

COLLINS RADIO COMPANY

CEDAR RAPIDS



IOWA, U. S. A.

ENGINEERING DATA

SERVICE MANUAL

on
30FXB TRANSMITTER

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SERVICE NOTES ON THE 30FXB TRANSMITTER

CRYSTAL OSCILLATOR

Occasionally trouble is experienced with the crystal being sluggish or erratic. In cases where the crystal starts hard it is well to remove the crystal from the holder and clean carefully with carbon-tetrachloride (carbona), both the crystal and holder plates. Avoid touching the face of the crystal with the hands after it has been cleaned. In replacing in the holder do not tighten the pressure spring too tight; this should be adjusted to a point where the crystal just becomes firm in the holder and will not slide easily when the holder is tapped from side to side. If the crystal still refuses to start, remove the two buffer tubes from their sockets and attempt to start the crystal in that way. If it does start you can get an idea of the strength of the crystal before inserting the two buffer tubes. If inserting the buffer tubes causes the crystal to go out of oscillation it may start again by faintly tapping the crystal holder with a lead pencil or other light object. If the crystal still does not oscillate, check the crystal coil for proper marking. The 160 and 80 meter coils will be marked with a designation "CB"; the 40 meter coil with a designation "C". Some types of crystals have a tendency to change frequency during operation of the transmitter causing the whole system to be detuned. In this case the crystal should be exchanged for one that will operate on one frequency only. In some cases the change of frequency is sufficient to cause all the meters to go off scale.

BUFFER OR DOUBLER

When the crystal is oscillating and the buffer tuning dial is detuned the plate milliammeter should go to about 150 mills or more. When the buffer dial strikes resonance this amount will drop appreciably.

NEUTRALIZING: The buffer stage is neutralized at the factory and the condenser is locked. Occasionally this condenser may be jarred out of adjustment and requires reneutralizing. It is adjusted with an insulated screw driver through a small hole in the top of the chassis after removing the lock-nut which holds the adjustment in position. With the buffer plate switch off and the crystal oscillating there should be no indication of grid current as the buffer dial is rotated through resonance.

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If more than about 3 MA of grid current is indicated the neutralizing condenser may be adjusted to the minimum reading of grid current, making sure the crystal continues to oscillate during this operation.

EXCESSIVE HEATING: It is well to check the tubes in the buffer stage for being soft. Also check the line voltage and plate voltage. When the line voltage is excessive the plate voltage is increased to a point considerably above 400 volts which will always cause excessive heating. Check the 5000 ohm resistor and RF choke connected to the grids of the 46 tubes to ground. This is a bias resistor and if it becomes shorted to ground will cause erratic operation and excessive heating. Also be sure that the buffer dial is tuned to resonance and corresponds to dial setting indicated by tuning chart.

NO EXCITATION TO BUFFER: If the 5000 ohm bias resistor or RF choke, connected to the grids of the 46 tubes becomes open the plate current will not increase when the crystal starts oscillating. In rare cases the coupling condenser becomes defective, which also is indicated by lack of increase in plate current when the crystal is oscillating.

FINAL AMPLIFIER

A 203A tube is generally used in the RF amplifier, although tubes such as the 242A, UV211, 276A, etc. can be used satisfactorily. The circuit is a split-stator arrangement, series fed and when once neutralized will remain so regardless of frequency or coil used. The frame of the condenser is placed 1000 volts above ground to reduce the effective voltage across the plates of the condenser. With the split-stator arrangement the effective air-gap of the condenser is equal to twice the actual air gap of one section. The 700 ohm resistor across the RF choke directly under the tank coil serves as a low frequency parasitic suppressor.

EXCESSIVE PLATE CURRENT: If it is impossible to strike resonance, or if the tube draws an unreasonable amount of plate current - first, check the C battery connected between terminals 2 and 4 of the power supply. It is essential that the negative side of the battery go to terminal No. 2. Also check power supply terminal print showing external connections and be sure you have all of the lugs on the power supply properly connected.

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Take a continuity test from the grid of the tube to the frame of the transmitter; this should read 2,000 ohms. Be sure the C battery leads are shorted and not connected to the C battery when this test is made. No continuity here indicates that the 2000 ohm resistor connected from terminal two to terminal one, inside the power supply, is open. A no resistance reading indicates the grid is being grounded in the RF chassis and no bias is being supplied to the tube.

