ICB-700

E Model

Serial No. 24001 and later

TRANSCEIVER

SPECIFICATIONS

GENERAL

Frequency:	CH-1 27.085 MHz CH-2 27.035 MHz
Communication System:	Push-to-talk system (one-way system)
Semiconductors:	1 IC, 1 FET, 13 transistors, 6 diodes
Antenna:	Telescopic antenna 1,893 mm (6'2")
Speaker:	Permanent dynamic speaker 7.7 cm dia (3" dia), 8 Ω
Microphone:	Dynamic microphone, 200 Ω
Power Requirement:	DC 12V flashlight battery size "D" 8 pcs Car battery DC 12V by using SONY car battery cord DCC-6 AC 120V 60 Hz by using SONY AC adaptor AC-12
Covering Distance:	In cities 1 ~ 2 km, 0.5 ~ 1 miles In the suberbs 6 ~ 8 km, 3.5 ~ 5 miles In-sight areas 80 ~ 160 km, 50 ~ 100 miles
Dimensions:	196 (w) x 280 (h) x 86 (d) mm 7¾ (w) x 11 (h) x 3⅜ (d) inches
Weight:	3,270 g, 7 lb 3 oz (including batteries)

TRANSMITTER SECTION

Circuit:	Crystal controlled oscillator
Frequency Tolerance:	±0.005 %
Output Power:	500 mW
Modulation:	Simultaneous collector modulation at oscillator and final stage
Modulation Sensitivity:	63 dB
Current Drain:	120 mA at no modulation

RECEIVER SECTION

Circuit:	Superheterodyne using crystal controlled local oscillator
Intermediate Frequency:	455 kHz
Maximum Sensitivity at 50 mW output:	-6 dB (0.5 μV)
Signal-to-Noise Ratio:	45 dB (at 44 dB input)
Selectivity:	55 dB at 27.085 MHz ±8 kHz off-resonance
Maximum Power Output:	900 mW
Current Drain:	23 mA at zero signal 25 mA at stand-by position

SONY®

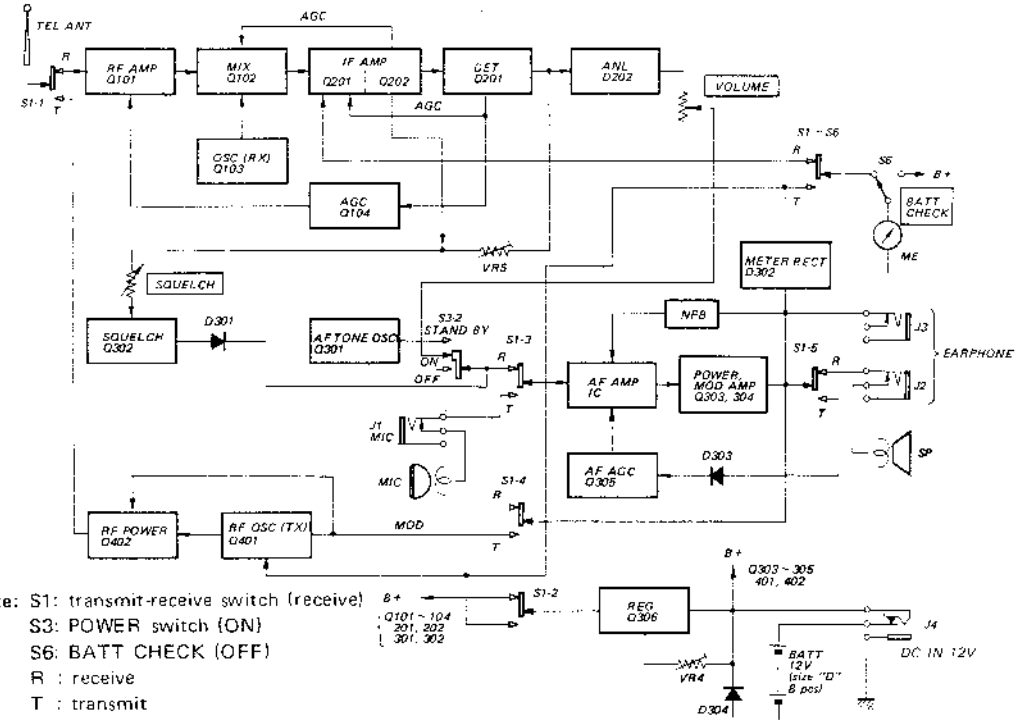
SERVICE MANUAL

TABLE OF CONTENTS

When ordering replacement parts, use PART NUMBERS listed in Parts Lists or shown in EXPLODED VIEWS.
Parts List reference numbers should not be used.

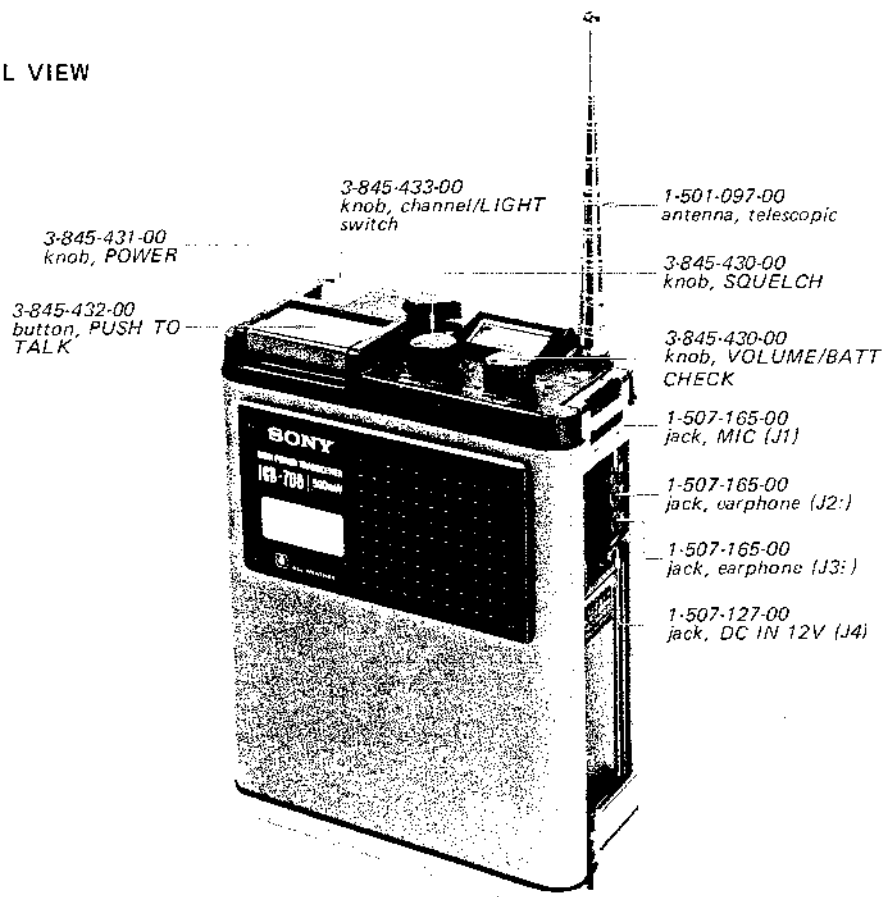
SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM

