (receiver) and a push button operated switch. As well microphone as earpiece are of the modern interchangeable capsule type. The microphone has a nominal resistance of 50 ohms. Its response curve is rising about 20 dB from 200 Hz to 2000 Hz, substantially flat from 2000 to 3500 Hz and falls off above 3500 Hz. Output of the microphone (at a D.C. of 60 milliamps.): at 2000 Hz about 0,5 volts A.C. at a sound pressure of 10 dynes per square centimeter.

The microphone is fed with D.C. from a rectifier, converter or battery depending on the primary power source, the current being sufficiently smoothed by a low pass filter before entering the microphone.

The A.C. output of the microphone is fed to a step-up transformer, the output of which passes a clipper containing two biased diodes before it is led to a potentiometer, P4, the setting of which determines the modulation percentage. After amplification by one transistorized stage the signals passes a low pass filter with a sharp cut off at 3000 Hz. This filter will suppress all harmonics above 3000 Hz created by the clipper, and of course also voice frequencies above 3000 Hz. After two transistorized stages of amplification the power is sufficient to drive the modulator proper through an autotransformer. The modulating stage contains four beam power tubes 6159B, arranged in parallel-push pull and connected to the R.F. power amplifier through a matching transformer. This transformer also is provided with a low impedance winding for A.F. output to a hailer system - about 70 watts of A.F. power being available, so an attenuating network generally will have to be interposed. The low impedance winding also provides a voltage for negative feedback to the ultimate stage of the A.F. driver. Screen grid voltage for the four modulating tubes is 220 volts, stabilized by two series connected cold cathode voltage stabilizers OB2. The same voltage, 220 volts, also feeds the A.F. amplifier and driver.

A refinement in the clipper system should be mentioned. In order to keep the maximum modulation percentage fairly constant - and below 100% - even if the R.F. power stage is incorrectly loaded or the transmitter is set to 1/10 power, the bias voltage of the clipping diodes is made partly variable as far as a supplementary bias voltage is supplied from the screen grids of the R.F. power amplifier, the voltage of which being dependent on the operating conditions of the stage.

Necessary A.F. input to transmitter for 95% modulation: 50 millivolts (in 50 ohm) at 1000 Hz. 500 millivolts will not overmodulate the transmitter.

Grid bias for the different stages is obtained from a vacuum tube oscillator, containing an PL 84 tube and an L-C circuit, resonating at about 1000 Hz. The output is via a matching transformer fed to a selenium rectifier. One of the D.C. terminals of this rectifier is connected to neutral (ground), while the other terminal, which will have a potential of -150 volts, is connected to a relay which again is connected to a resistance chain and a voltage stabilizer connected to neutral. The contacts of the relay will, when the relay coil is energized, close the 600 volts feed line to the transmitter proper. A neon pilot lamp with yellow lense is connected across the 150 volts and will thus indicate presence of grid bias.

The relay thus prevents the transmitter from having high tension applied before grid bias is present.

Grid bias, -90 volts, for the R.F. part of the transmitter is branched off across the full voltage of the voltage stabilizer, while about -50 volts for the modulating tubes is tapped off a potentiometer in the resistance chain.

Besides the aforementioned yellow grid bias pilot lamp a green pilot lamp for the filament voltage and a red pilot lamp for the anode voltage has been provided for.

Keying of the transmitter takes place in the crystal oscillator. A contact in a keying relay changes a high negative grid bias, which in "key up" condition cuts off the anode current of the crystal oscillator, to a suitable operating bias. The keying relay may be operated by an external key (which normally is not provided) and the transmitter thus be employed for telegraphy, but normally the keying relay is operated via an auxiliary relay by the push button of the handset. The keying relay besides the keying contact has a contact which, when the transmitter is employed as hailer, starts the anode voltage. The auxiliary relay also has an extra contact. This is used for muting the loud speaker in the receiver and will, when the relay operates, break connection to the loud speaker and insert a 5 ohms load resistor instead.

In position "duplex" of the below mentioned operating switch the transmitter is keyed directly by a contact of the operating switch, but modulation will not take place until the push button of the handset is pressed, which means, that the loud speaker is muted also in position "duplex".

An operating switch is provided and has the following positions:

1) Off
2) Stand by - Hailer
3) Simplex
4) Duplex
5) Alarm transmitter.
6) Alarm test

Position "Off" is self explanatory.

In position "Stand by - Hailer" the whole transmitter is supplied with filament and relay voltages only, when operating off a 24 volts battery or A.C. mains. When operated off 110 or 220 volts D.C. also anode voltage is present. When the push button of the handset is pressed the transmitter will act as a high power A.F. amplifier - no radio signals being transmitted. For the rest the position is a real stand by position inasmuch as the transmitter is ready for immediate operation when the operating switch is turned to one of the succeeding positions.

In position "Simplex" the transmitter will transmit voice modulated radio signals, when the push button of the handset is pressed, the earpiece at the same time being shorted by a relay in the receiver.

In position "Duplex" there will be a constant carrier as the transmitter is keyed by an internal contact of the operating switch, and the earpiece will be kept open, also when the push button of the handset is pressed, as the muting relay in the receiver in this case is inoperative.

