
# 430MHz ALL MODE TRANSCEIVER LS-707



## INSTRUCTION MANUAL

Belcom NIHON DENGYO CO., LTD

## PRIOR TO USE

We hope that you will peruse the OPERATION MANUAL with utmost care so that you may make the best use of this unit smoothly without any trouble for many years to come.

It is extremely important to gain mastery of the operational procedure in order to keep the transceiver always at the best operating condition.

## CONTENTS



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# 1. FEATURES

* **LS-707** FEATURES FULL COVERAGE OF OVER 10MHZ OF ALL MODE

  This transceiver is the first version in the world to cover continuously 430MHz – 440MHz and using a full solid-state line.
  **LS-707** can be operatable A1, A3j (LSB/USB), A3 and F3 modes.

* FIX X'TAL CHANNELS

  **LS-707** has 10 bands and 10 FIX X'TAL position for common use, resulting 100 channels for your convenience.

* FREQUENCY DRIFT CANCELLER

  Frequency stability is the most important point of operation of SSB at the UHF band. **LS-707** has a unique drift cancelling circuit and a specialized gear shift.

* MODULAR TYPE PLUG IN PCB

  Upon the servicing, keeping a reliability and high-performance of **LS-707**, using a plug-in type modular circuits.

* MARGINABLE FINAL POWER AMPLIFIER

  Using a marginable circuit design and high-output power transistor 2SC-2132 which allows 25W output in UHF band.

* DIAL INDICATION AND ILLUMINATION

  Main dial scale is installed into the inside of the front display window with soft and green scale illumination to avoid the fatigue of eyes.

* USABLE METER FUNCTION SWITCH

  Push switch is adopted to switch S/RFO and center meter with a simple action.

* MANY USABLE ADDITIONAL CIRCUITS

  BELCOM **LS-707** is adopted many usable circuits for the amateur station, VOX, CW semi-break-in, CW monitor, FIX X'TAL channels and etc.

# 2. PRIOR TO USE

## 2–1. Installing place

- **LS-707** is a communication apparatus which has been adjusted accurately by high quality measuring instruments.
  Avoid installing this unit in such places as shown hereunder so that it may be operated stably for a very long time.

  1 Very hot and humid place

    Near the room cooling and heating place, or place which is exposed directly to the wind blown directly from the equipment or kitchen etc.

  2 Dusty place

  3 Place exposed directly to the sunlight

  4 Place subjected directly to vibration and shock

  5 Place having poor ventilation

- Playing attention to the abovementioned points, select such a dry place as having good ventilation.
  Be sure to separate its rear heat sink and bottom from the wall or desk as much as possible in order to improve the heat radiating effects.

(CAUTIONS)

If the set is installed on its side or with its back panel side facing downwards, the heat radiating effects will become poor, resulting in unstable operation sometimes.

## 2–2. Power source

- **LS-707** may be operated on DC 13.8V.

(CAUTIONS)

1 Check whether or not SEN-REC switch of the **LS-707** has been placed at position "REC".

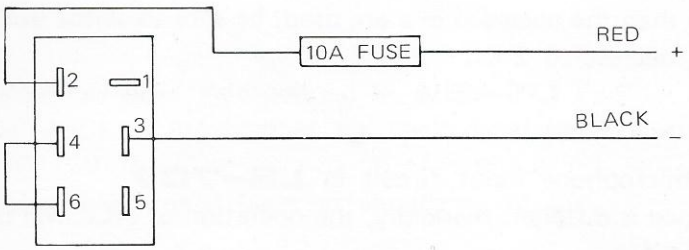
2 In the case of DC power, check whether or not the cord for DC has been disconnected with DC power (battery).

- A (–) earthing system has been adopted for **LS-707**.

- Inserting a 6P square type connector of the power cord for DC (Fig. 1) into the set, connect the (+) of the DC power with the red cord and (–) with black cord.

- At mobile operation, a maximum of approx. 5A runs. Therefore, in order to prevent the battery from overdischarging, be sure to operate the unit with the engine at operating state.

FIG. 1 DC POWER CORD




(CAUTIONS)

- When DC power (battery) is used, be sure to confirm the following points.

  1 Check whether or not the polarity of (+) and (–) is all right.
  If the polarity is wrong, the set might be troubled sometimes.

  2 Check whether or not the cord has been fitted to the DC power source (battery) positively.
  If fitted loosely, heat will be generated, burning the DC power cord of the battery or breaking out fire.
  Special attention must be paid thereto so that such an accident may not develop. At the same time, the transmitting output might drop.

## 2–3. Antenna

- There are many types of antennas available. UHF band depends especially on the performance of the antenna markedly. Be sure to select a good antennas which is best suited for the intended purpose.
  (10MHz covered continuously in **LS–707**)

- At the same time, the height of an antenna exerts influence over UHF band seriously.
  The minimum height of the antenna must be higher than 10m.

- The antenna impedance of **LS–707** is 50Ω.
  The matching with antenna is especially important in UHF band. The antenna and coaxial cable must be of 50Ω and SWR must be as low as possible.
  (If used at mismatching state the band pass characteristics of the set will become poor, resulting in poor performance.)

- The cable loss at UHF band is very large.
  The coaxial cable 10D–2V or higher must be used.

- The antenna connector of **LS–707** is N TYPE.
  N type connector must be used.

## 2–4. Microphone

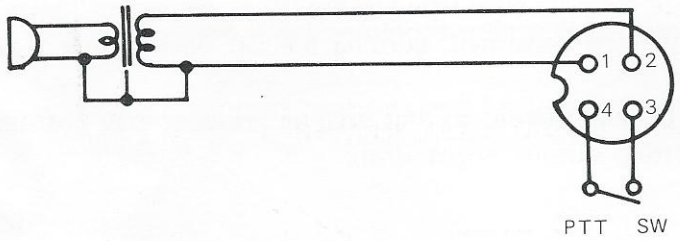
- The impedance of the enclosed microphone is 2 KΩ.
  When other microphones than the enclosed one are used, be sure to select such a microphone as having an impedance nearest to 2 KΩ.

(CAUTIONS)

ALC is applied to the microphone input circuit in **LS-707**.
Therefore, if the impedance is different markedly, the operation of ALC will become unstable sometimes.

- Fig. 2 shows the connection of microphone.
  When other microphone than the enclosed one are used, full attention must be taken so that wiring is provided correctly.

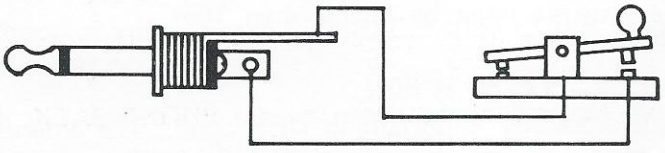
FIG. 2 CONNECTION OF MICROPHONE CONNECTOR




## 2–5. Key for CW

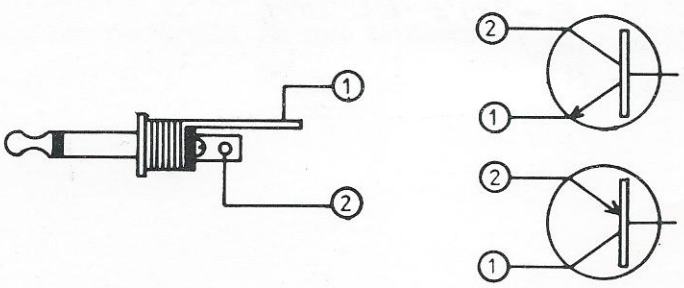
When the manual key is used, be sure to connect it with the enclosed plug.

FIG. 3 KEY PLUG CONNECTION DIAGRAM



When an electric keyer is used, pay attention to the polarity of the electric keyer.

FIG. 4 POLARITY OF THE SWITCHING TRANSISTOR WHEN ELECTRIC KEYER IS USED

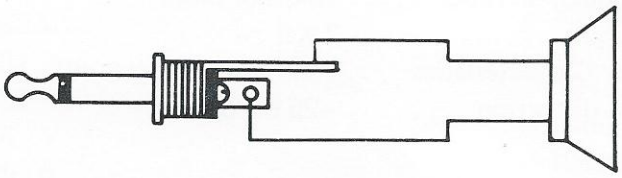


In other modes than CW mode, keying circuit does not operate. With the key inserted to KEY JACK, other modes can be used.

## 2-6. External speaker

- A speaker has been incorporated in **LS-707**.
  EXT SP JACK is provided at the back panel so that an external speaker can be used.
- External speakers must have an impedance of 8Ω.
- In order to improve clearness at reception, be sure to use a speaker for communication equipment having a large diameter so far as practicable.
- When an external speaker is used, the attached small plug must be used and connection, be made with EXT SP. (Fig. 5)
- When an external speaker is used, the attached small plug must be inserted and the built-in speaker will be turned off.

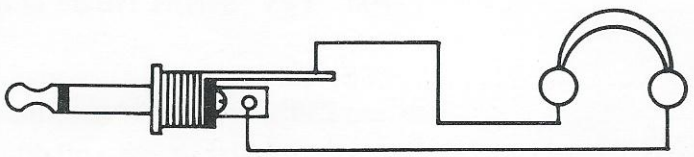
FIG. 5 CONNECTION DIAGRAM OF EXTERNAL SPEAKER



## 2-7. Head phone

- Be sure to use a head phone having an impedance from 8 – 16Ω.
- Be sure to use the attached plug and connect it with the PHONE JACK. (FIG. 6)
- When the plug is inserted to the PHONES JACK, the incorporated speaker and external speaker will be turned off.