EXCESSIVE HEATING: The most general cause for excessive heating is having the amplifier dial detuned, or the antenna matching network not properly tuned. Connecting the antenna network to the amplifier stage should not detune the final amplifier. That is: the low dip or resonant point on the dial should remain the same after the antenna network is connected. Check the number of your coil to be sure you are operating in the proper band and check the dial position with the tuning chart to be sure you are not doubling in the final amplifier. Also an unbalanced antenna connected to the network will de-neutralize the stage sufficiently to cause excessive heating. Refer to "neutralizing".

NEUTRALIZING: The neutralizing condenser is adjusted and locked at the factory. It is usually about 70 to 90 percent engaged when properly neutralized. Neutralizing may be checked with a thermo-couple milliammeter or a small flash light lamp with two or three turns of wire coupled closely to the final tank coil. When properly neutralized there will be no indication of RF in the tank coil as the second amplifier condenser is passed through resonance. When certain types of antennas having an unbalanced reactance are used the final amplifier will become deneutralized, in which case a pick-up coil should be used inside the tank coil and connected directly to the antenna network. The Zeppelin type antenna is the most common unbalanced type. The pick-up coil should contain about one-third the number of turns of the tank coil and may be wound around one of the tube shield cans of the 7C Amplifier, (the shield can being used as a form on which to wind the wire); it is then slipped off and inserted inside the coil.

NO GRID CURRENT: The grid bias is supplied through a 2000 ohm resistor between terminals 1 and 2 inside the power supply. Check this resistor for being open, also make sure that the C battery is inserted between terminals 2 and 4.

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IN ALL CASES THERE WILL BE A JUMPER CONNECTION BETWEEN TERMINALS 3 AND 6 OF THE POWER SUPPLY. Check the RF choke connected to the grid of the 203A tube for continuity.

NO INDICATION OF PLATE CURRENT: Check both of the 500 MA RF chokes in the plate circuit of the 203A for continuity. Make sure the bias battery is connected properly and test the RF choke on the grid of the 203A tube. Take a short piece of wire, connected to the filament of the 203A socket and momentarily touch it to the frame of the transmitter with the plate voltage turned on. If the plate current increases it is an indication that the filament center-tap of the 203A filament is not connected. In making this test BE VERY CAREFUL THAT YOU DO NOT COME IN CONTACT WITH ANY OF THE PLATE VOLTAGE LEADS, as 1000 volts is very dangerous.

SPEECH AMPLIFIER

NO SIGNAL: Have all tubes tested in the speech amplifier and make sure they are good. Be sure that the microphone plug is making proper connection and is inserted into the socket properly. Remove the shield can cap from the 57 tube and touch the tube cap with your finger. If a sharp increase in plate current is indicated on the modulator plate meter, it is quite evident that the trouble is in the microphone circuit as touching the 57 tube with your finger will cause a strong audio oscillation.

RF FEEDBACK: If you are troubled with feedback due to the location of the microphone and you are not able to advance the gain control sufficiently without feedback, you may insert an RF choke on the grid cap of the 57 tube. The choke should be a Receiver type, such as the CHX Hammarlund. The shield can cap must be cut away to admit the choke directly to the grid cap. It will also be necessary to shield the choke by first insulating it with friction tape and then wrapping with tin foil connected to ground. This will entirely eliminate any RF feedback, picked up in the microphone line.

AUDIO FEEDBACK: Occasionally the modulation transformer talks up to the extent that a "ring back" in the microphone circuit is experienced. In this case it will be necessary to remove the three screws on each side of the modulation transformer.

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holding the face plates. You can then gain access to the bolts holding the transformer laminations together, which should be tightened with a large screw driver. In severe cases of mechanical feedback it may be necessary to fill the sides of the modulation transformer with impregnating compound or common battery wax. In doing this fill sufficiently to exert a pressure on the end covers when they are pressed back on top of the wax, as it is sometimes vibration of the end covers that causes the trouble.

EXCESSIVE MODULATOR PLATE CURRENT: Check the C batteries and make sure they are delivering at least 26 volts. Also make sure that the connections are not reversed. Check the 5 prong plug on the modulator chassis to make sure that it is thoroughly engaged.