In position "Alarm transmitter" a constant carrier will also be present, and 24 volts ("relay voltage") is fed to the built-in telephony alarm signal transmitter and the device may be operated when switch labelled "Alarm signal transmitter" is set to either "Test" or "Alarm".

The specification of the alarm signal transmitter is:

Frequencies:	1300 and 2200 Hz $\pm$ less than 1,5 per cent.
Duration of signals:	250 millisecs. $\pm$ less than 50 millisecs.
Interval between successive tones:	less than 50 millisecs.
Ratio of the amplitude of the stronger tone to that of the weaker	less than 1 to 1,2.
Output voltage:	variable, maximum 0,5 volts across 50 ohms.
Consumption:	24 volts 140 milliamps.
Temperature range:	-15° - $+55^{\circ}$ C.

The alarm signal device consists of a transistorized A.F. L-C oscillator, oscillating alternately on 1300 and 2200 Hz. Changing of frequency takes place by coupling an extra capacitor in parallel with the fixed capacitor when the lower frequency shall be produced. Shifting is carried out by means of a relay which also adjusts the amplitude of the oscillations to nearly equal amplitude by inserting a damping resistor on the higher frequency. The relay is operated by a multivibrator, also transistorized, and a single stage of amplification. Potentiometer P 201 adjusts the pulse frequency of the multivibrator and may easily be readjusted if the pulse frequency should change a bit on account of ageing of transistors. The fixed frequencies 1300 and 2200 Hz are adjusted from the factory and are stabilized by temperature-dependent capacitors and negative feedback.

The pulsed two-tone output is from a special winding in the output transformer fed to the earpiece of the handset, when the switch labelled "Alarm Transmitter" is turned to either "Test" or "Alarm", so that the signal may be checked. In position "Alarm" of the said switch the output is also fed to the input transformer of the A.F. amplifier of the modulator instead of the microphone output, so the alarm signal will be transmitted if the transmitter for the rest is correctly set. In position "Test" the signal will not modulate the transmitter.

In position "TEST ALARM" of the main operating switch the alarm transmitter may be tested without high tension on the transmitter, that means definitely without any carrier on.

In order that the alarm signal should not be transmitted unintentially the knob "Test - Off - Alarm" has been equipped with a locking device, which must be released - by pressing a push button "Release" - before the switch can be turned.

As a means for checking the correct operation of all stages the transmitter has been provided with a milliammeter and a switch. The milliammeter proper will show full deflection for 1 milliamp., but has been provided with two scales: 0-150 mA and 0-5 A.

Suitable shunt resistors have been inserted in the cathodes of all tubes so that the meter will read the cathode current on scale 0-150 mA. In the grid circuit of the R.F. P.A. a different shunt resistor has been inserted, so that the meter will read the grid current on the same scale, but the reading has to be divided by 10, full deflection in this case being 15 mA.

The switch will connect shunt resistors to the meter according to the labelling without breaking the circuits.

In position "Aerial" of the same switch the meter will read the aerial current in amperes. This is brought about by inserting a current transformer (toroidal) in the aerial wire proper, rectify and filter the output and feed it to the meter through a suitable semiadjustable resistor, (P2). The calibration in this case is so adjusted that the meter will read 5 amps. at full deflection.

For convenience and in order to be able to read the cathode current of the R.F. P.A. tubes during aerial tuning without repeatedly switching between aerial current and cathode current, a pilot lamp, fed from a small R.F. transformer in the aerial circuit, has been placed in the front plate. The lamp will glow when aerial current passes through the transformer. On certain frequencies (i.e. where the aerial is an equal number of quarter wavelength long) the current is very weak so little or no light is produced in the lamp.

The power supply may be 110 or 220 volts A.C. 50/60 Hz, or 110 or 220 volts D.C. or 24 volts battery.

In case of A.C. mains a power pack is provided. It consists of chassis, normally placed as a drawer in the bottom of the transmitter cabinet, containing a transformer supplying 27 volts A.C. for all filaments, a transformer, rectifier and filter supplying 24 volts D.C. for all relays, microphone and alarm signal transmitter, and finally a transformer, rectifier and filter supplying 600 volts anode voltage.

24 volts, unsmoothed, from the relay voltage rectifier is also fed to a relay placed in the power pack in series with a contact of the operating switch and safety contacts in the cabinet. The contact of the relay closes the primary circuit of the anode voltage transformer, so high tension may only be applied when all drawers have been pushed right home.

Yet the safety switches may be temporarily locked by hand, if high tension is wanted for check purpose with a unit withdrawn.

In case of 110 or 220 volts D.C. a converter provided with starting relays and filters will supply 26 volts D.C. for filaments and relays and 600 volts D.C. for anode voltage.

The starting relay circuit in this case is closed through the operating switch and the safety contacts in the cabinet.

In case of 24 volts battery operation the 24 volts are used directly for filaments and relays and a converter provided with starting relays and filters supplies 600 volts D.C. for anode voltage.

The starting relay circuit in this case is likewise closed through the operating switch and the safety contacts in the cabinet.