FIG. 6 CONNECTION OF HEAD PHONE AND PLUG



# 3. SPECIFICATIONS

- Frequency range ..... 430~440 MHz
- Type of emission ..... A3J (LSB, USB)
  A1, A3, F3
- Power supply voltage ..... DC 13.8V ±10%
- Antenna impedance ..... 50Ω
- External dimensions:
  Height x Width x Length ..... 110H x 280W x 355L
- Weight ..... 9.8 kg

## TRANSMITTER SECTION

- RF output ..... A3J 10W (PET)
  A1, F3 10W
  A3 4W
- Modulating system ..... A3J Balanced modulation
  A3 Low power modulation
  F3 Variable reactance frequency modulation
- FM maximum frequency deviation ..... ±5 KHz
- SSB generating system ..... Crystal filter system
- Unrequired carrier suppression ..... 40 dB or more
- SSB unwanted side band suppression ratio ..... 40 dB or more
- Microphone impedance ..... 2 KΩ
- Transmitting audio frequency Characteristics .... 300~2,700Hz (±3 dB)
- Third order cross modulation distortion ..... –25 dB or less

## RECEIVER SECTION

- Receiving system ..... SSB, AM, CW:
  Double conversion superheterodyne
  FM:
  Triple conversion superheterodyne
- Intermediate frequency ..... SSB, AM, CW:
  1st IF 46.7~47.7 MHz
  2nd IF 10.7 MHz
  FM: 1st IF 46.7~47.7 MHz
  2nd IF 10.7 MHz
  3rd IF 455 KHz
- Sensitivity ..... SSB, CW: 0.5μV input S + N/N
  20 dB or more
  FM 30 dBQS 1 μV or less
  AM 1 μV S+N/N 10 dB or more
- Selectivity ..... SSB, CW, AM
  ±1.2 KHz or more –6 dB
  ±2.4 KHz or less –60 dB
  FM ±7.5 KHz or more –6 dB
  ±15 KHz or less –60 dB
- FM squelch sensitivity ..... 0.5 μV or less

- Audio output ..... 2W or more into 8Ω load
- Image ratio ..... 60 dB or more
- Frequency stability ..... ±4 kHz or less from 1 minute after power on to 60 minutes
  200 Hz or less per 30 minutes after that
- Semi-conductors ..... Transistor 85
  FET 11
  IC 6
  Diode 90
- Power consumption ..... DC 13.8V Max. 5A

SEMI-CONDUCTORS USED

- TRANSISTORS

| | |
|---|---|
| 2SB525 - C | 5 |
| 2SC381 - O | 3 |
| 2SC387 - A | 17 |
| 2SC509 - Y | 2 |
| 2SC710 - C | 47 |
| 2SC1164 - 0 (or R) | 2 |
| 2SC1260 | 2 |
| 2SC1967 | 1 |
| 2SC1968A | 1 |
| 2SC2131 | 1 |
| 2SC2132 | 1 |
| 2SD114 - Y | 1 |
| 2SD325 - 0 | 2 |

- FET's

| | |
|---|---|
| 2SK19GR | 10 |
| 3SK48 | 1 |

- IC's

| | |
|---|---|
| TA7063P | 1 |
| SN7400 | 1 |
| SN7490 | 2 |
| μPC577H | 1 |
| AN315 | 1 |

- DIODES

| | |
|---|---|
| S5VB - 20 | 1 |
| IS1555 | 58 |
| MI402 | 2 |
| IN60 | 16 |
| IS990 | 5 |
| RD6A | 3 |
| BZ090 | 1 |
| MV201 | 1 |
| MA320B1 | 3 |

# 4. ACCESSORIES

**LS-707** has the following accessories.

① Microphone (1 pc.)
With press-to-talk (PTT) switch and 4P connector.
Impedance: 2 KΩ

② Microphone hanger (1 pc.)
Crown washer, 3M tap screw with 2 pcs. each

③ Power cord for DC 13.8V (1 pc.)
With 6P connector, fuse holder

④ 9-pin plug (1 pc.)
For ACCY (accessory)

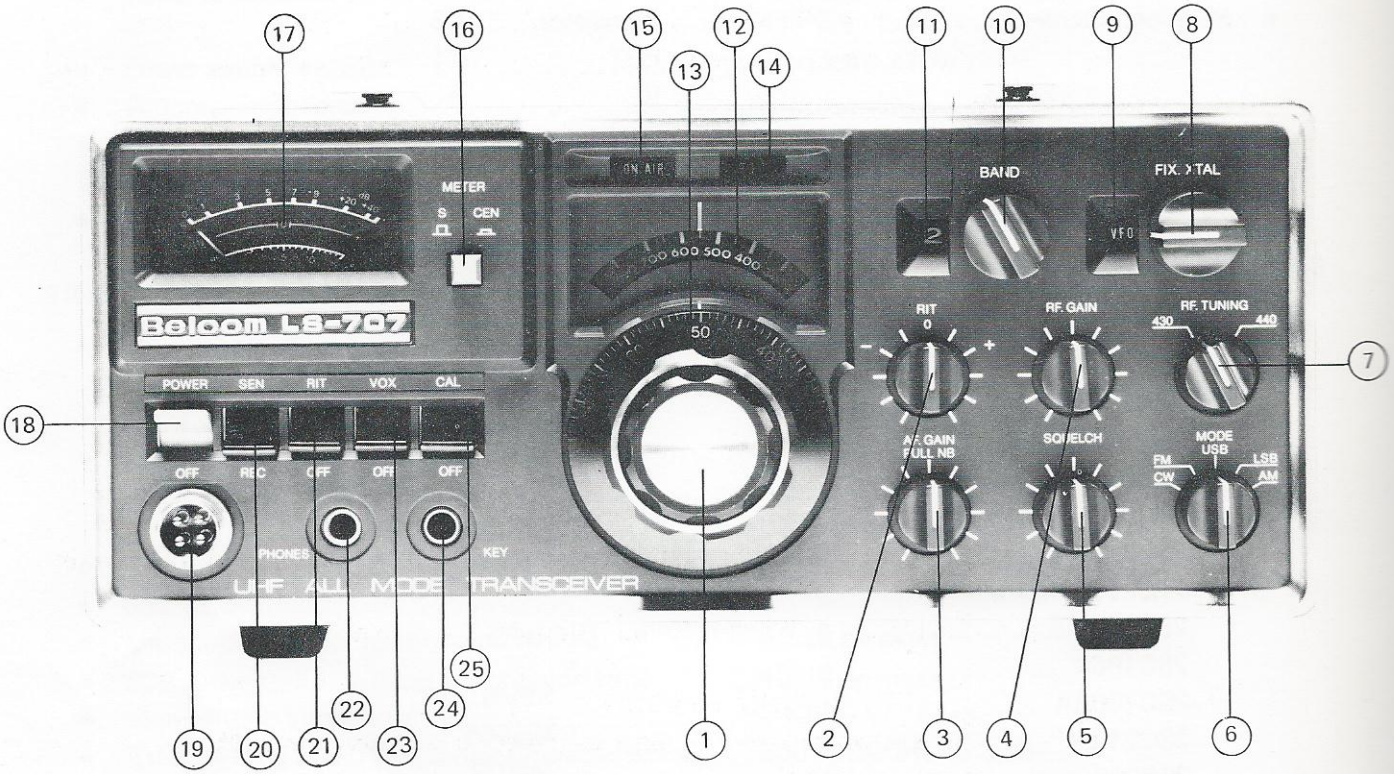
⑤ Small type plug 2P (1 pc.)
For EXT. SP (external speaker)

⑥ Plug 2P (2 pcs.)
For key and head phone

⑦ Fuse 10A (1 pc.)

# 5. DESCRIPTION ON PANEL

## 5–1. Front panel




① MAIN TUNING KNOB

- This is a knob for tuning the frequency to a desired frequency.
- Double speed tuning function
  100KHz (OUTSIDE) per revolution and 25KHz (INSIDE).

② RIT

- This is a knob for making fine adjustment on frequency only at the time of reception.
- The operation of RIT circuit is turned on or off by means of RIT switch ㉑ .
- When RIT knob pointer is located at position "0", transmitting and receiving frequencies will be in accord with each other.
- The receiving frequency can be changed by approx. ±2KHz regardless of transmitting frequency.

③ AF GAIN, PULL NB

- This is a knob for adjustment on volume at the time of reception.
- When turned clockwise, the volume will be increased. When turned counter-clockwise, it will be decreased.
- When this knob is pulled out towards the front, the noise blanker will be turned ON.

④ RF GAIN

- This is a knob for gain adjustment of amplifiers at RF and IF stages.
- When turned clockwise, gain will be increased. When turned counter-clockwise, it will be decreased.
- Use it usually by turning it fully in the clockwise direction.

⑤ SQUELCH

- This is a knob for adjustment on operating point of SQUELCH for cutting noise at no-signal time.
- It is operated only when it is at FM mode.
- When turned counter-clockwise fully, the SQUELCH will be released.
- When turned clockwise, the SQUELCH will be closed, cutting off noise.
- Turning it slowly clockwise, be sure to use it at such a position where noise is cut off.

⑥ MODE

- This is a change-over switch for radio wave modes.
  - CW ..... Transmitting and receiving of telegraph ($A_1$)
  - FM ..... Transmitting and receiving of FM ($F_3$)
  - USB ..... Transmitting and receiving of UPPER SIDE BAND ($A_3J$)
    USB is usually used at 430MHz band.
- LSB ..... Transmitting and receiving of LOWER SIDE BAND ($A_3J$)
- AM ..... Transmitting and receiving of AM ($A_3$)

⑦ RF TUNING

- This is a knob for adjustment of RF tuning circuit at the time of reception.
- This unit has used a tuning circuit having BAND PASS characteristics of 10MHz width. The tuning of this knob is broad.
- When the input signal is small, adjust it to the best point by this knob.

⑧ FIX X'TAL ⑨ INDICATING WINDOW

- This is a change-over switch for fixed frequencies (crystals) and incorporated VFO.
- The position of the switch is indicated in the indicating window ⑨ .
- When the switch is at VFO:
  1. "VFO" is indicated at the indicating window ⑨ .
  2. The illumination lamp of the channel indicating window ⑫ , ⑬ is turned on.
  3. VFO is operating.
- When the switch is fixed frequency (crystal)
  1. "1" – "10" is indicated in the display window ⑨.
  2. The illuminating lamp of the frequency indicating scales ⑫ and ⑬ are put out.
  3. The fixed crystal oscillating circuit is operating.
  4. When a crystal is not put in the fixed crystal oscillating circuit, the illuminating lamp of the indicating window 9 will be put out.
     * There are 10 FIX X'TAL channels.
       They are operated in common for each band. This unit has 10 bands, resulting in total 100 channels.

