

NEC SSB LINEAR AMPLIFIER

CQ-301

INSTRUCTION MANUAL



CONTENTS

◦ FEATURES	2
◦ RATINGS	2
◦ NAMES OF RELEVANT PARTS AND THEIR DESCRIPTION	2
◦ FRONT	2
◦ BACK SIDE	3
◦ PREPARATION FOR OPERATION	4
◦ POSITIONS OF SWITCHES AND THEIR CONNECTION	4
◦ ADJUSTMENT OF DRIVER SET	5
◦ ADJUSTMENT METHOD	5
◦ OPERATING METHOD	6
◦ CONSTITUTION OF MODEL CQ-301	6
◦ TRANSMITTING CIRCUIT	6
◦ ASSOCIATED CIRCUIT	8
◦ MAINTENANCE AND REPAIR OF CQ-301	8
◦ CHANGING METHOD OF AC POWER SOURCE	8
◦ CIRCUIT DIAGRAM	11

PREFACE

Thank you very much for your purchase of our LINEAR AMPLIFIER MODEL CQ-301. This LINEAR AMPLIFIER is the fruit of our endeavour to develop new products by mobilizing our superior communication technology and based on our ample experience accumulated for the past years. We hope that you will peruse this OPERATION MANUAL with care and gain mastery of the details of performance of this unit.

FEATURES

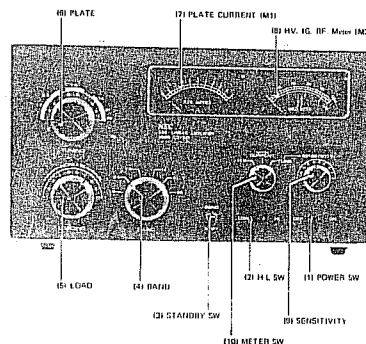
- 1) Model CQ-301 is a linear preamplifier for grading up of NEC HF tranceiver lines and can be connected with all types of SSB tranceivers (transmitters) easily.
- 2) Possible to be used for HF band amateur bands from 160 m band to 10 m band.
- 3) The related parts and stable transformer have been designed and manufactured specially for high power use. Adoption of the direct heating transmitting tube 3-500Z enables you to enjoy mobile QSO.
- 4) We firmly believe that DX'ers will be satisfied at the unit due to ample allowance of power.

RATINGS

Transmitting frequencies

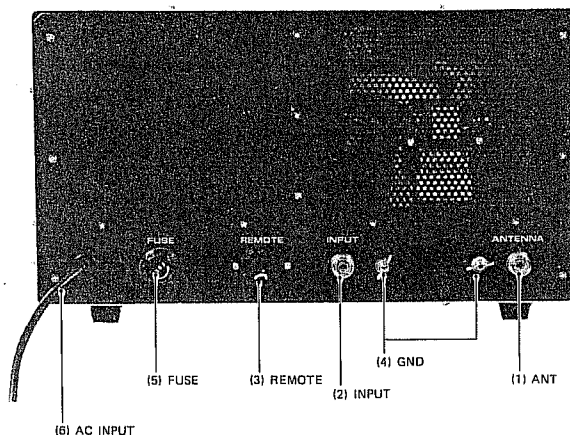
- 160 m (1.9 MHz) band
 - 80 m (3.5 MHz) band
 - 40 m (7.0 MHz) band
 - 20 m (14.0 MHz) band
 - 15 m (21.0 MHz) band
 - 10 m (28.0 MHz) band
- | | | |
|------------------------|-------|-----------------------------|
| ○ ○ Type of radio wave | | SSB(A3J)/AM(A3, A3H)/CW(A1) |
| ○ Type of circuit | | Grid grounding type AB1 |
| ○ Max. input | | SSB 2KW AM 1 KW |
| ○ Drive power | | 100 – 200W |
| ○ Plate voltage | | 2,900V DC |
| ○ Antenna impedance | | Input Approx. 50Ω |
| | | Output 50 – 100Ω |
| ○ Vacuum tubes used | | 3-500Z x 2 pcs. |
| ○ Cooling system | | Forced air cooling |
| ○ Weight | | Approx. 38 Kg |