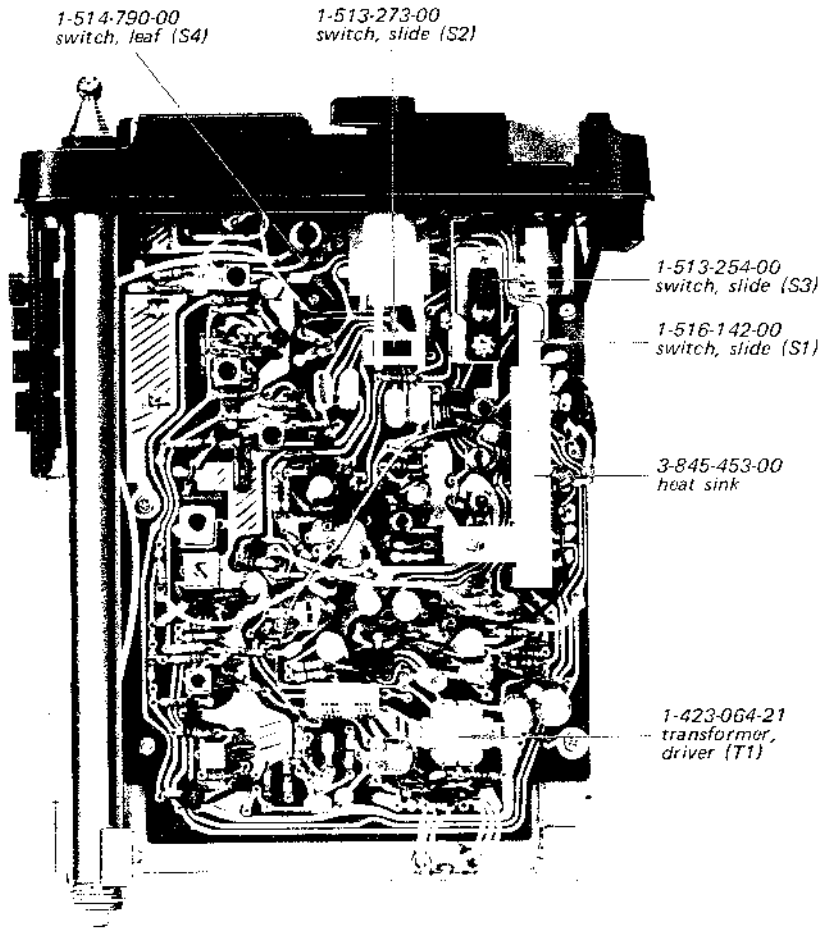


Note: S1: transmit-receive switch (receive)
S3: POWER switch (ON)
S6: BATT CHECK (OFF)
R : receive
T : transmit

1-2. EXTERNAL VIEW



1-3. INTERNAL VIEW



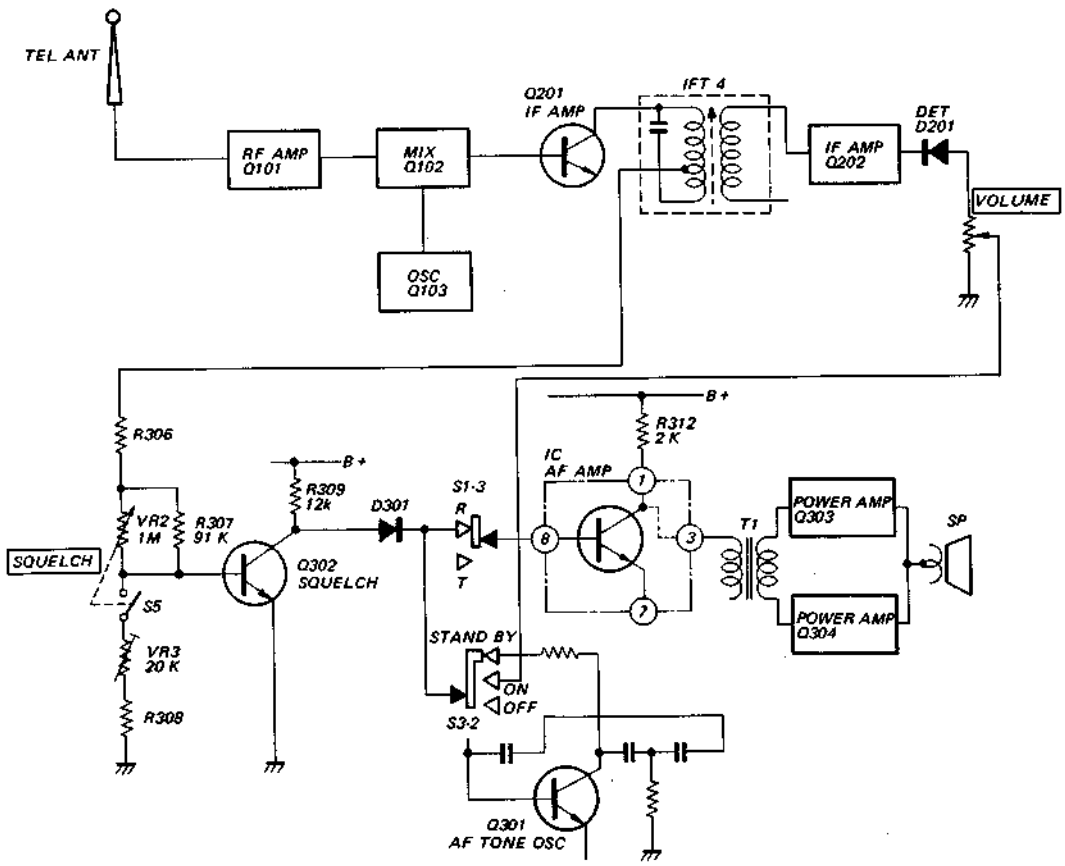
1-4. STAND-BY CIRCUIT

ICB-700 uses STAND BY circuit consisting of SQUELCH and STAND BY oscillator circuits.

The STAND BY circuit operates when the unit receives a signal of higher level than the level set with the SQUELCH control knob. When such a signal is received, a STAND BY oscillator signal of 300 ~ 800 Hz is heard through the speaker.

When a signal is received and transferred to the Q201 collector, the Q302 collector current increases and flows through R309. The voltage drop across R309 decreases the collector voltage of Q302. When input signal level is higher than the level set with the SQUELCH control knob, D301 is reverse-biased and turns off. The STAND BY oscillator signal is amplified through IC and power amplifier and is heard through the speaker.

When the input signal level is lower, the Q302 collector current decreases and D301 is forward-biased. Consequently the collector current of the transistor in the IC increases and the collector voltage drops to make the voltage between collector and emitter almost zero. So the IC does not operate as an amplifier and the STAND BY oscillator signal is not heard through the speaker.



SECTION 2
DISASSEMBLY

2-1. CASE REMOVAL

Remove case in the numerical order shown below.

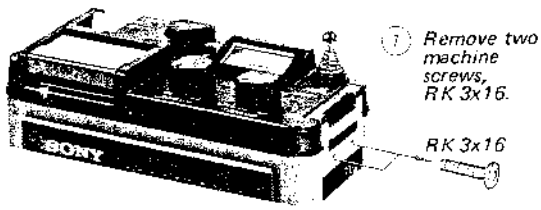


Fig. 2-1.

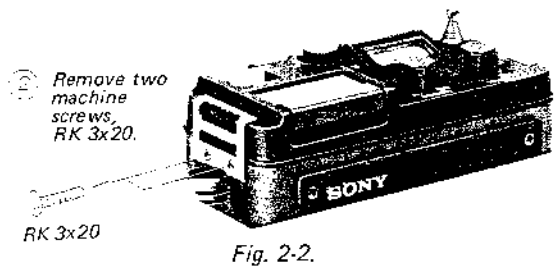


Fig. 2-2.

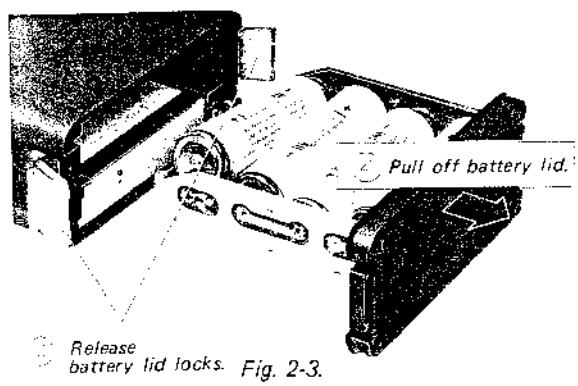


Fig. 2-3.