⑩ BAND ⑪ INDICATING WINDOW

- This is a switch for changing over bands.
- Change-over is effected over 430MHz – 440MHz in a step of 1MHz.
- The frequency of each band is indicated in the indicating window ⑪ in "0" – "9".
- The relations between indication and frequency are as follows:

| DISPLAY | FREQUENCY |
|---|---|
| 0 | 430MHz |
| 1 | 431MHz |
| 2 | 432MHz |
| . | . |
| . | . |
| . | . |
| 8 | 438MHz |
| 9 | 439MHz |

⑫ MAIN SCALE FREQUENCY INDICATOR

- In a scale of 0~1000, frequencies of 100KHz's are shown.

⑬ SUB-SCALE FREQUENCY INDICATOR

- In a scale of 0~100, frequencies of 1KHz is shown.

⑭ RIT INDICATOR

- When RIT switch ㉑ is turned on, it will be lighted.

⑮ ON AIR INDICATOR

- It is lighted on a transmitting state.

⑯ METER SWITCH

- This is a change-over switch for meters.
- Change-over is effected from center meter to S meter by means of the push switch.
- This switch is operated only at a FM mode. In other modes, it becomes a S meter (at reception) regardless of switch position.

⑰ METER

- This unit is operated as S meter or center meter when the meter switch ⑯ is changed over at reception.
- Strength of transmitting power output signal is indicated at the time of transmission.

⑱ POWER

- This is an ON/OFF switch for power source.

⑲ MIC

- This is a connector for the microphone.

⑳ SEN-REC

- This is a switch for hanging over of transmission and reception.
- SEN: TRANSMISSION
- REC: RECEPTION
- When the set is on a receiving state with this switch placed at position "REC" and the PTT switch of the microphone is pushed, it will be ready for transmission.

(CAUTIONS)

When the power switch of the set is turned on, be sure to place this switch at position "REC" (lower side) and turn on the power.

When the power is turned on with the switch positioned at SEN (up side), the power switch will become poor in contact or other troubles will be caused.

㉑ RIT

- This is a switch for turning ON and OFF of the RIT (RECEIVING INCREMENTAL TUNING).
- With RIT switch at position "ON", only the receiving frequency can be adjusted finely with RIT knob ②.
- With RIT switch at position "OFF", transmitting and receiving frequencies will be in accord regardless of the position of RIT knob ②.

㉒ PHONES

- Jack for head phone (8—16Ω).
- When the head phone plug is inserted, the speaker will be turned off.

㉓ VOX

- This is a switch for turning on and off the voice control circuit.
- When the switch is turned on, transmission and reception by voice can be changed over.
- When it is at CW mode, it will become a semibreak-in system.
- With the switch located at OFF position, transmission and reception are changed over by PTT switch of the microphone or SEN switch ⑳.

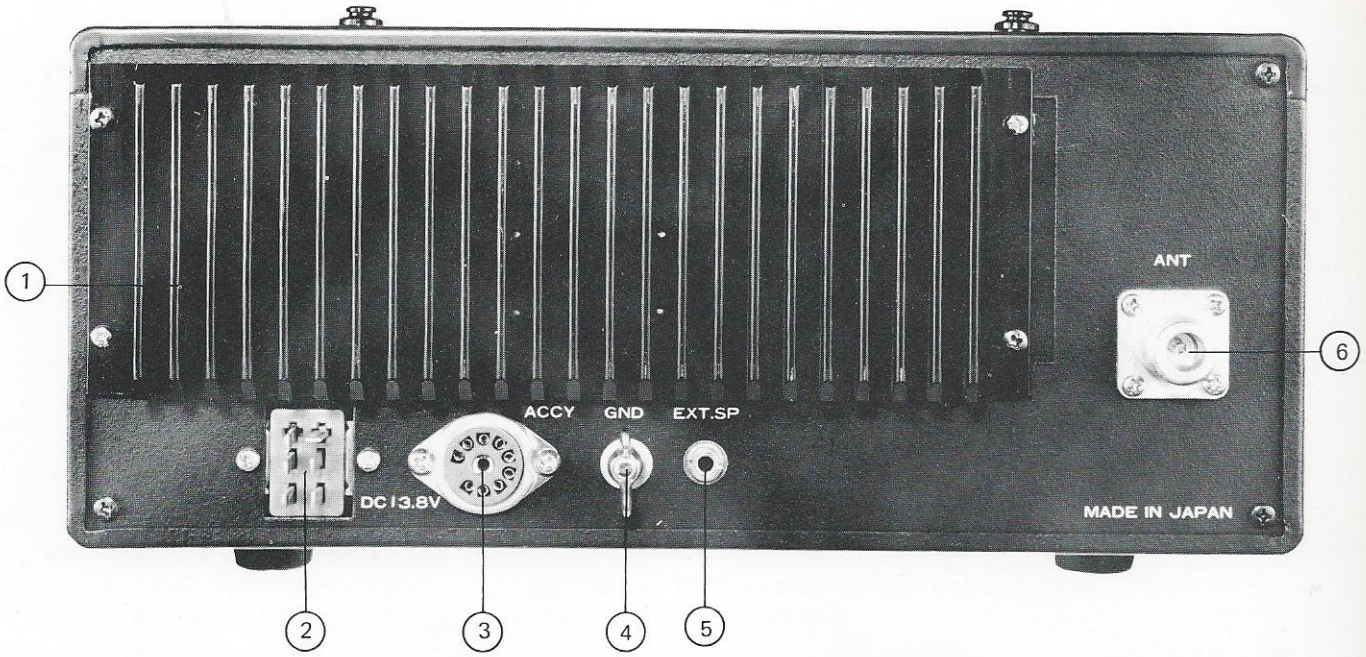
㉔ KEY

- At CW mode, this is a jack for connection of the key.

㉕ CAL

- This is an ON/OFF switch for 100kHz calibrator.
- By bringing down the switch to CAL (upper side), the frequency indication sub-scale is calibrated.

## 5–2. Back panel




① TX PA SECTION HEAT SINK
- This is a heat sink for heat radiation at the transmitting linear amplifier section.

② POWER (DC 13.8V)
- This is a connector for power source.
- Connect the enclosed DC power cord.

③ ACCY
- This is a socket for accessories.

④ GND
- This is a terminal for earthing the set.

⑤ EXT. SP
- This is a jack for an external speaker.
- Use the enclosed small type plug.

⑥ ANT
- This is an N type connector for the antenna.
  Read the text for the details of the antenna and cable.

# 6. OPERATING PROCEDURE

## 6–1. How to read the frequency

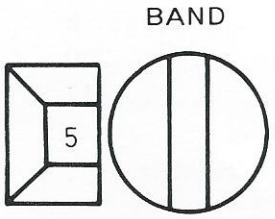
- When VFO is used and the unit is operated, read the frequency as follows:

  (MHz's) . . . . . Read the indicated value in the band indicating window ⑪ (FIG. 7)

- Relations between indication and frequency

| (INDICATION) | (FREQUENCY) |
|---|---|
| 0 | 430MHz |
| 1 | 431MHz |
| . | . |
| . | . |
| . | . |
| 8 | 438MHz |
| 9 | 439MHz |

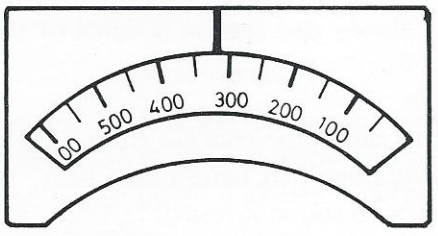
FIG. 7




EXAMPLE: 435MHz

(100KHz's) . . . . . Read the indicated value on the main scale ⑫ . (FIG. 8)

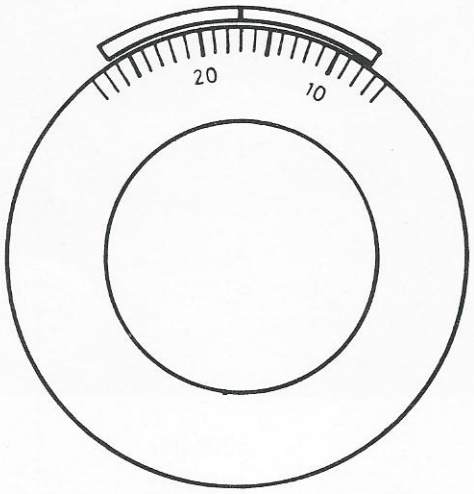
FIG. 8




EXAMPLE: 300 KHz

(KHz's) . . . . . Read the indicated value of frequency on the sub-scale ⑬ . (FIG. 9)

FIG. 9




EXAMPLE: 17KHz

From examples of FIG. 7, FIG. 8 and FIG. 9:

- MHz's . . . . . 5
- 100KHz's . . . . . 300
- KHz's . . . . . 17

Then desired frequency read out becomes 435.317MHz.

### 6–2. Calibration of frequency indicating scale

#### 6–2–1. Calibration of SSB mode

(1) In SSB mode, the frequency of carrier indicates the frequency.

(2) Bring down CAL switch ㉕ to the CAL SIDE.

(3) Adjusting the frequency indicating main scale to the frequency near 100KHz, turn the main tuning knob ① (INSIDE) slowly and receive a signal of the calibrator in order to make zero beat.

How to make zero beat:

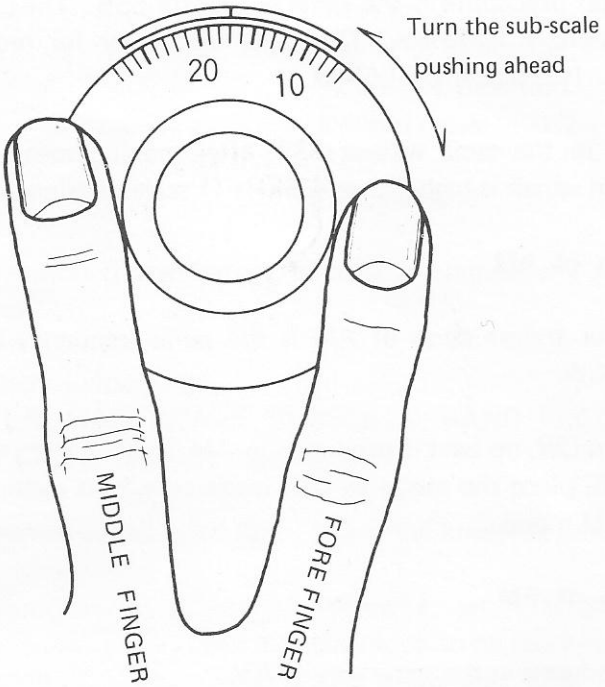
The beating sound of the calibrator changes from a high pitched tone to a lower one and changes to a trembling noise just before zero beat. Turn it slightly from that point and find the position where no sound is heard.