NAMES OF RELEVANT PARTS AND THEIR DESCRIPTION FRONT



- | | |
|---|---|
| <p>(1) POWER</p> <p>(2) H-L SW</p>
<p>(3) STANDBY SW</p>
<p>(4) BAND</p> <p>(5) LOAD</p> <p>(6) PLATE</p>
<p>(7) M1</p> <p>(8) M2</p>
<p>(9) SENSITIVITY</p> <p>(10) METER SW</p> | <p>POWER SWITCH</p> <p>The switch is usually to be positioned at HIGH SIDE. When it is brought to LOW SIDE, high voltage (plate voltage) will be decreased approx. 10%. Use this switch for that adjustment.</p> <p>When this switch is placed at position "REC", reception will be made or only the driver will be ready for operation. When placed at position "SEND", it will be ready for transmission (LINEAR AMPLIFIER operated).</p> <p>In this case, shortcircuit the (6) and (7) of the remote (octal socket) terminals at the rear. When VOX or PTT operation is carried out, connect the connection cord (earthed at transmission: remote) from the driver with (7)-(6) or (5) of the remote terminals at rear side. Place this unit at position "SEND".</p> <p>This is a band change-over switch. The amateur band of 1.9 - 28 MHz is divided into 6 bands.</p> <p>For load adjustment.</p> <p>For plate tuning.</p> <p>A tuning point can be obtained in a range displayed on the panel.</p> <p>This is a plate ammeter and the full scale is 1.0A. HV (high voltage), IG (grid current) and RF (high frequency output) can be read off directly with meter switch.</p> <p>Adjusting knob for sensitivity of RF meter.</p> <p>Change-over switch of M2 meter.</p> |
|---|---|

BACK SIDE



- | | |
|--------------------|--|
| (1) ANT | Output connector to be connected with antenna. |
| (2) INPUT | Input connector for connecting high frequency output of driver. |
| (3) REMOTE | There are standby and ALC output terminals. When connected with the driver, automatic change-over of transmission and reception can be effected. |
| (4) GND | Grounding terminal. |
| (5) FUSE | Fuse holder.
Use 15A (At AC 200V). |
| (6) AC INPUT | Giving the corresponding AC input with AC cord, use it. |

PREPARATION FOR OPERATION

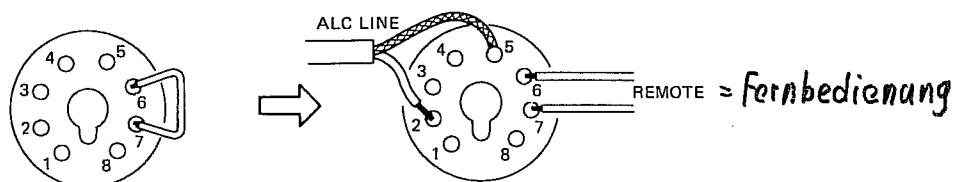
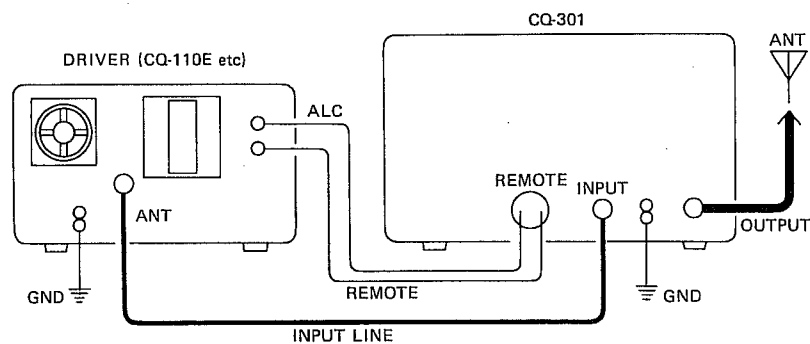
Before setting the set, be sure to confirm the following points well.

To begin with, check the external appearance of the set proper. Check whether or not the set proper is dented or scratched by visual inspection of the whole unit. Check the external knobs in order to confirm that all are positioned at specification positions and not loosened, by turning the knobs. Check whether or not there is any knob which is caught by any part when it is turned with hand. Check all the switches in the same manner and confirm that they are all operated positively.