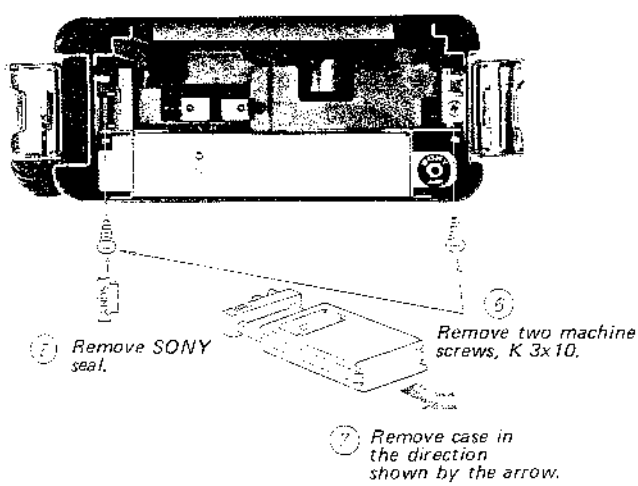


Fig. 2-4.

2-2. TELESCOPIC ANTENNA REMOVAL

Remove telescopic antenna in the numerical order shown below.

① Remove case as outlined in 2-1 above.

② Remove water release screw from the bottom of the telescopic antenna as shown in Fig. 2-5 below.

③ Remove telescopic antenna upwards through telescopic antenna sleeve.

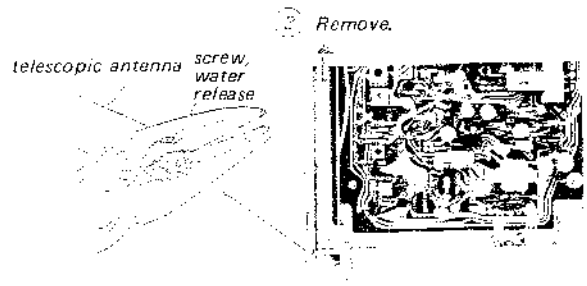


Fig. 2-5.

2-3. TOP PANEL REMOVAL

Remove top panel in the numerical order shown below.

① Remove case as outlined in 2-1 above.

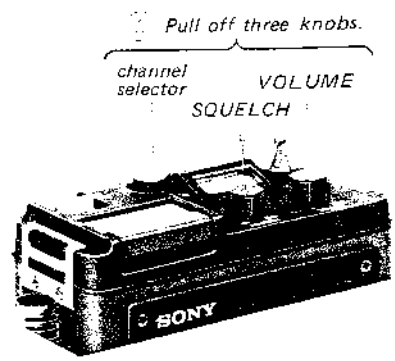


Fig. 2-6.

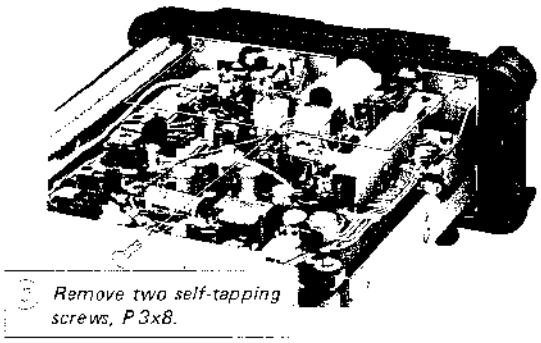


Fig. 2-7.

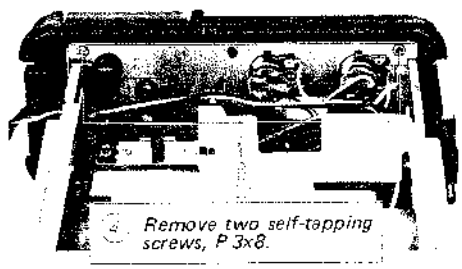


Fig. 2-8.

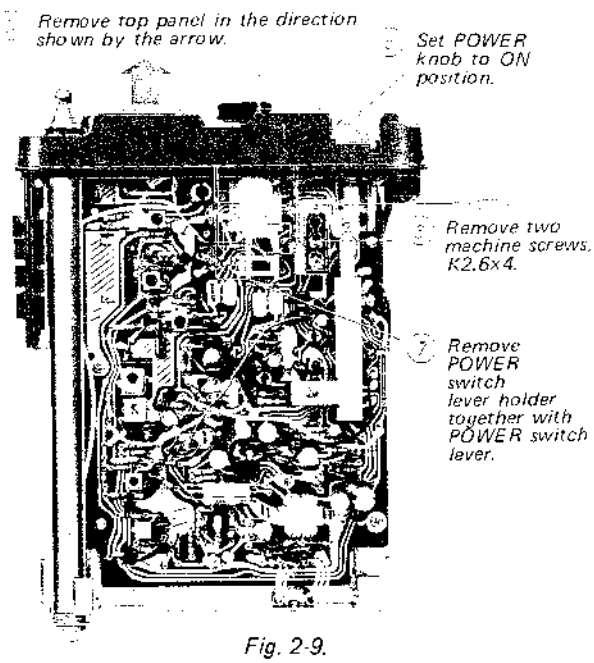


Fig. 2-9.

2-4. PRINTED CIRCUIT BOARD REMOVAL

Remove printed circuit board in the numerical order shown below.

1 Remove case as outlined in 2-1 on page 6.

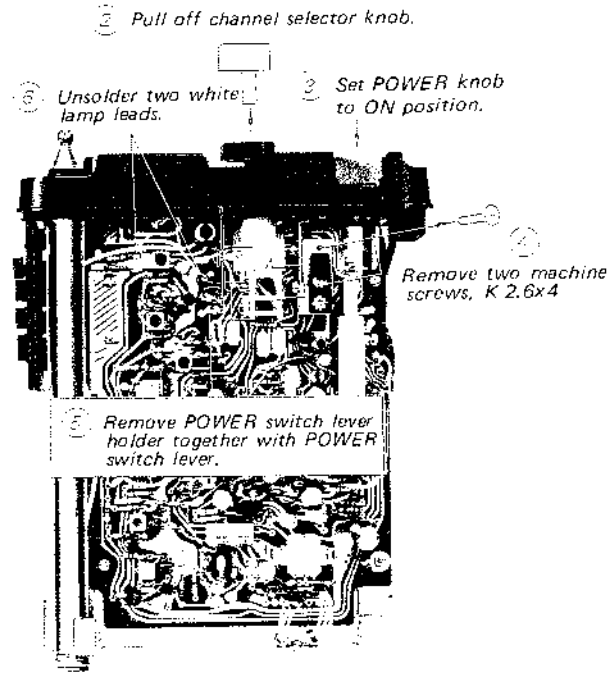


Fig. 2-10.

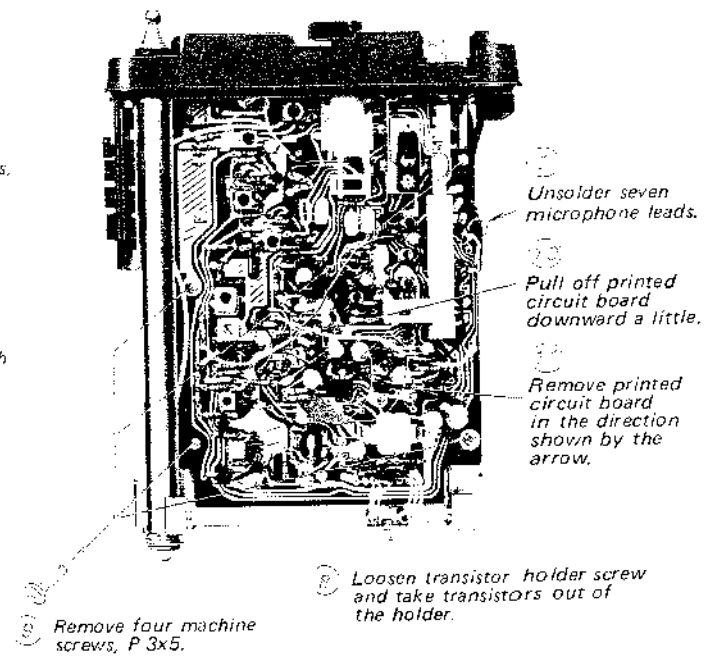


Fig. 2-11.