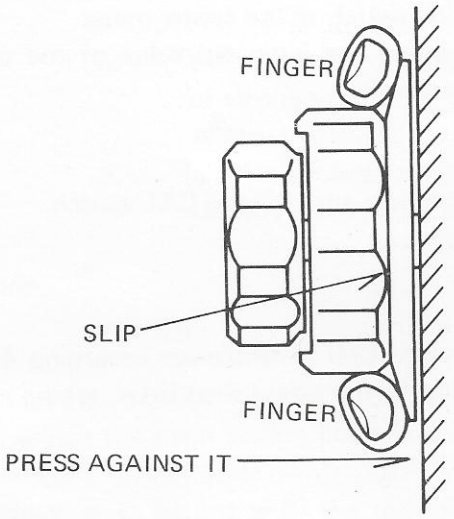
(4) At this state, push the sub-scale ⑬ and turn it and adjust it to the scale "0". (FIG. 10)

(CAUTIONS)

After providing a zero beat, when the sub-scale is turned, hold it with other fingers so that the main tuning knob is not turned.

FIG. 10 SCALE CALIBRATION




(CAUTIONS)

When zero beating is provided, a slight beating sound might be heard at sides of zero beat sometimes. This phenomenon develops attributable to the following:

In order to use the calibrator up to 430MHz, a slight phase difference is caused between both 10MHz and 100MHz by dividing are synthesized.

For the same reason, there are strong and week points in beat of 100KHz's. These phenomena are not attributable to the trouble of the receiver.

(CAUTIONS)

Between LSB and USB, the position of carrier deviates by 3KHz. Recalibration must be made separately.

### 6–2–2. Calibration of CW

(1) The calibration procedure is the same as that for SSB. The oscillating frequency of the carrier for transmission is 10.7MHz. The BFO frequency for reception (USB carrier is used) is 10.6985MHz. It is higher by 1.5kHz.

(2) Accordingly, in the same way as SSB, after making zero beat calibration, set the subscale at the position which is higher than 1.5kHz (1 scale division and 1/2) from "0".

### 6–2–3. Calibration of AM

(1) The carrier for transmission of AM is the same frequency as CW. Calibrate it in the same procedure as CW.

(2) Different from CW, no beat is produced in AM.
To begin with, place the mode to CW, make zero beat calibration in the same way as CW and return it to AM mode.

### 6–2–4. Calibration of FM

(1) No beat is produced in the same way as AM.
Upon receiving a signal from the calibrator, adjust it to the point where the signal is maximum.

(2) Position the meter function switch to the center meter.
Adjusting to the point where the indicated value of the center meter is CENTER "0", adjust it to the "0" of the subscale.

(CAUTIONS)
After completion of calibration, turn off the CAL switch.

## 6–3. Before operation

- **LS-707** is an all-mode UHF Transceiver coverning 430MHz ~ 440MHz. Therefore, it must be operated according to the established rules, taking care not to interfere other stations or to cause disturbance.

## 6–4. How to make reception

### 6–4–1. Preparation

- After preparing the antenna and the power supply, set the switches and knobs in the following procedure.

(1) POWER switch ⑱ ..... OFF (LOWER SIDE)
(2) SEN-REC switch ⑳ ..... REC (LOWER SIDE)
(3) RIT switch ㉑ ..... OFF (LOWER SIDE)
(4) VOX switch ㉓ ..... OFF (LOWER SIDE)
(5) CAL switch ㉕ ..... OFF (LOWER SIDE)
(6) METER switch ⑯ ..... S
(7) NB switch ③ ..... OFF (PUSH IN)
(8) AF GAIN knob ③ ..... Turn fully counterclockwise

(9) RIT knob ② ..... Center of indication "0"
(10) RF GAIN knob ④ ..... Turn fully clockwise
(11) SQUELCH knob ⑤ ..... Turn fully counterclockwise
(12) RF TUNING ⑦ ..... Center of indication, 12 o'clock direction
(13) MODE switch ⑥ ..... Desired mode
(14) FIX X'TAL switch ⑧ ..... VFO
(15) BAND switch ⑩ ..... Desired band

- After making the abovementioned preparation, be sure to connect the antenna and the power supply with each connector.

- Turn on the POWER switch (upper side).
The pilot lamps of METER, MAIN SCALE, SUBSCALE, BAND FIX X'TAL are lighted, indicating that the **LS-707** is ready for operation.

- After confirming the abovementioned operations, adjust the knobs as follows.

(1) AF GAIN knob ..... Turning clockwise, set it at an appropriate volume.
(2) MODE ..... Set it to the mode to be received.
(3) MAIN TUNING knob ..... Turning the knob and tune it to a desired signal. Adjust the S meter to the position "MAX" where it can be heard most clearly.
(4) RF TUNING knob ..... Adjust it in such a way that the maximum sensitivity can be obtained. Not so effective at the time of strong signal. Use it when the signal is weak.
(5) RF GAIN knob ..... When the signal is very strong, return it counterclockwise and use it at an appropriate position. Usually, turn it clockwise and use it.

### 6–4–2. Reception of CW mode

- Turn off the RIT switch.

- Receiving CW radio signal, adjust the main tuning knob in such a way that the beat is 1500Hz.

- Then, the receiving frequency is in accord with the transmitting frequency. The frequency is in accord with that of the partner station.

♦ USE OF RIT

(1) After adjusting to the partner station in the abovementioned procedure, if beat is high, turn on the RIT switch and use RIT knob in order to obtain a desired beat. (Generally speaking, 800Hz ~ 900Hz are said to be ideal for listening)

(2) For the call transmitted by your station, if the partner station responds by a beat of 1500Hz, the frequencies of the stations will be both in accord. If responded deviating from 1500Hz, turn on the RIT switch without turning the main tuning knob and adjust it by the RIT knob.

### 6–4–3. Reception of FM mode

- Turn the METER switch to CEN.
  The meter serves for a center meter and the pointer of the meter indicates "0" at center of the meter.

- Turning the main tuning knob, adjust it to the partner station. Then, the center meter vibrates once at left or right. It indicates "0" at center when the frequency is adjusted.

- That is, when adjusted to the partner station in such a way that the indication of the center meter is zero at center, the transmitting and receiving frequencies will be in accord with each other.

(CAUTIONS)

If the deviation of the partner station is wide, voice will be distorted at the peak sometimes. This is because FM mode of **LS-707** has been designed on a narrow bais (±5kHz deviation). Therefore, it is not a trouble.

♦ USE OF SQUELCH

FM has its own unique noise at no signal.
SQUELCH is used for illumination of this noise.

(1) When the SQUELCH knob is turned slowly clockwise at no-signal state, there will be a point the noise is cut. Turning the knob clockwise slightly from that point, you will find the point where it is operated at a normal operating state.

(2) When the knob is turned clockwise, the squelch will become deep considerably. When no strong signal is applied, it will not open.

(CAUTIONS)

If the deviation of the partner station is wide (e.g. ±15KHz or more), the squelch will be closed sometimes at the peak of reception. This is because the FM mode of **LS-707** has been designed on a narrow basis. It is not a trouble.

### 6–4–4. Reception of SSB mode

- Turn the MODE switch to USB.

- Upon receiving SSB radio signal, adjust it in such a way that the demodulated voice is a natural one. Then, the transmitting and receiving frequencies are in accord with each other.

- If the demodulated voice is not a normal one even in case the main tuning knob is turned, there will be a possibility that it is LSB. Therefore, change over the MODE switch to LSB.

(CAUTIONS)

In other modes than SSB, a beat is heard, resulting in enabling you to distinguish it from SSB. Then, change it over to other modes.

(CAUTIONS)

In SSB mode of 430MHz, it is a prevailing custom to use USB.

In SSB mode, the beginner will find it very hard to adjust frequencies. Use the tuning knob (inside) and turn it as slowly as possible and adjust it in such a way that a natural voice is obtained.

♦ USE OF RIT

(1) After being adjusted to the partner station, if the frequency of the partner station has deviated, do not turn the main tuning knob and turn on the RIT switch. Adjust it by utilizing the RIT knob.

(CAUTIONS)

With the RIT switch turned on, if the indicated value of the RIT knob is other than "0" at center, transmitting and receiving frequencies will be not in accord with each other.

If new communications are made with another station, be sure to turn off the RIT switch and call it.

### 6–4–5. Reception of AM mode

- Turn the main tuning knob, adjust it to the point where the voice of the partner station is natural and the indication of the S meter becomes maximum.

- In AM reception, the crystal filter in common use for SSB is used. The pass band becomes narrow and high pitched tone is cut.
  After adjusting to the partner station once, turn on the RIT switch and turn the RIT knob. Deviate the frequency slightly, resulting in improvement of clearness.

### 6–5. How to transmit

- After gaining mastery of receiving operation, carry out the transmitting operation.

- For transmission, receive the frequency to be transmitted by your station beforehand and confirm that other stations have not made communications with the station.

### 6–5–1. Transmission of CW mode

- Connect the key for CW with the KEY JACK at front panel with the attached plug.

- Turn the MODE switch to CW.

- Bring down the SEN-REC switch to the position "SEN" (upper side). Then, the ON AIR indicator at the front panel is lighted.

- No radio wave is transmitted at this state.

- When the key is brought down, the radio wave will be transmitted. Therefore, carry out the keying operation.

- The meter vibrates according to keying.

- A low frequency oscillator for CW monitor has been incorporated in **LS-707**. Therefore, the keying of your own station can be monitored. Voice of the monitor is adjusted with AF GAIN (front panel).