In case the transmitter should be operated as well from 220 volts A.C. as 24 volts battery as well a power pack as a converter and a special switchboard with a heavy duty two-way switch must be provided.

Mostly charging facilities for the battery will be incorporated in such switchboard.

Operation

Assuming that the transmitter has been calibrated during installation, setting to a certain frequency takes place in the following manner:

Find the frequency in the channel chart on the front plate. Set the crystal switch "Frequency" to the number of the frequency concerned, and set the knobs "Band", "Trimmer", "Coupling", "Aerial Fine" and "Aerial Coarse" to the settings indicated in the apertures vertically above each knob.

Set operating switch to "Stand by" and let it remain in this position for about half a minute. Check that the green pilot lamp , "Filament", in the lower left hand corner lights. Set "Power" to 1/1. Set "Cathode/Grid/Aerial Curr." switch to Aerial. Set operating switch to "Simplex" and check that as well the red pilot lamp, "High Tension", as the yellow pilot lamp, "Grid bias", light. Press push button of handset. Note deflection of ammeter and red pilot lamp above aerial tuning knobs and reset eventually "Aerial Fine" for maximum aerial current.

Set operating switch to "Duplex" if this mode of transmission is wanted.

When transmission has been closed, set all knobs to the setting corresponding to the emergency frequency 2182 kHz.

If the alarm signal shall be transmitted, first check that all knobs have been set according to the calibration figures. If as well battery as main operation is provided set switch in charging board to "Battery". If only mains operation is provided check that mains switch is closed. Set operating switch to "Alarm Transm." and check that aerial current is present (half a minute after the operating switch has been turned from the "Off" position). Press with one hand push button "Release" in lower left hand corner of the transmitter and turn with the other hand knob "Alarmsignal Transmitter" from position "Off" to "Alarm", and let it remain in this position for at least half a minute, but not more than one minute and check in the earpiece that the two tone signal is transmitted during that time. Reset knob "Alarmsignal Transmitter" to "Off" and set operating switch to "Simplex", press push button of handset and talk.

If calibration of "Coupling", "Aerial Fine" and "Aerial Coarse" has not been undertaken during installation, or if the transmitter shall be tuned to for instance an emergency aerial, aerial tuning and matching is carried out in the following way:

Set knobs "Frequency", "Band" and "Trimmer" according to the calibration carried out at the factory. Set "Coupling" to 1, "Aerial Coarse" to 1, "Cathode/Grid/Aerial Curr." to K6a, operating switch to "Simplex" and press "Test key" or push button of handset. Note cathode current of K6a, which should be about 15-30 mA. Turn knob "Aerial Fine" from 00/0, clockwise, untill the cathode current K6a rises to a maximum; yet the knob should not be turned more than 37 revolutions. If a maximum of cathode current has been found, note the value of the K6a cathode current. If the value should happen to be 110-120 mA the settings of the three knobs are correct, and aerial current should be checked to be maximum for the setting found (resonance).

If no resonance was found during the turning of "Aerial Fine", set "Aerial Coarse" to 2 and turn once again "Aerial Fine" from 0/00 to 37/0 and note if cathode current K6a during the 37 revolutions now rises to a maximum. If not, proceed to "Aerial Coarse" 3-4- and so on until a distinct maximum appears.

If cathode current K6a at the maximum found rises to say only 70 mA, set "Coupling" to 2 and reset "Aerial Fine" to maximum current K6a, which at correct loading of the power amplifier should be 110-130 mA. If coupling 2 is insufficient turn knob "Coupling" to 3 and so on until the cathode current K6a (and also K6b and K6c) will reach a maximum of 110-130 mA, when "Aerial Fine" is tuned to resonance. Check that aerial current is maximum simultaneously with maximum cathode current K6a.

If transmitting on a frequency, to which the transmitter has not been calibrated, is wanted, first procure a crystal type HC6U (1,3 mmø pins, 12,3 mm apart), load capacitance 30 pF, of the same frequency as the transmitting frequency. Yet in the 16 and 22 MHz bands crystals at half the transmitting frequency should be ordered. Insert the crystal in an idle crystal socket (immediately behind the front plate). Note the number of the socket. Set frequency switch to the socket number in question. Set "Coupling", "Aerial Fine" and "Aerial Coarse" to 0 (Zero). Set "Band" according to frequency. (See the ranges in section "Specification". If for instance the frequency is 3560 kHz, band 3: 2700-3800 kHz is the correct one to be chosen). Set "Trimmer" to 00/0, start transmitter, press "Test Key", and turn "Trimmer" clockwise until a distinct dip in cathode current K6a is found. The cathode current K6a now should amount to 15-35 mA.

Tuning of aerial circuit ("Coupling", "Aerial Coarse" and "Aerial Fine) now may be carried out as explained above.

With a well pointed pencil put the setting figures found in the small white spaces appearing in the apertures above each knob.

The procedure is the same if the crystal belongs in the crystal storage (nos. 29-52), but in this case the crystal should be placed in the socket labelled "EXTERNAL CRYSTAL" and the frequency switch set to position "EXTERNAL". The figures found in this case should be put down in the space in the calibration table of the crystal storage intended for this purpose.

(A 261C)

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