SECTION 3
ADJUSTMENTS

1. B+ VOLTAGE ADJUSTMENT

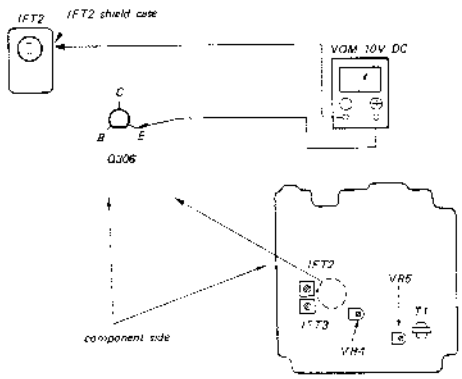
Settings:

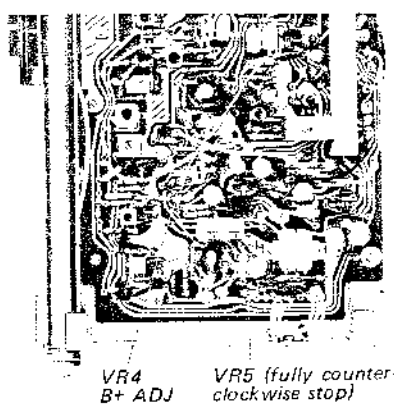
POWER switch:	ON
VOLUME control:	MIN
PUSH TO TALK button:	released
power source:	12 V DC

Procedure:

Mode: Receive

1. Set the ANL control VR5 to fully counter-clockwise stop.
2. Adjust B+ ADJ control VR4 for 6.5V VOM reading.





2. BIAS ADJUSTMENT

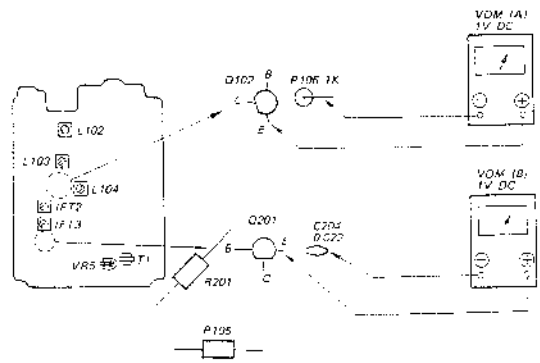
Settings:

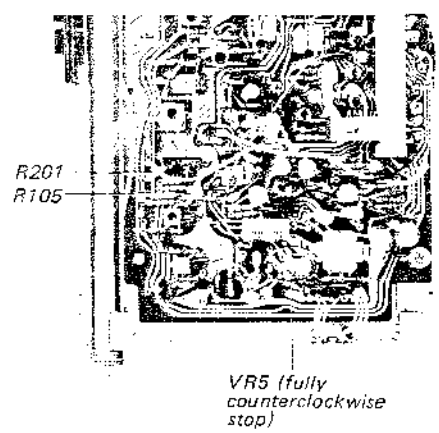
POWER SWITCH:	ON
VOLUME control:	MIN
SQUELCH control:	OFF
PUSH TO TALK button:	released
power source:	12V DC

Procedure:

Mode: Receive

1. Set the ANL control VR5 to fully counter-clockwise stop.
2. Select R105 (10k~39k) for 0.35 V VOM (A) reading. Voltage rises as the value of R105 decreases.
3. Select R201 (180 kΩ~240 kΩ) for 0.4V VOM (B) reading. Voltage rises as the value of R201 increases.



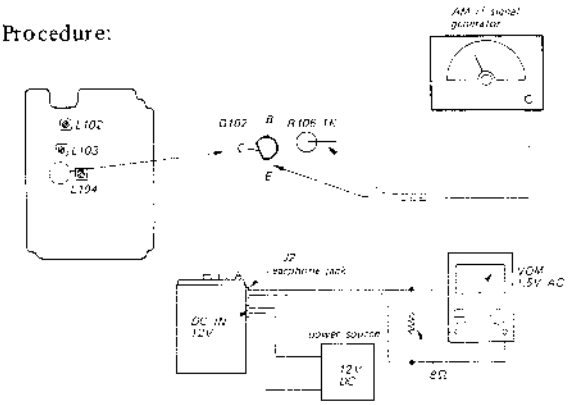


3. IF ALIGNMENT

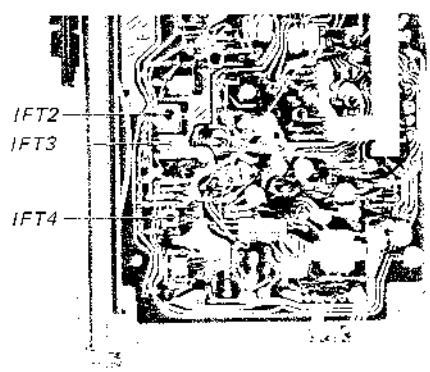
Settings:

POWER switch:	ON
VOLUME control:	MAX
SQUELCH control:	OFF
PUSH TO TALK button:	released
channel selector:	CH-1
power source:	12V DC
signal source:	AM rf signal generator (455kHz, 400Hz 30% modulation)

Procedure:



Adjust IFT 2 ~ 4 for maximum VOM reading.

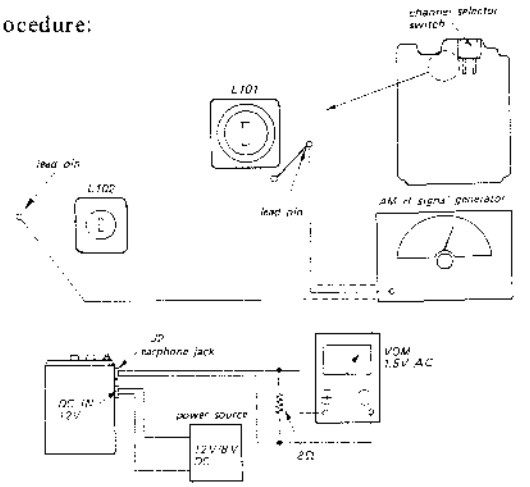


4. SENSITIVITY ADJUSTMENT

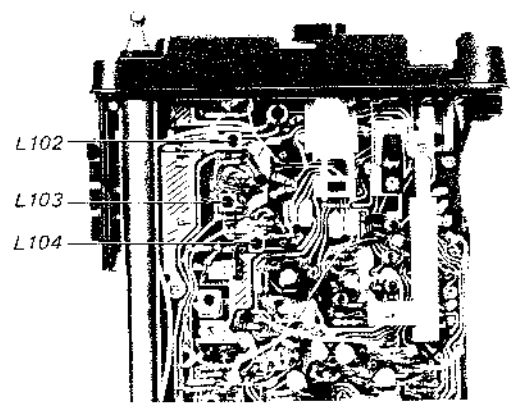
Settings:

POWER switch:	ON
VOLUME control:	MAX
SQUELCH control:	OFF
PUSH TO TALK button:	released
channel selector:	CH-1
power source:	12V/8V
signal source:	AM rf signal generator (27.085MHz, 400Hz, 30% modulation, attenuator usable lowest possible)

Procedure:



1. Adjust L102 ~ 104 for maximum VOM reading with power source of 12V DC.
2. Reduce power source voltage from 12V to 8V DC and check that VOM still deflects. If not, adjust L104 to obtain VOM deflection.