### 6–5–2. Transmission of FM mode

- Connect the attached microphone with the MIC connector at front panel.
- Turn the MODE switch to the position "FM".
- Bring down the VOX switch to the position "OFF" (lower side).
- When the press-to-talk switch of the microphone is pushed or SEN-REC switch is turned to SEN, the ON AIR indicator will be lighted. At the same time, the pointer of the meter will vibrate, resulting in being ready for transmission.
- When talking to the microphone, FM radio wave will be transmitted.

### 6–5–3. Transmission of SSB mode

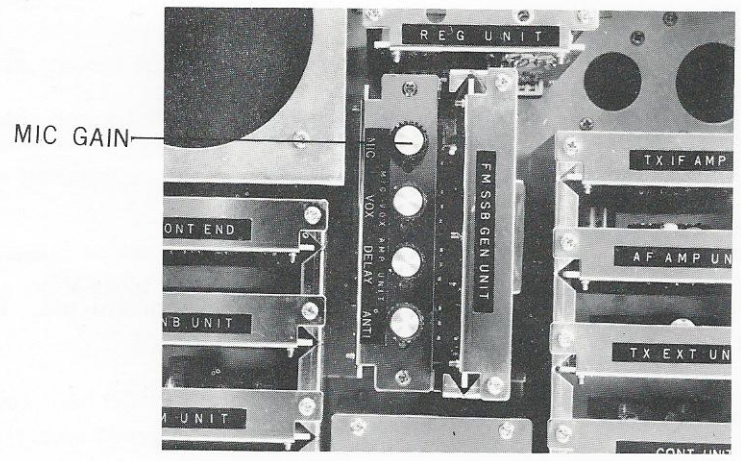
- Connect the attached microphone with the MIC connector at front panel.
- Place the MODE switch to the position USB or LSB. (Usually, USB is used in UHF.)
- When the press-to-talk switch of the microphone is pushed or SEN-REC switch is turned to SEN, the ON AIR indicator will be lighted, resulting in indicating the transmitting state.
- When talking to the microphone, SSB radio wave will be transmitted.
- The pointer of the meter will vibrate according to the voice.

(CAUTIONS)

For adjustment on microphone gain of SSB, open the upper cover of the case and adjust the knob for adjustment on MIC gain. (FIG. 11)

In **LS-707**, there is ALC (AUTO LEVEL CONTROL) for the microphone amplifier. Place it fully clockwise and do not move it in normal operation.

FIG. 11



### 6–5–4. Transmission of AM mode

- Connect the attached microphone with the MIC connector at front panel.
- Turn the MODE switch to the position "AM".
- When the press-to-talk switch of the microphone is pushed or SEN-REC switch is turned to the position "SEN", the ON AIR indicator will be lighted. At the same time, the pointer of the meter vibrates, indicating the transmitting state.
- When talking to the microphone, AM radio wave will be transmitted.

(CAUTIONS)

When talked too near to the microphone, clearness will become poor.
Keeping the microphone 10–15cm from the mouth, talk to it in a normal volume.

(CAUTIONS)

The scale RFO (RF OUT) for indication of the transmitting output of the meter has been adjusted upon connecting with a dummy load before shipment. It is influenced by SWR of the antenna, resulting in poor indication.
Use it for a temporal reference for transmitting output.

## 6–6. Change-over of transmission and reception

The following methods are available for change-over of transmission and reception of **LS–707**.

### 6–6–1. SEN-REC switch

- Change-over method by SEN-REC switch ⑳ at front panel.

SEN ..... TRANSMISSION
REC ..... RECEPTION

Use it when transmission is made for a very long time or CW is operated.

(CAUTIONS)

When the SEN-REC switch is used, turn off the VOX switch (lower side).

### 6–6–2. PTT switch (built-in microphone)

- Method by press-to-talk switch of the microphone

PUSH ..... TRANSMISSION
RELEASE ..... RECEPTION

Usually, transmission and reception are changed over by this method.

(CAUTIONS)

When PTT switch is used, turn off the VOX switch (lower side).

### 6–6–3. VOX

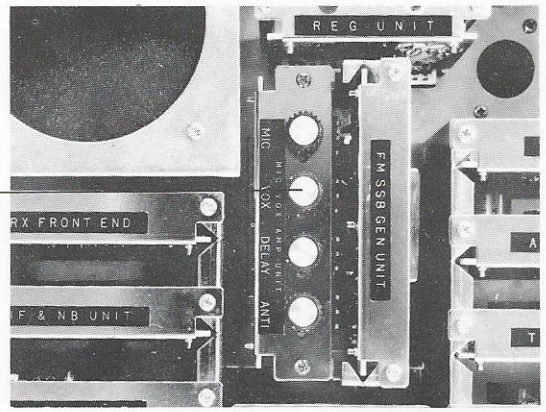
- This is a method by which transmission and reception are changed over automatically by voice.

The following operations are required.

♦ VOX OPERATION OF SSB MODE

To begin with, open the upper cover of the case and there is a knob for adjustment as shown in Fig. 12.

FIG 12




Make adjustment in the following sequence.

(1) Bring down the VOX switch (front panel) to the position "VOX" (upper side).

(2) Talk to the microphone in a normal talking volume. Adjust the VOX. GAIN knob in such a way that change-over is effected smoothly without cutting the head of speach. Keep the microphone approx. 10 – 15cm from the mouth.

(3) Stop talking and adjust the AF GAIN (front panel) in such a way that the volume of the speaker is at normal use condition.

(4) After finishing the abovementioned adjustment, turn the ANTI knob counterclockwise fully once.
(At this state, the sound of speaker enters to the microphone and transmission and reception are repeated flappingly.)
Then, when the ANTI knob is turned clockwise slowly, there will be a point where the flapping is stopped. Set the knob at that position.

(5) Repeating the adjustment mentioned in the abovementioned (2) and (4) a few times, adjust it to the best point.

(6) Finally, adjust the DELAY knob and fix the time for changing to reception after transmission. Adjust it to the best point in such a way that it is not returned to reception in pauses of words and the head of transmission at partner station is not cut after completion of transmission.

♦ VOX OPERATION OF CW MODE (SEMI BREAK-IN)

In the case of CW, change over is not effected by voice. Transmission is made by keying down. As for adjustment on break-in, adjust the DELAY knob in such a way that it is not returned to reception between letters or words at the time of transmission.

### 6–6–4. External switch

- Transmission and reception are changed over by the switch mounted on the desk. Connect it with ACCY socket at back panel (Fig. 16).
  When the 7-pin and 9-pin of ACCY socket are shorted, it will be transmission. When opened, it will be reception.

(CAUTIONS)

When external switch is used, turn off the VOX switch and turn the SEN-REC switch to the position "REC".

## 6–7. Use of FIX XTAL (fixed frequency)

An oscillating circuit for use of fixed frequencies with crystals has been incorporated in **LS–707**.

- It demonstrates its full capacity in FM mode which is used very frequently in the same frequency.
- For the club channel, operation on a vehicle, on the operation of all modes, stable operation can be carried out by crystal control of a desired frequency.

### 6–7–1. Operating method of FIX XTAL

- Set the FIX XTAL switch to a desired channel of "1" – "10" other than "VFO" in the indicating window.
- By the abovementioned operation, the lamps of MAIN SCALE and SUBSCALE for indication of frequency of VFO are put out and oscillation of VFO is stopped, resulting in indicating that it has been changed over to FIX XTAL.
- When no crystal has been put in the crystal socket of FIX XTAL, the lamp of the indicating window for indicating the channel will be put out, indicating that no crystal has been put.
- FIX XTAL channels are in common for each band. Therefore, if 10 channels are fitted, 10 x 10 = 100. In a width of 10MHz, 100 channels will be obtained.

(EXAMPLE) When a crystal of 430.35MHz is put, the following 10 channels will be obtained.

430.35MHz
431.35MHz
432.35MHz
.
.
.
.
439.35MHz

### 6–7–2. Calculation of the frequency of crystal for FIX XTAL

- How to fix the desired frequency
  The frequency in MH's will be indicated at BAND switch. Therefore, if you fix frequencies lower than 100kHz's, it will be all right.

(EXAMPLE) 4 3 2 . 1 4 5 MHz

To be selected by the BAND SWITCH.

Fix this frequency. With this as X, express it in a unit of MHz.

- Make calculation as follows.

  □ AM, FM, CW

CRYSTAL FREQUENCY (MHz) = 8.5 + X

(EXAMPLE) Desired frequency 432.145 MHz
Crystal frequency = 8.5 + 0.145 = 8.645 MHz

  □ SSB

  - USB

CRYSTAL FREQUENCY (MHz) = (8.5 + X) + 0.0015

(EXAMPLE) Desired frequency 432.145 MHz
Crystal frequency = (8.5 + 0.145) + 0.0015 = 8.6465 MHz

  - LSB

CRYSTAL FREQUENCY (MHz) = (8.5 + X) – 0.0015

(EXAMPLE) Desired frequency 432.145 MHz
Crystal frequency = (8.5 + 0.145) – 0.0015 = 8.6435 MHz

(CAUTIONS)
When band edge frequencies are used, pay special attention to the following points.

(1) In the case of lower end frequencies e.g. 432.000MHz, using 8.5MHz FIX XTAL. In the case of BAND "0" (430), it will become 432.000MHz.
The side band wave or the part of deviated frequency is off-band (deviated from the AMATEURE BAND). Take full care for it.

(2) In the case of upper end frequencies e.g. 435.999MHz, using 9.499MHz FIX XTAL. In the case of BAND "9" (439), it will become 439.999MHz, resulting in being off-band as mentioned hereabove.

- Crystal for FIX XTAL is an option.