POSITIONS OF SWITCHES AND THEIR CONNECTION

Connect the antenna (or dummy load), REMOTE and RF INPUT connectors from SSB DRIVER as illustrated in the following sketch. Incidentally, be sure to use a connection cable 1 – 1.5m long between driver and INPUT.

Be sure to use a large coaxial cable for antenna cable.



When use a REMOTE CONTROL CABLE.

POSITIONS OF SWITCHES AND KNOBS BEFORE POWER SWITCH IS TURNED ON

<input type="radio"/> POWER	OFF
<input type="radio"/> METER SW	HV
<input type="radio"/> BAND	Desired band (same as driver)
<input type="radio"/> PLATE	Center of desired band
<input type="radio"/> LOAD	Capacity MAX (counter-clockwise fully)
<input type="radio"/> H-L SW	HIGH
<input type="radio"/> STANDBY SW	REC (OFF)
<input type="radio"/> SENSITIVITY	Center
<input type="radio"/> ALC	MIN (counter-clockwise fully)

After confirming the above-mentioned, connect the AC power cord.

ADJUSTMENT ON DRIVER SET

Adjust the driver set which serves for an exciter. Connecting a dummy load or an antenna with the antenna output terminal, supply an output of the CQ-110E or the equivalent 100W class receiver to INPUT and adjust it by transmission adjustment method of the transceiver unit itself without the power switch turned on.

If the METER SW is RF, it will serve for a RF meter of the driver. Thus, preparation finishes. After preparation, adjust the linear amplifier of the unit.

ADJUSTMENT METHOD

Turn on the POWER SWITCH of this unit and the pilot lamps and vacuum tube heater are lighted. And confirm that the fan is turned.

If there is nothing abnormal, turn the STANDBY SW to the position "SEND". (This operation must be carried out without feeding drive input.)

At the time of "SEND", confirmation shall be made on the following points.

- Check whether or not PLATE CURRENT is approx. 100mA.
- Check whether or not HV is approx. 2.7 KV.

After the above, start adjustment.

- 1) Drive power is different according to driver. Giving an input, adjust it in such a manner that the PLATE CURRENT (IP) is approx. 200mA.
Adjust the LOAD in such a manner that the vibration of the RF meter is maximum. Then, make fine adjustment on PLATE too. The tuning point of PLATE is the one where IP is dipped.
- 2) Then, increase the output from the driver and give input in such a manner that 600 mA runs in IP. Then, make fine adjustment on the LOAD at driver side and plate tuning again. (Especially, special attention must be paid to the driver current (IP), avoiding running too much current.)
- 3) Make fine adjustment on LOAD and PLATE of this unit furthermore and adjust it in such a manner that IP is dipped or RF becomes maximum.

With the above, this unit has been adjusted. Adjustments mentioned in Items 1) - 3) must be made as quickly as possible. If not, unreasonable force will be given to the driver and the power tube of the unit.

Increasing or decreasing microphone gain (increasing or decreasing input) or turning on or off the STANDBY SWITCH, adjustment must be made.

OPERATING METHOD

1) DRIVING LEVEL

- a) In the case of CW, use it with IP (M1) of 0.5A at peak.
- b) In the case of SSB, use it with IP (M1) of 0.5A - 0.8A at peak.
- c) In the case of AM, use it within 0.4A. If connected and used exceeding 0.4A, it will deteriorate the power tube. Accordingly, full attention must be paid to it. Incidentally, when the type of radio wave is changed, make fine adjustment on LOAD and PLATE and check whether or not it is perfect. These are applicable when perfect matching is made with the antenna. Full attention must be paid to the matching of the antenna. If SWR stands erect or proper matching is not made, heat will be generated at the cable or the transmitting tube will deteriorate, resulting in causing trouble of the set. Full attention must be paid to the prevention of such.

2) ALC

As full voltage is obtained, adjust ALC output to such working voltage suited for the driver and use it.