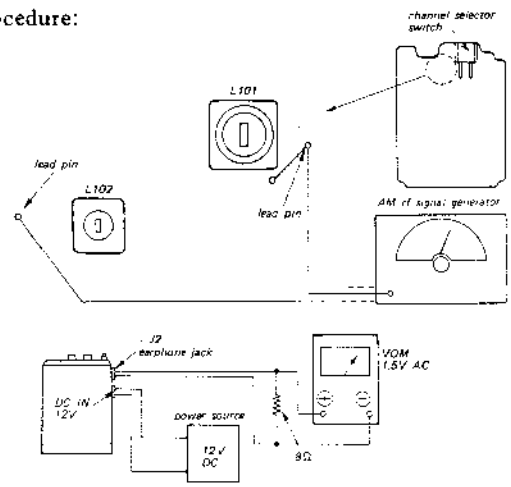


5. ANL ADJUSTMENT

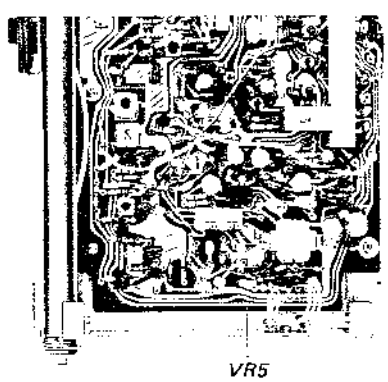
Settings:

POWER switch:	ON
SQUELCH control:	OFF
PUSH TO TALK button:	released
channel selector:	select channel on which no station is coming in
power source:	12V DC
signal source:	AM rf signal generator (27.085 MHz or 27.035 MHz, 30% modulation, attenuator maximum)

Procedure:



1. Vary VOLUME control for 0.63V (50 mW output) VOM reading.
2. Adjust and set VR5 for 0.5V (2dB down from 0.63V) VOM reading.

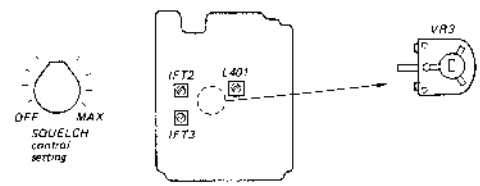


6. SQUELCH LEVEL ADJUSTMENT

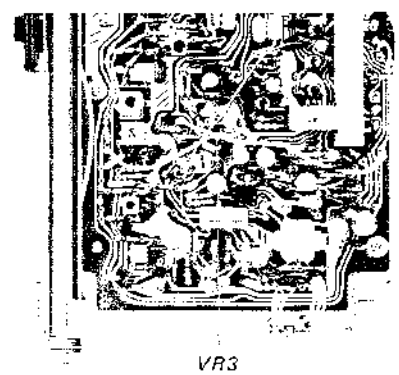
Settings:

POWER switch:	ON
VOLUME control:	MAX
SQUELCH control:	mechanical mid position
PUSH TO TALK button:	released
channel selector:	select channel on which no station is coming in
telescopic antenna:	fully extended
power source:	12V DC

Procedure:



Adjust and set VR3 (SQUELCH LEVEL) to the point at which receiver noise disappears.



7. TRANSMITTER OUTPUT POWER ADJUSTMENT

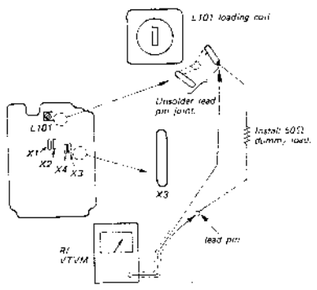
Settings:

POWER switch:	ON
PUSH TO TALK button:	pressed
channel selector:	CH-1, CH-2
power source:	12V/8V DC

Procedure:

Preparation

1. Install a shortening plug in MIC jack to disable modulator.
2. Unsolder lead pin joint and install a 50 Ω dummy load between lead pins as shown below.



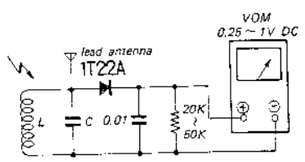
3. Set channel selector to CH-1.

A. **Rf VTVM Method**

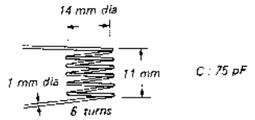
1. Press PUSH TO TALK button. Adjust L402 ~ 404 for maximum rf VTVM reading.
2. Adjust L401 for 5 V rf VTVM reading. If 5 V can not be obtained, select R403 (15 ~ 30 Ω) to obtain 5V.
3. Set channel selector to CH-2 and ensure that the change of rf VTVM reading is negligible.
4. Remove 50 Ω dummy load and reconnect unsoldered lead pins.
5. Fix cores of L401 ~ 404 with wax.

B. **Absorption Type Frequency Meter Method**

1. Prepare a 27MHz absorption type frequency meter as shown.

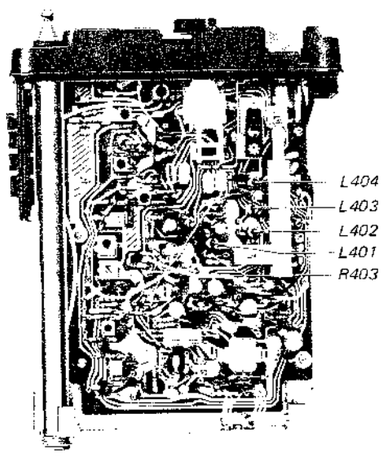


L.C Value:



2. Press PUSH TO TALK button and bring the frequency meter close to the 50 Ω dummy load about 1 cm apart so that VOM deflects half scale.
3. Adjust L401 ~ 404 for maximum VOM reading.
4. Decrease power source voltage to 8V DC and ensure that VOM still deflects.
5. If VOM deflection falls, adjust L401 to obtain VOM deflction.
6. Set channel selector to CH-2 and ensure that the VOM deflection changes are negligible when compared with those obtained on CH-1, while changing power source voltage from 12V to 8V DC.
7. Remove 50 Ω dummy load and reconnect unsoldered lead pins.
8. Fix cores of L401 ~ 404 with wax.

Adjustment location:

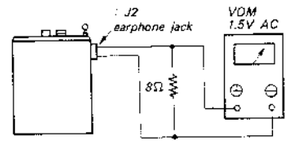


8. STAND-BY AUDIO TONE VOLUME ADJUSTMENT

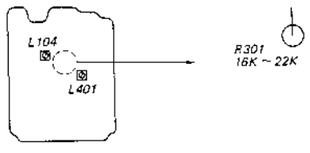
Settings:

POWER switch:	STAND BY
SQUELCH control:	OFF
PUSH TO TALK button:	released
power source:	12V DC

Procedure:



Select R301 (16 kΩ ~ 22 kΩ) for 0.9V (100 mW output) VOM reading.

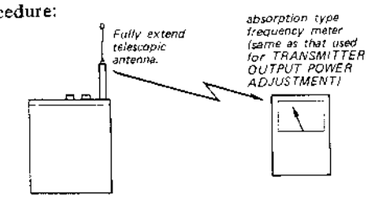


9. LOADING COIL ADJUSTMENT

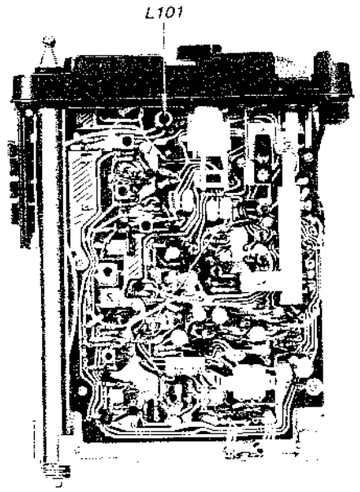
Settings:

POWER switch:	ON
PUSH TO TALK button:	pressed
channel selector:	CH-1
telescopic antenna:	fully extended
power source:	12V DC

Procedure:



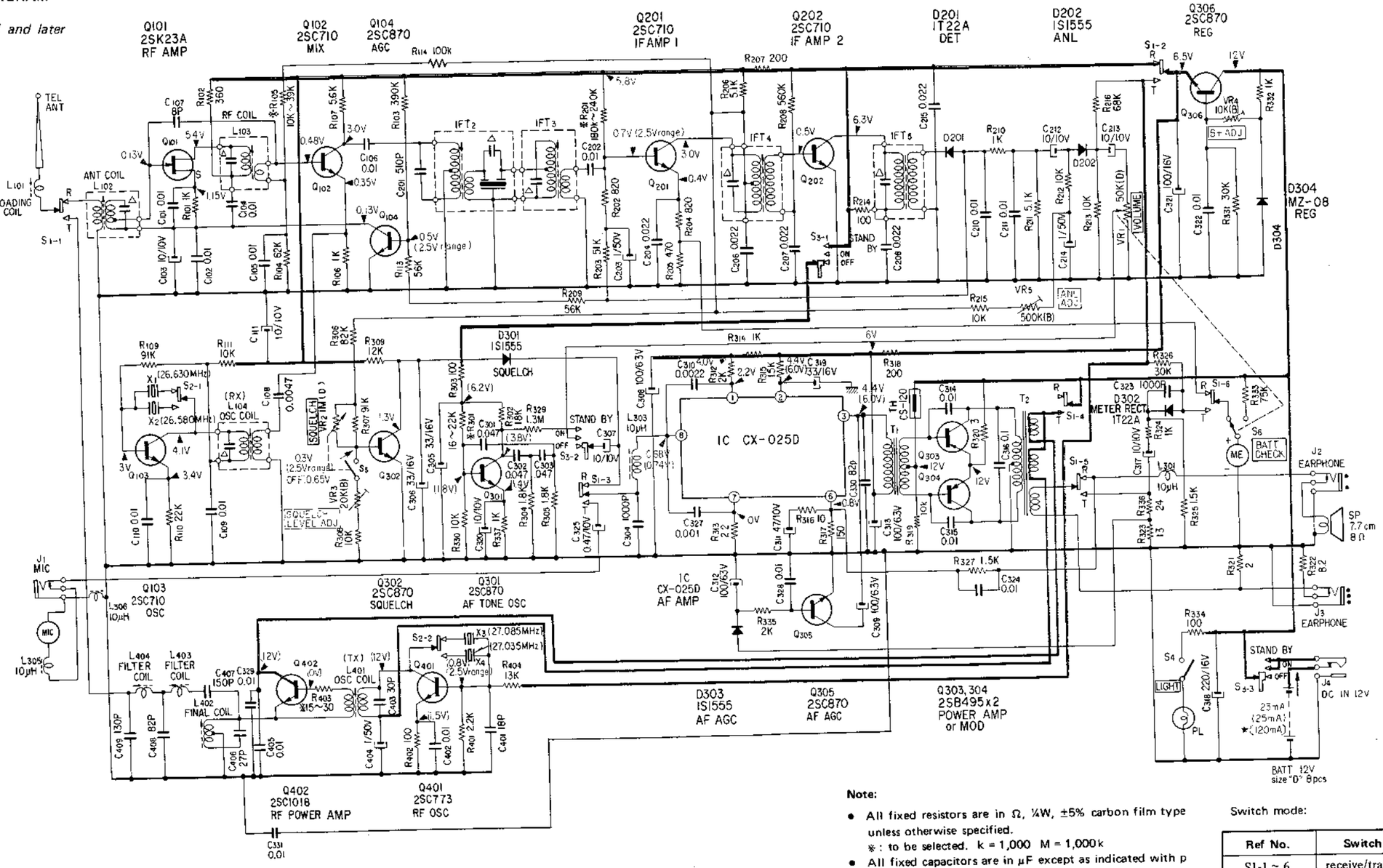
1. Install a shortening plug in MIC jack to disable modulator.
2. Press PUSH TO TALK button.
3. Adjust L101 for maximum VOM reading.
4. Fix core of L101 with wax.



SECTION 4
DIAGRAMS

4-1. SCHEMATIC DIAGRAM

Serial No. 24001 and later



Note:

- All fixed resistors are in Ω, ¼W, ±5% carbon film type unless otherwise specified.
  ※: to be selected. k = 1,000 M = 1,000 k
- All fixed capacitors are in μF except as indicated with p which means μμF. △: included in coils and transformers.
- All voltages and currents are taken with a 20 kΩ/V DC VOM with reference to ground pattern with no receiving signal, no modulation. [ ]: transmitting mode. ( ): STAND BY mode. ★: taken with telescopic antenna fully extended. No mark: receiving mode.
- ——: B+ Line

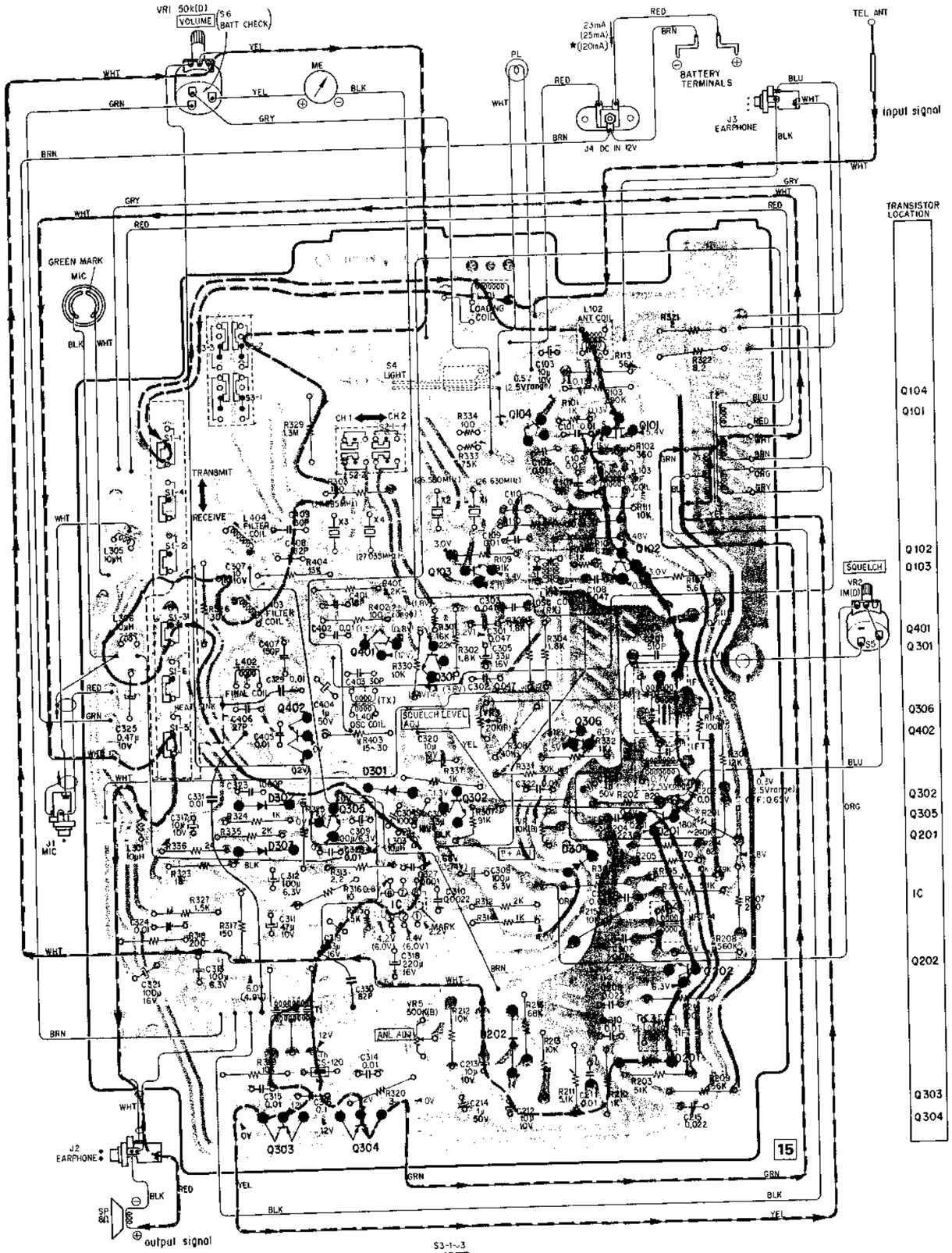
Switch mode:

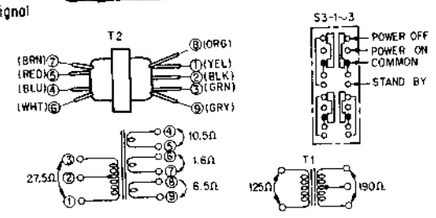
Ref No.	Switch	Mode
S1-1 ~ 6	receive/transmit	receive
S2-1 ~ 2	channel	CH-1
S3-1 ~ 3	POWER	OFF
S4	LIGHT	OFF
S5	SQUELCH	OFF
S6	BATT CHECK	OFF

4-2. MOUNTING DIAGRAM

– Conductor Side –

Serial No. 24001 and later



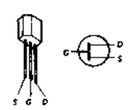


DC Resistance

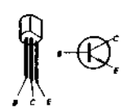
Note:

- All fixed resistors are in Ω, ¼W, ±5% carbon film type unless otherwise specified.
  ※: to be selected. k = 1,000 M = 1,000 k
- All fixed capacitors are in μF except as indicated with p which means μμF. △: included in coils and transformers.
- All voltages and currents are taken with a 20 kΩ/V DC VOM with reference to ground pattern with no receiving signal, no modulation. [ ]: transmitting mode. ( ): STAND BY mode. ★: taken with telescopic antenna fully extended. No mark: receiving mode.
- : B+ pattern
- ←---: signal path
- C330, C331 are mounted on conductor side.