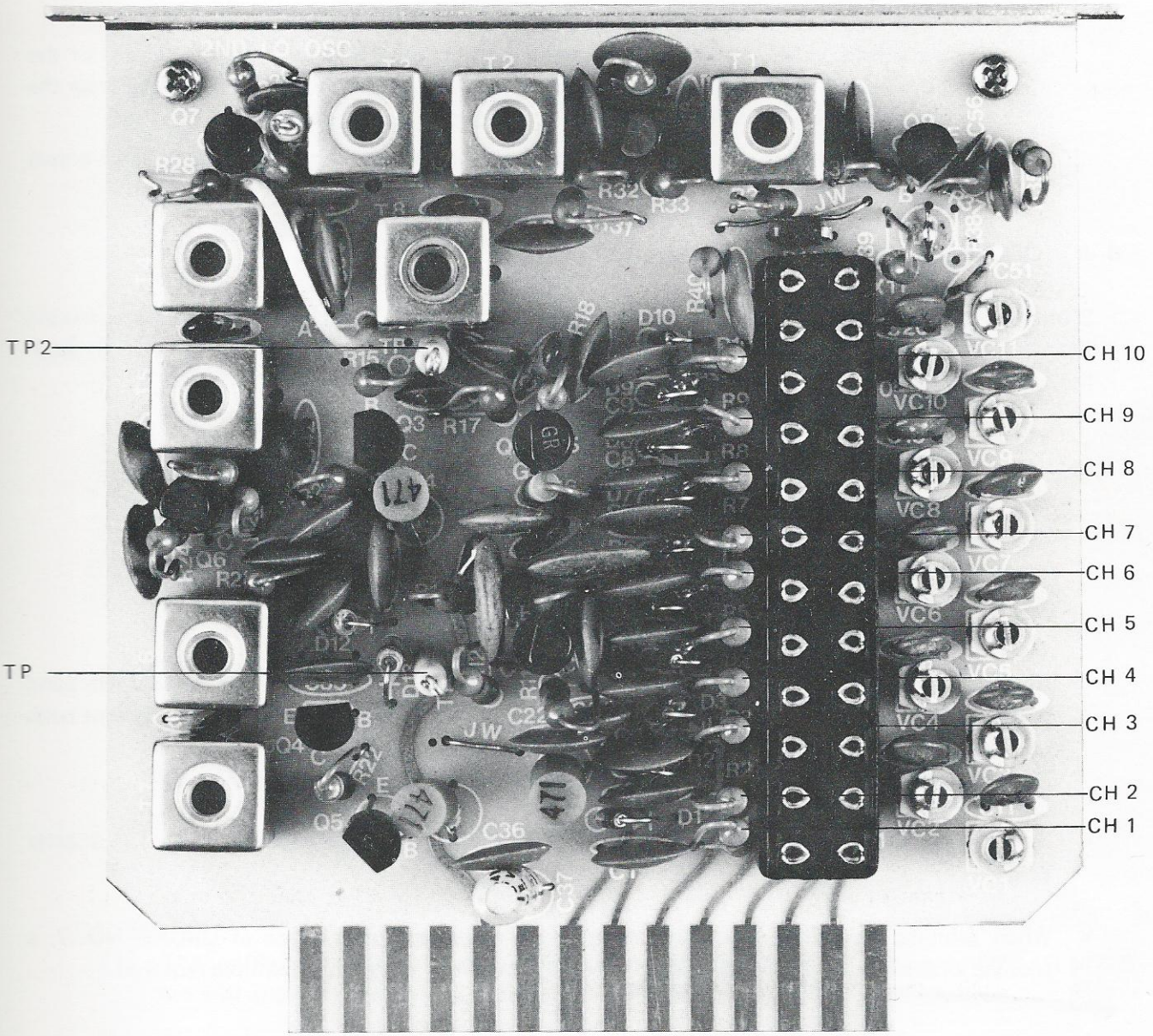
- Your orders are accepted by your dealer or our company. When you place an order with us, specify the transmitting and receiving frequency and mode.

- When you place an order with the crystal manufacturer directly, specify the following specifications beside the frequency calculated in Item 6–7–2.

1. Name of model ..... HC 25/u
2. Load capacity ..... 30PF ± 0.5PF
3. Actual resistance ..... 20Ω or less
4. Electrostatic capacity ..... 7.0PF ± 0.5PF
5. Exciting level ..... 5 mW

## 6–7–3. Adjustment method on frequencies of FIX XTAL

FIG. 13 2ND LO UNIT



- CH1 – CH10 shown in the above photo correspond to the display "1" – "10" of FIX XTAL.

- The indication of each CH in the photo shows the position of parts to be lined up on the pull-out line in the order of 10KΩ resistance, crystal, socket, trimmer capacitor from the left.

- Adjustment of the oscillating frequency of crystal oscillator is made in the following procedure.

  1. Pull out 2ND LO UNIT from the **LS-707**. Insert the crystal of a desired frequency into the socket.
  2. Connect the power DC 9V (as it is located at ACCY socket PIN 8, use it) with TP1 at Fig. 13.
  3. Connect a frequency counter by which counting can be made up to 10MHz, with TP2 in Fig. 13.
  4. Prepare a lead 15–20cm with a clip at each end of it. Hold the negative ground of the printed board with a clip at one side. Holding the lead of 10KΩ resistor which is on the same line of the crystal of CH with a clip at the opposite side, earth it.
  5. Adjust the trimmer capacitor corresponding to the socket inserted into the crystal, adjust it to a desired frequency.

### 6–8. OSCAR satellite communications

2 units of amateur radio communication satellites OSCAR NO. 7 and OSCAR NO. 8 are making their orbits. Taking advantage of B mode of OSCAR NO. 7 and J mode of OSCAR NO. 8, satellite communications can be made by **LS-707**.

- The frequencies of B mode are as follows:

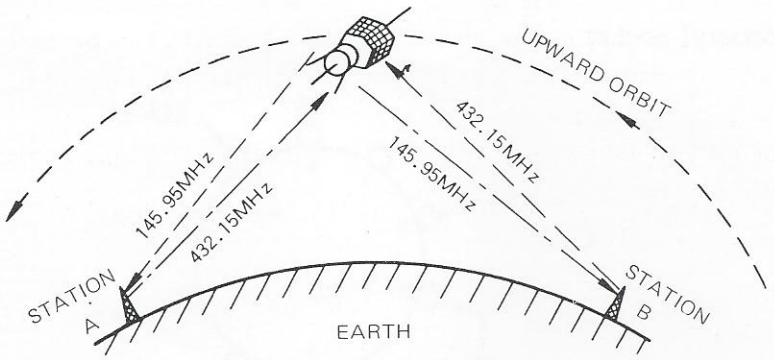
| UP LINK | DOWN LINK |
|---|---|
| (OSCAR NO. 7 from ground) | (From OSCAR NO. 7 to ground) |
| 432.125 MHz | 145.975 MHz |
| ∫ | ∫ |
| 432.175 MHz | 145.925 MHz |

As seen from the abovementioned frequency relations, a signal transmitted in 432MHz band is turned over (heterodyne of difference) at a repeater of OSCAR NO. 7. Then, it is sent back in 145MHz band.
As the mode is also turned over, when transmitted in USB, it will be sent back in LSB.

- Take for instance, when uplinked with 432.15MHz USB, it will be down linked in 145.95MHz LSB.

- When satellite communications are made taking advantage of B mode of OSCAR NO. 7, a receiver of 2m (by which 145.925MHz – 145.975MHz can be received) will be required.

FIG. 14 B mode of OSCAR NO. 7




** Doppler effect will affect a few KHz difference in the repeated signal of 435.190MHz from a satellite.

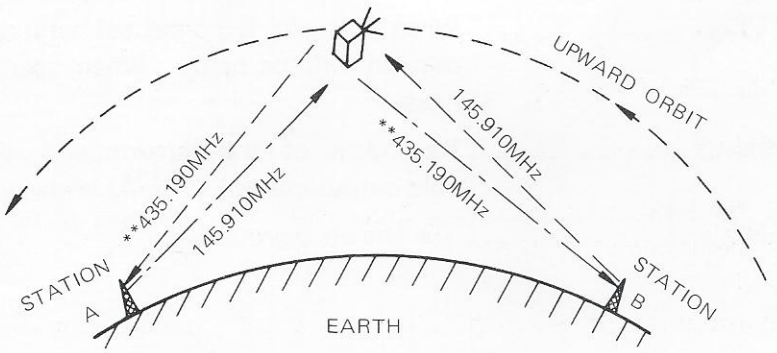
- OSCAR NO. 7 is provided with a repeater and a transmitter for transmitting a beacon. Upon receiving a beacon signal, you can know the condition of the satellite.

BEASON FREQUENCIES OF OSCAR NO. 7

29.502 MHz
145.975 MHz
435.10 MHz

- Referring to the orbit information, satellite communication guide and other reference literature shown in QST and etc. every month, enjoy satellite communications.

FIG. 15 J mode of OSCAR NO. 8




** Doppler effect will affect a few KHz difference in the repeated signal of 145.95MHz from a satellite.

(CAUTIONS)

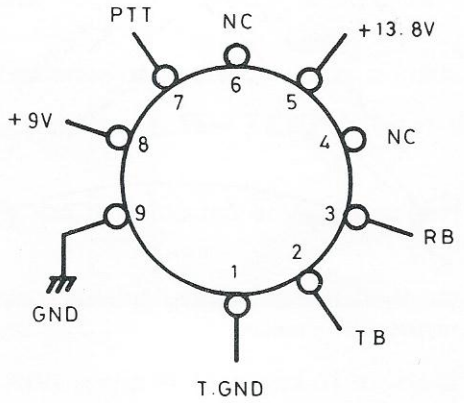
(1) The usable transmitting mode of B mode of OSCAR NO. 7 and J mode of OSCAR NO. 8 are SSB and CW. Do not transmit on other modes.

(2) The radio wave through the satellite reaches DX. Do not interfer other stations by transmitting useless radio waves.

# 7. ACCESSORY CIRCUITS

## 7–1. ACCY (accessary) socket

FIG. 16




- The connection of ACCY socket is as shown in Fig. 16.

PIN 1. T. GND ..... At transmission, it drops to the GND. At reception, it is opened.

PIN 2. TB ..... At transmission, +9V (available output currents 100mA) is produced. At reception, it is 0V.

PIN 3. RB ..... +9V (available output current 100mA) is produced at reception. At transmission, it is 0V.

PIN 4. NC ..... NON-CONNECTION

PIN 5. +13.8V ..... Regardless of transmission and reception, +13.8V (available output current 200mA) is always produced.