ANTENNA NETWORK

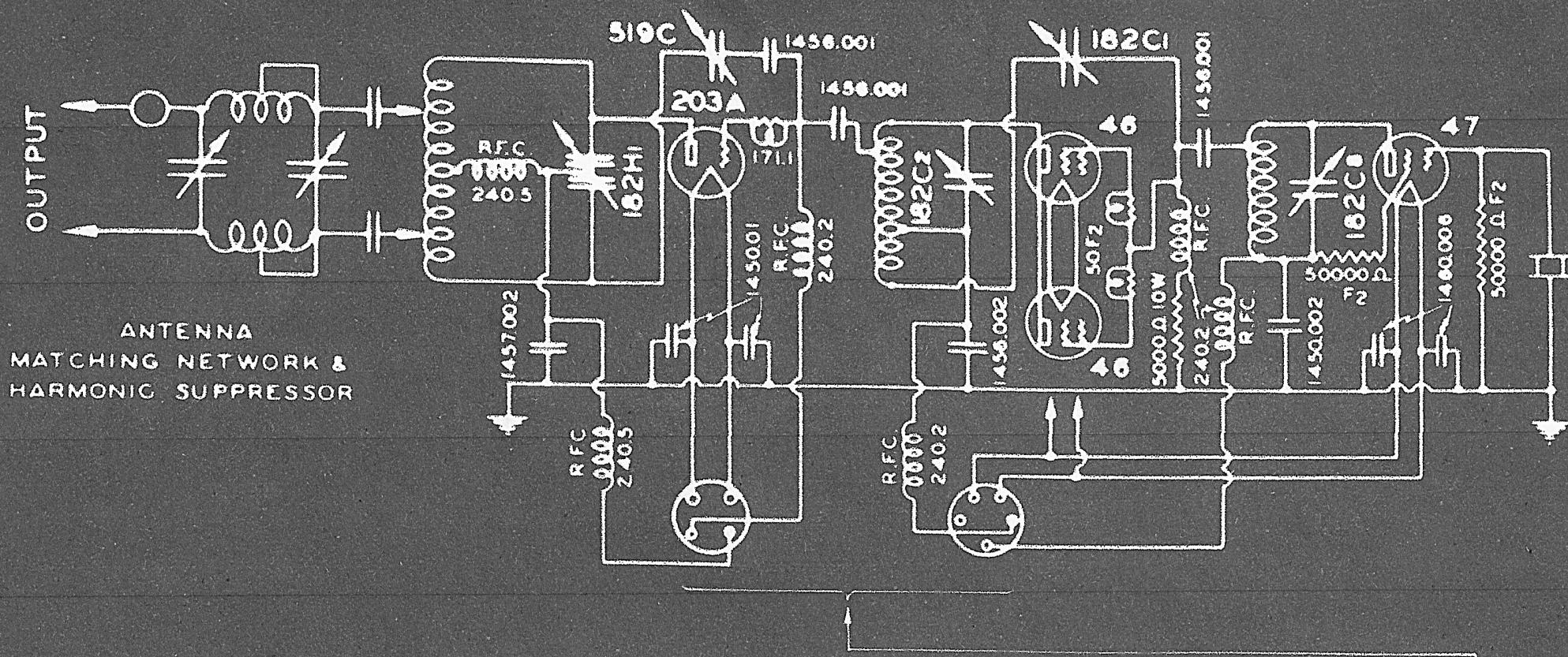
Types of antennas have already been referred to with respect to their deneutralizing effect on the final amplifier. The 20 meter antenna is the most apparent offender. In all cases where it is possible the use of center-fed or balanced type of antenna is advised, such as the two wire matched impedance "Y" type and the feeder type center-fed. In tuning up the antenna network it is always a good policy to insert about a 100 watt light globe in series with terminal No. 11 or No. 12. This places a resistance in series with the 110 volt plate voltage transformer thereby reducing the plate voltage to the final amplifier during tuning procedure of the network. In this way you will have an opportunity to try various taps and dial settings without damage to the transmitter tubes and equipment. When it is believed the antenna is properly tuned the light globe may be taken out for trial; this system should not be overlooked as it is a desired advantage in tuning the antenna.

POWER SUPPLY

The 405C Power Supply contains two complete voltage supplies adequately filtered, one of which delivers 1,000 volts for phone operation when the AC supply is connected to terminals 10 and 12

2c

10 J. R.F. UNIT



TYPE 14C CONTROL BOX
APPLY FILAMENT POWER 15
SECONDS BEFORE PLATE POWER

FILAMENT PLATE STAND BY

ON

ON

ON

OFF

OFF

OFF

TYPE 14C CONTROL BOX

APPLY FILAMENT POWER 15
SECONDS BEFORE PLATE POWER

FILAMENT

ON

OFF

PLATE

ON

OFF

STAND BY

ON

OF