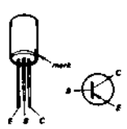
Q101: 2SK23A



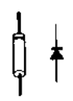
Q102, 103
201, 202: 2SC710
Q104, 301, 302
305, 306: 2SC870
Q401: 2SC773



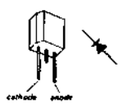
Q303, 304: 2SB495



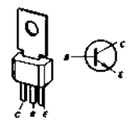
D201, 302: 1T22A
D202, 301, 303: 1S1555



D304: MZ-08



Q402: 2SC1018

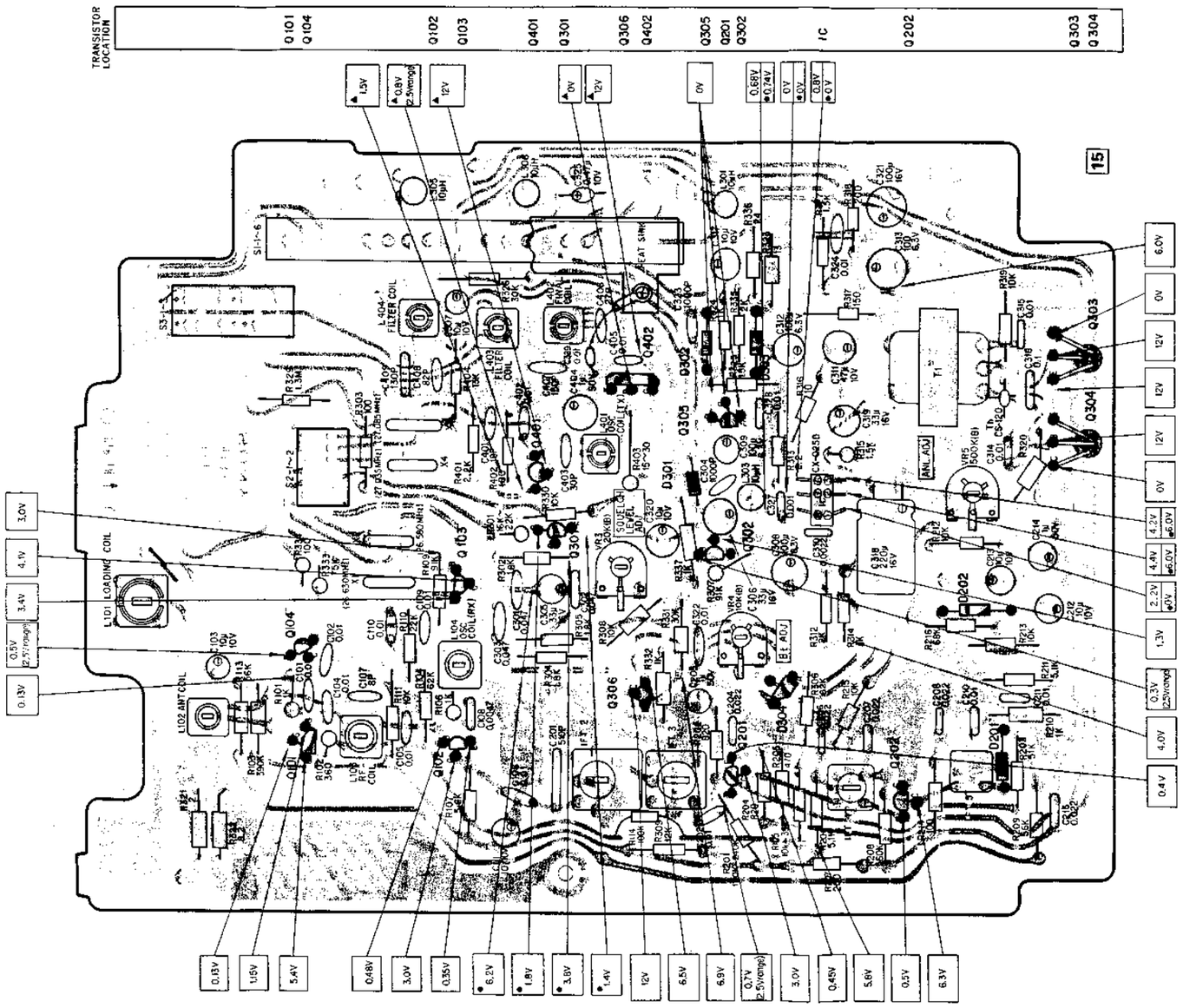


IC1: CX-025D

4-3. MOUNTING DIAGRAM

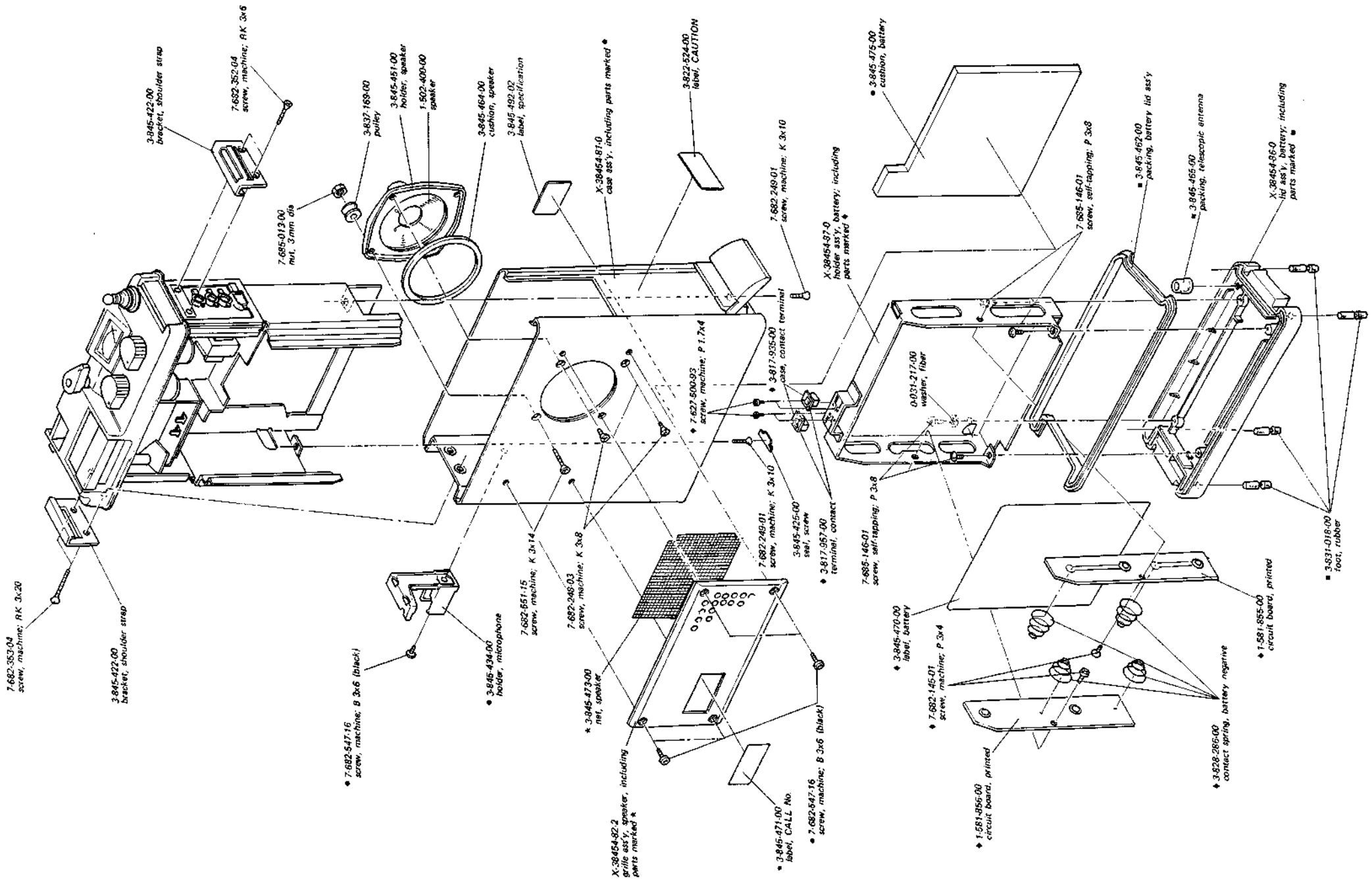
– Component Side –

Serial No. 24001 and later

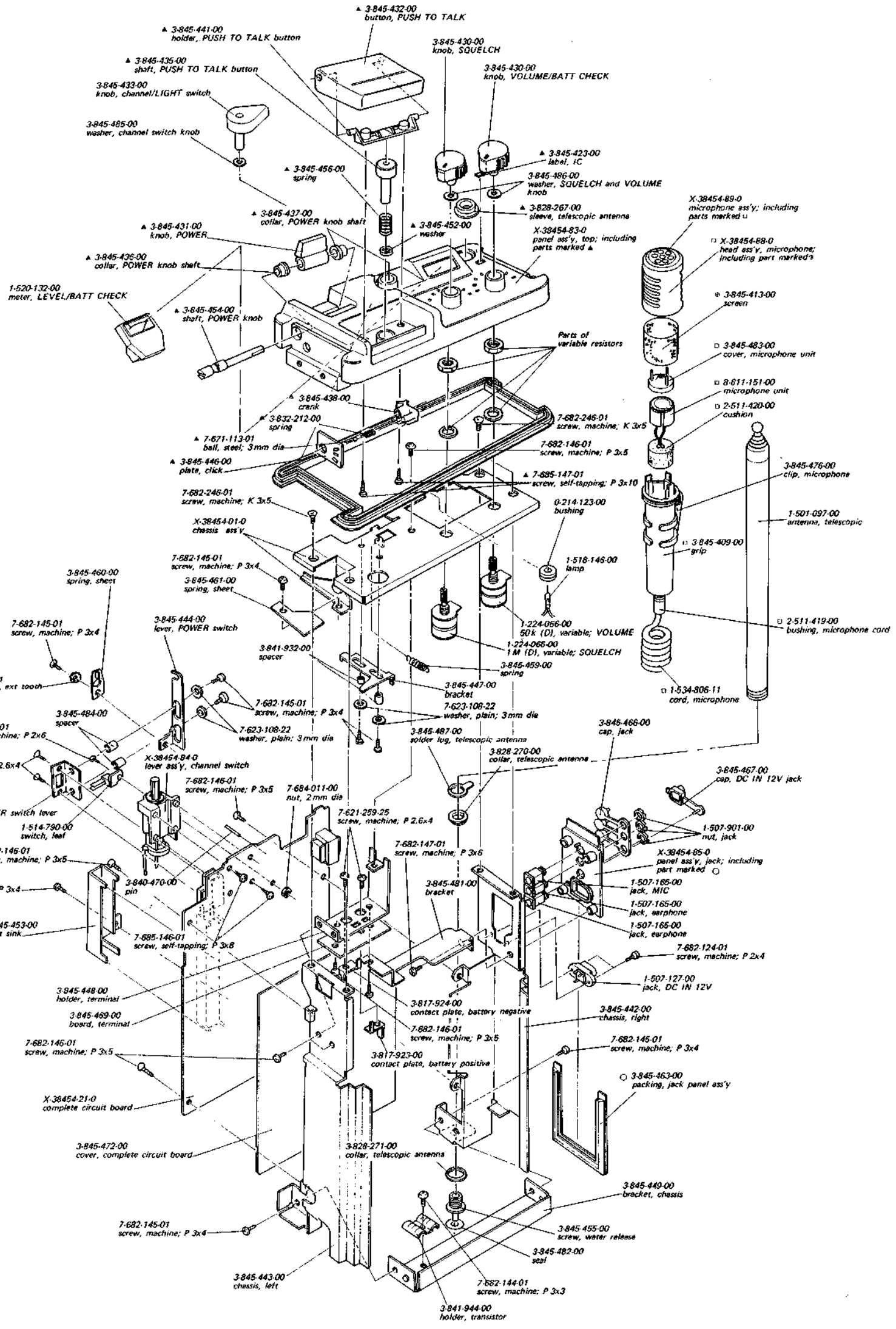


SECTION 5
EXPLODED VIEWS AND PACKING

5-1. EXPLODED VIEW (1)



Note: 1. Parts without part numbers and names are not available.
2. All screws are Phillips type (cross recess type) unless otherwise indicated. (–): slotted head



Note: 1. Parts without part numbers and names are not available.
2. All screws are Phillips type (cross recess type) unless otherwise indicated. (-): slotted head

MEMO

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	COMPLETE CIRCUIT BOARD	
	X-38454-21-0	complete circuit board
	SEMICONDUCTORS	
Q101		transistor 2SK23A
Q102		transistor 2SC710
Q103		transistor 2SC710
Q104		transistor 2SC870
Q201		transistor 2SC710
Q202		transistor 2SC710
Q301		transistor 2SC870
Q302		transistor 2SC870
Q303		transistor 2SB495
Q304		transistor 2SB495