PIN 6. NC ..... NON-CONNECTION

PIN 7. PTT ..... When this pin is connected with ground (GND), transmission will be made. When opened, reception will be made.

PIN 8. +9V ..... Regardless of transmission and reception, +9V (available output current 100mA) is always produced.

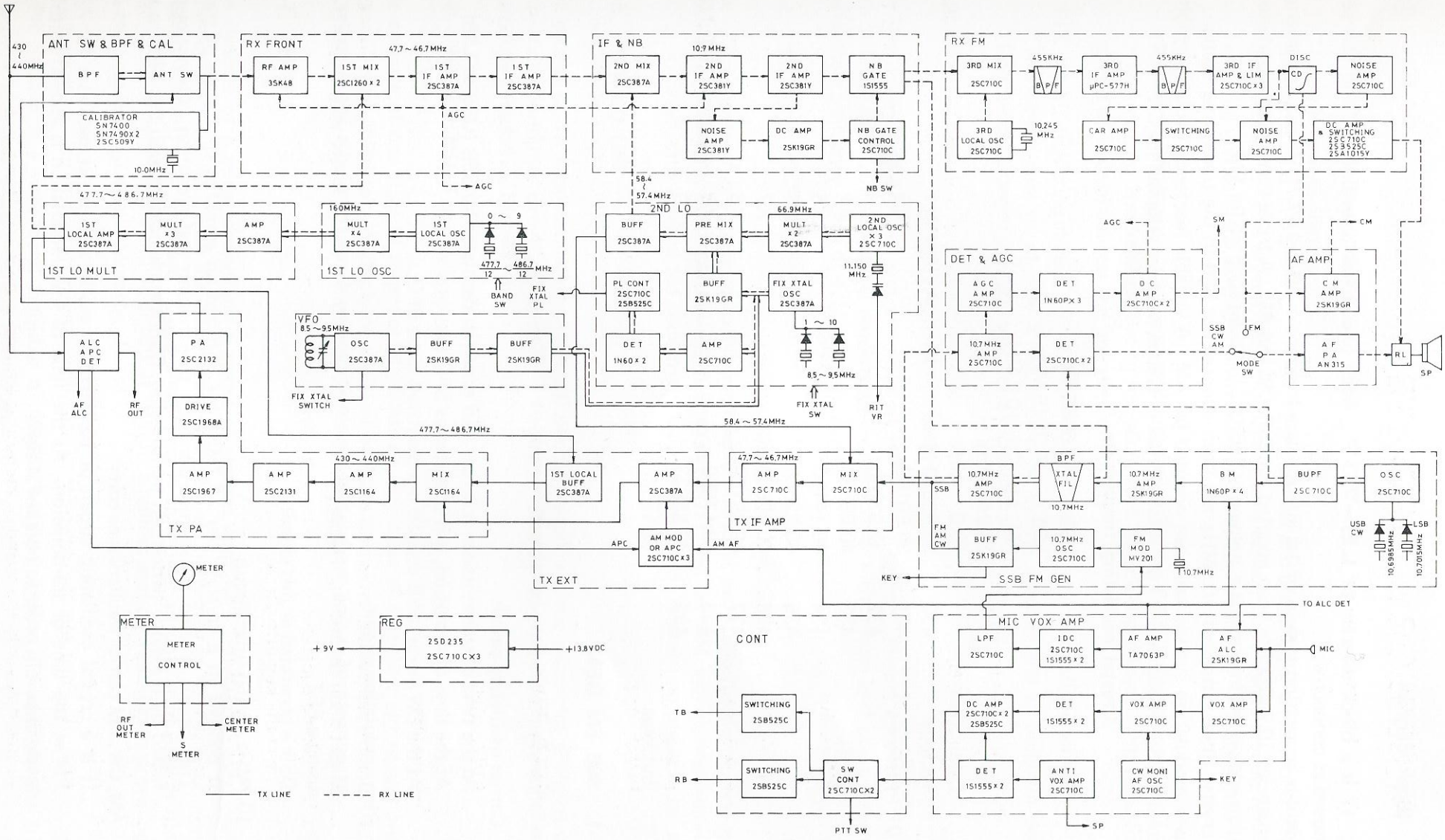
PIN 9. GND ..... The chassis is grounded.

## 7–2. CW monitor

- A low frequency oscillator for monitoring use has been incorporated in **LS-707** in order to use on CW mode. This oscillator can be used as a CW training apparatus. When used as a CW training apparatus, carry out the operations as follows.

1. Insert the key into the KEY JACK.
2. Turn the MODE switch to CW.
3. Turn the SEN-REC switch to REC (lower side).
4. Turn off the VOX switch (lower side).
5. Turn the RF GAIN knob counterclockwise fully.
6. Adjust the AF GAIN knob to the best volume.
   After finishing the abovementioned operation, key it down and you can hear a sound of "Peeeee ---------".
   At this state, only the sound of monitor is emitted without emitting a radio wave.

FIG. 17 BLOCK DIAGRAM OF MODEL **LS-707**



## 8–1. Block diagram

Fig. 17 is a block diagram of **LS-707**. Each circuit has been unitized and can be set or removed at connector.

A double conversion system of 1st intermediate frequencies 46.7 – 47.7MHz and 2nd intermediate frequencies 10.7MHz has been adopted for SSB, CW and AM. A triple conversion superheterodyne system adding 3rd intermediate frequency 455KHz has been adopted for FM.

A crystal filter system of 10.7MHz has been adopted for SSB in the transmitter section. A low power modulation system has been adopted for AM. A variable reactance frequency modulating system has been adopted for FM. A semi-break-in system has been adopted for CW.

**Crystal oscillating frequencies**

| | | | |
|---|---|---|---|
| Carrier oscillation | | USB 10.6985 MHz | |
| | | LSB 10.7015 MHz | |
| | | FM, AM, CW 10.7 MHz | |
| FM unit | | 10.245 MHz | |
| Calibration | | 10.0 MHz | |
| 1st local | 430 | 39.80833 MHz | INDICATION X1 |
| | 431 | 39.89166 | X2 |
| | 432 | 39.97500 | X3 |
| | 433 | 40.05833 | X4 |
| | 434 | 40.14166 | X5 |
| | 435 | 40.22500 | X6 |
| | 436 | 40.40833 | X7 |
| | 437 | 40.39166 | X8 |
| | 438 | 40.47500 | X9 |
| | 439 | 40.55833 | X10 |
| 2nd local | | 11.15 MHz | |

### 8–1–1. SSB FM GEN

The following circuits have been incorporated.

- Carrier oscillating circuit
  At the time of transmission, it is operated as carrier oscillator for SSB (USB or LSB).
  At the time of reception, it is operated as BFO oscillator of SSB, CW.
  At the CW mode, USB crystals are oscillated to be BFO.

- Ring modulating circuit
  It consists of a ring modulating circuit employing 4 pcs. of diodes and a buffer circuit using a FET.
  DSB is generated at this circuit.

- 10.7MHz crystal filter circuit
  It consists of a crystal filter 10.7MHz for SSB and an amplifier of 1 stage of transistor. This circuit is used in common for both transmission and reception. Change-over is effected by the diode switch. At transmission, DSB is made pass through this filter to be SSB.

- AM, CW, FM carrier oscillating circuit
  It is a crystal oscillating circuit of 10.7MHz. It works as a carrier oscillator for AM, CW, FM at the time of transmission. At the time of FM, modulation is applied to this oscillating circuit in order to obtain FM signal.

### 8–1–2. 2ND LO

The following circuits have been incorporated.

- 11.15MHz crystal oscillating circuit
  It consists of a 11.15MHz crystal oscillating circuit and a multiplier circuit for multipluing it to 66.9MHz. This crystal oscillating circuit uses variable capacitance diodes, resulting in enabling you to make fine adjustment on the oscillating frequency. It is operated as RIT.

- Mixer circuit
  Mixing 66.9MHz from the abovementioned circuit with 8.5 – 9.5MHz from VFO or FIX XTAL circuit, 2nd local oscillating frequency of 57MHz's is produced at this circuit. This circuit consists of a mixer and one stage of buffer.

- FIX XTAL oscillating circuit
  This circuit consists of FIX XTAL oscillating circuit, a buffer and an oscillator detector. Crystals are changed over by means of a diode switch.

### 8–1–3. TX IF AMP

This unit consists of a mixer and one stage of transistor amplifier. Mixing a signal of 10.7MHz from SSB FM GEN with 2nd local oscillating frequency of 57MHz's from 2nd LO, a transmitting intermediate frequency signal of 47MHz's is produced.

### 8–1–4. TX EXT

This unit consists of one stage of buffer amplifier of 1st local oscillating frequency, one stage of amplifier of 47MHz's, APC (AUTO POWER CONTROL) and an AM modulating circuit. The APC is operated with a signal fed back from ANT terminal and transmitting power is controlled.

### 8–1–5. 1ST LO OSC

This consist of 1st local oscillating circuit, 10 pcs. of crystal, a diode switch for changing over of them and a multiplier circuit. Oscillating a frequency of 40MHz's, it is multiplied by 4 in order to produce a frequency of 160MHz's.

### 8–1–6. 1ST LO MULT

This consists of one stage of amplifier of 160MHz's, one stage of multiplier circuit and one stage of amplifier of 480MHz's. Multiplying the local oscillating signal of 160MHz's from 1ST LO OSC by 3, a frequency of 480MHz's is produced and amplified to be 1st local oscillating signal.

### 8–1–7. TX PA

This consists of a mixer circuit and 5 stages of straight amplifiers. Mixing 1st local oscillating frequency from TX EXT with the transmitting intermediate frequency of 46MHz's, a transmitting signal of 430MHz's is produced. Upon amplifying it straightly, an output of 10W is obtained. A strip line is used for the tuning circuit at straight amplifier section, resulting in providing band pass characteristics of 430 – 440MHz.

(CAUTIONS)

PA Section is a wide band amplifier of 10MHz width, therefore, do not turn the trimmer without high level experience and techniques.

### 8–1–8. ANT. SW. & B.P.F.

A band pass filter of distributing constant type and a diode switch for changing over the antenna are housed in one case, the case has been silver plated.
The band pass filter is used in common for transmission and reception and has a pass band of 10MHz.