3) POWER OFF

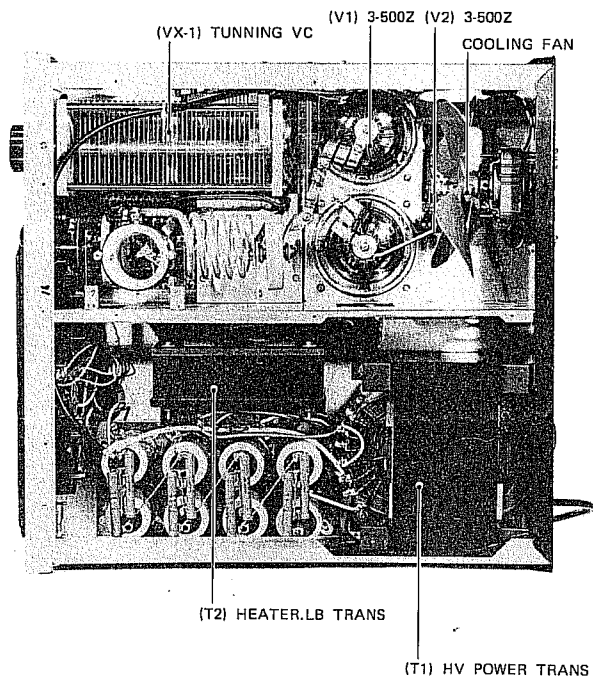
If used at it is (only driver), if the power is turned off, the antenna will be connected with the driver automatically without exchanging cable and communications can be made as it is.

CONSTITUTION OF MODEL CQ-301

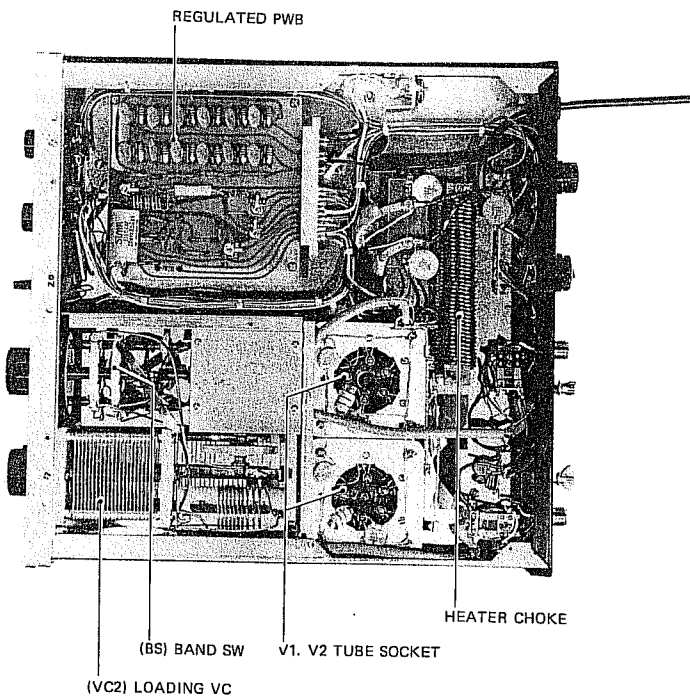
Transmitting Circuit

Model CQ-301 is a 1.9 - 30 MHz 6 band KW linear amplifier employing 2 pcs. of direct heating transmitting tubes of 3-500Z. AB1 grid earthing type (G.G. amplifier) has been adopted for the circuits. The power supply is divided into two blocks i.e. one for high voltage and the other for heater for low voltage, assuring you of stable transmitting output. T1 is a transformer for high voltage and a high voltage of 2700V is induced at (11) pin and supplied to the PLATE. This voltage is always applied to the plate and turned on and off by bias power source of T2. Furthermore, heater power is supplied to T2 and the heater voltage is supplied through filament choke. For input circuit, 1.9 - 7 is supplied directly. For higher than 14MHz, it is made to pass through 11 type filter through L6, L7 and L8.

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CQ-301 UPPER SIDE VIEW



CQ-301 BOTTOM VIEW

A large sized tank circuit is employed for output circuit for the purpose of improvement of coil Q. It has been so designed and manufactured that matching can be made with the impedance of 50 – 100Ω unbalanced antenna by π -matching circuit.

A shorting circuit has been adopted for the tank circuit for the purpose of prevention of sparks from the variable condenser, resulting in assuring you of stable operation.