### 8–1–9. RX FRONT

It consists of one stage of high frequency amplifier by dual gate MOS type FET, a specially designed balanced mixer and 2 stages of 1st intermediate frequency amplifiers.
A signal of 430MHz band from the antenna is amplified in one stage and mixed with 1st local oscillating frequency of 480MHz's, resulting in providing 1st intermediate frequency of 46MHz. Then, it is amplified in 2 stages furthermore.

### 8–1–10. IF & NB

This consists of a mixer, 2 stages of 10.7MHz amplifiers, a noise blanker circuit.
Mixing a 1st intermediate signal of 46MHz's from RX FRONT and 2nd local oscillating signal of 57MHz's from 2ND LO, a 2nd intermediate frequency signal of 10.7MHz is produced. 2nd intermediate frequency signal of 10.7MHz is amplified in two stages and it passes through the noise blanker switching diode. The noise blanker is turned on and off by an external switch. When a pulse noise like ignition noise is fed, it will synchronize with the pulse noise, resulting in turning on or off the switching diode and removing the noise.

### 8–1–11. DET & AGC

This consists of one stage of amplifier of 10.7MHz, a balanced demodulater circuit and an AGC circuit.
SSB, CW, AM signals passing through the crystal filter are amplified in one stage and enter the demodulater circuit. A BFO signal is added at SSB and CW mode and demodulated as AF. After being amplified in one stage, AGC is rectified and AGC voltage is taken out.

### 8–1–12. RX FM

This consists of a mixer, a 3rd local oscillating crystal oscillator circuit, a ceramic filter, a 455KHz amplifier circuit, a limiter circuit, a ceramic discriminator and a squelch circuit.
10.7MHz FM signal from IF & NB is converted to 455KHz at a mixer.
After passing through the ceramic filter, it enters the ceramic discriminator through an amplifier circuit limiter, resulting in being demodulated.
The noise amplifying detection and carrier amplifying detection are used in common for squelch, preventing the squelch from flapping at over deviation.

### 8–1–13. AF AMP

An audio amplifier circuit employing IC and a differential amplifier circuit of FM center meter are incorporated. The output of the audio amplifier circuit is 2W into 8 ohms load.

### 8-1-14. VFO

This consists of a transistor oscillating circuit and a buffer amplifier using FET. 8.5MHz – 9.5MHz are oscillated.

(CAUTIONS)

A technique of high level is required for adjustment of VFO depend on temperature characteristics, frequency linearity etc. Do not touch internal circuits and parts.

### 8-1-15. MIC VOX AMP

This consists of a low frequency ALC circuit, a audio amplifier circuit for signal of microphone input, FM, IDC circuit, a VOX circuit and a CW monitor circuit.
There are 4 volumes for adjustment such as MIC GAIN, ANTI, VOX GAIN, DELAY on this board.

### 8-1-16. REG

A power stabilizing circuit of 9V has been incorporated.

### 8-1-17. CAL & CONT

This consists of a change-over circuit for reception and transmission as well as a 100KHz calibration circuit. The change-over circuit for transmission and reception is controlled with signals from the VOX circuit of MIC VOX AMP and PTT switch.
At transmission, it is changed over to TB (at transmission + 9V) and at reception, it is changed over to RB (at reception + 9V).

# 9. TROUBLE SHOOTING

**LS-707** is a product with high performance and adjusted completely in the factory, so there is no requirement of adjustment. In order to adjust the related sections completely, highly accurate measuring equipments and high level techniques are required.
Without measuring equipment, be sure to avoid turning the related adjusting points. The following symptoms are not troubles. Be sure to check them well. If no trouble is corrected when countermeasures are taken according to the following TROUBLE SHOOTING TABLE, contact with the dealer or the SERVICE SECTION.

- RECEPTION

| SYMPTOM | CAUSE | COUNTERMEASUREMENT |
|---|---|---|
| When the power switch is turned on, no lamp will be lighted or no sound will be given. | 1) Poor connection of power cord.<br>2) The fuse has blown. | 1) Put power plug into the plug socket certainly.<br>2) Exchange fuses (if blown again, it is attributable to the trouble of the set itself) |
| When connected with the antenna, no signal can be received. | 1) The change-over switch for reception and transmission is set at TRANSMITTING SIDE and the set is at transmitting state.<br>2) FIX. CH switch is at empty channel (FIX XTAL lamp is put out)<br>3) Imperfect connection of antenna cable and connector. | 1) Place the changeover switch for transmission and reception to the RECEPTION SIDE.<br>2) Place the FIX. CH switch at VFO or at position where the lamp is lighted.<br>3) Connect the antenna cable and connector certainly. |
| At FM, S meter vibrates but no receiving sound is recieved. | The squelch circuit is operated. | Turn the squelch knob counterclockwise. |
| When SSB is received, no clear sound is generated. | Wrong side band. | Change over the MODE change-over switch to USB or LSB. |

- TRANSMISSION

| | | |
|---|---|---|
| No transmitting output is produced. | FIX XTAL switch is at empty channel. | Turn the FIX XTAL switch to VFO or to the position where the lamp is lighted. |
| In the case of SSB, no output is produced. | 1) Poor connection of microphone connector.<br>2) The MIC GAIN VOLUME has been closed. | 1) Connect the microphone certainly.<br>2) Turn the MIC GAIN volume (inside of the set) clockwise. |

# 10. OPTION POWER SUPPLY

MODEL **R-707PS** is a optional power supply designed for MODEL **LS-707**.

## 10–1. Raitings

- Output voltage ..... DC 13.8V ±0.5V
- Input voltage ..... AC 220V ±10% (or AC 110V ±10%)
- Output current ..... 5A
- Voltage regulation ..... less than –0.3V
- Lipple voltage ..... less than 3 mV
- Size ..... 150W x 120H x 320D
- Weight ..... 5.7 kg
- Speaker ..... .8 ohms 3W

## 10–2. Instruction

- Connect a ⊕ lead from the transceiver to the terminal coloured red and ⊖ lead to the terminal coloured black.

- Turn on the switch in front panel, lamp is turned on and providing 13.8V at the output terminal.

(CAUTION)

DO NOT USE AS A BATTERY CHARGER

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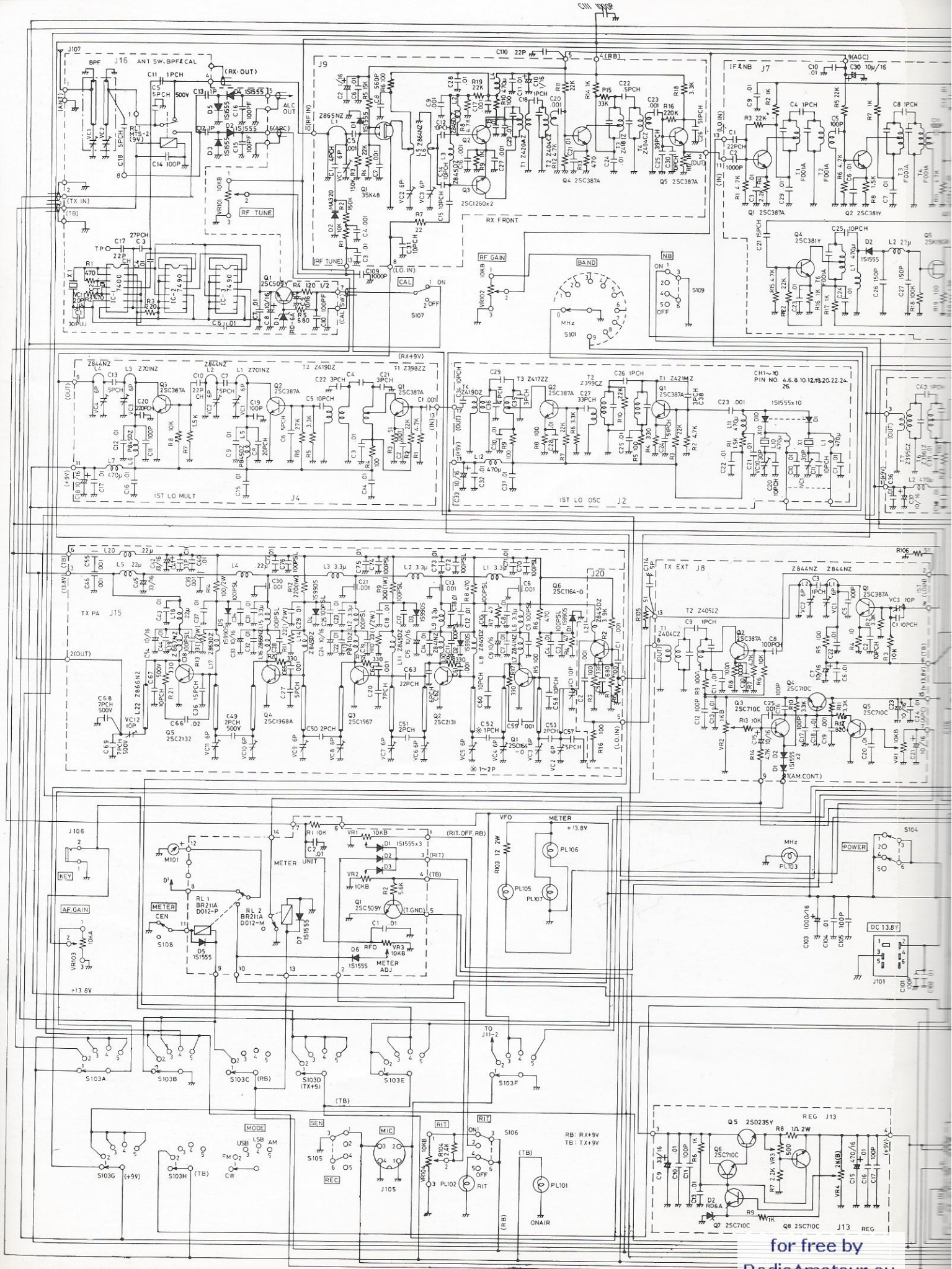
# CIRCUIT DIAGRAM FOR L



# FOR LS-707