ASSOCIATED CIRCUITS

- A rectifying type ALC is adopted for ALC circuit and an input signal detected at C39 is rectified at D13, 14 and then, conversion is made to DC voltage for ALC. It is regulated to a proper voltage so that it is suited for the set (driver) with VR4 100K and comes out as an output at (2) pin of the CN-3 remote connector.
- METER CIRCUIT
As for meter circuit, IP of M1 is installed independently and direct viewing can be made.
M2 has 3 positions such as HV, IG and RF which can be changed over with a meter switch. HV is for checking of plate voltage.
IG is for checking of the driving current.
RF is for checking of high frequency current of the output terminal.
The RF meter can set sensitivity by volume of VR5 of SENSITIVITY.
- STBY CIRCUIT
STBY controls RL-1 and RL-2 by remote circuit or STBY SW. The DC 100V relay is adopted. If the relay is not turned on, it will not pass through the amplifier circuit but be at through state.

MAINTENANCE AND REPAIR OF CQ-301

Periodical maintenance and repair are required for operating this unit always at best condition. The following maintenance and repair can be made by anybody.

- Cleaning of the interior.
Especially, the air passage at cooling part must be cleaned well.
- Inspection on emission of vacuum tubes

The above maintenance and repair must be made once every 6 months – 1 year depending on environment and use condition.

For cleaning, remove the cover of the set proper and the internal mechanism appears.

Blow off the dust or foreign accumulated inside with the air blowing from a cleaner. For checking of emission, if idling current is decreased, attention must be paid thereto.

Besides, check whether or not the knobs and switches are loosened or have some play. If they should be found defective, maintain or repair them and you can operate the set always at best condition.

TROUBLE

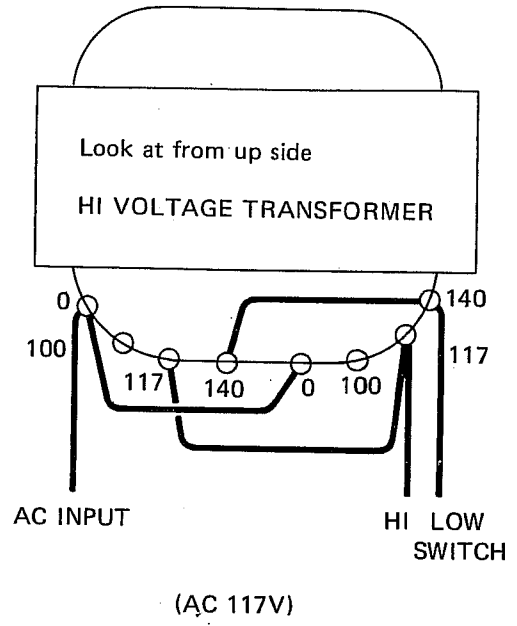
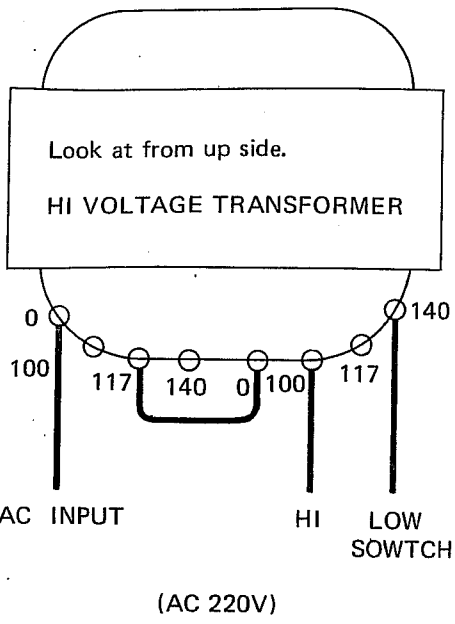
Only the trouble which can be corrected is the blowing of the fuse. If the fuse blows, exchange it for a spare fuse. After exchanging, if the fuse blows again, the internal mechanism has been troubled. In this case, you will please bring it to the nearby service station for repair.

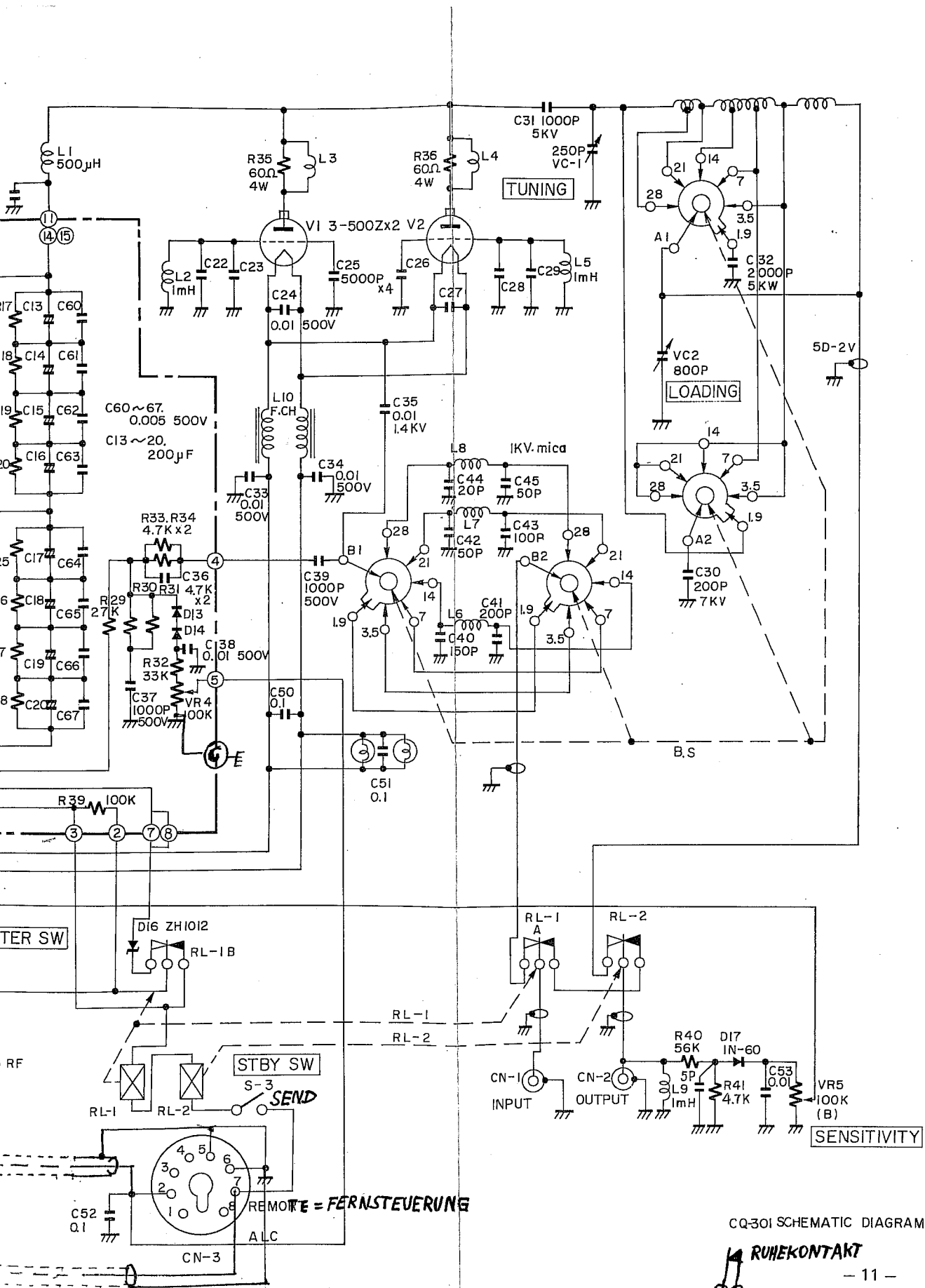
When the internal mechanism is handled with hand, be sure to remove the power plug socket and touch it after discharging the capacitor. If not, serious injury might happen sometimes.

CHANGING METHOD OF AC POWER SOURCE

The following sketch is the transformer facing upward. After confirming that the power source is not connected, connect it as illustrated in the sketch.

Furthermore, confirm the commercial power voltage. If mistaken, the set will be damaged seriously.





CQ-301 SCHEMATIC DIAGRAM