Q305		transistor 2SC870
Q306		transistor 2SC870
Q401		transistor 2SC773
Q402		transistor 2SC1018
IC		integrated circuit CX-025D
D201		diode 1T22A
D202		diode 1S1555
D301		diode 1S1555
D302		diode 1T22A
D303		diode 1S1555
D304		diode MZ-08
Th	1-800-192-00	thermistor CS-120
	COILS AND TRANSFORMERS	
IFT1		----------
IFT2	1-403-888-11	filter, ceramic
IFT3	1-403-888-21	filter, ceramic
IFT4	1-403-110-00	transformer, i-f
IFT5	1-403-137-00	transformer, i-f
L101	1-401-356-00	coil, loading
L102	1-401-384-00	coil, antenna
L103	1-425-374-21	coil, rf
L104	1-405-163-00	coil, osc (RX)

Ref. No.	Part No.	Description
L301	1-407-190-00	10μH, micro inductor
L302		----------
L303	1-407-190-00	10μH, micro inductor
L304		----------
L305	1-407-190-00	10μH, micro inductor
L306	1-407-190-00	10μH, micro inductor
L401	1-405-446-00	coil, osc (TX)
L402	1-425-671-00	coil, final
L403	1-407-449-00	coil, filter
L404	1-407-450-00	coil, filter
T1	1-423-064-21	transformer, driver
T2	1-459-098-00	transformer, output and/or modulator

CAPACITORS

All fixed capacitors are in μF except as indicated with p which means μμF. elect = electrolytic

C101	1-101-923-11	0.01		ceramic
C102	1-101-923-11	0.01		ceramic
C103	1-121-469-11	10	10V	elect
C104	1-101-923-11	0.01		ceramic
C105	1-101-923-11	0.01		ceramic
C106	1-101-923-11	0.01		ceramic
C107	1-102-945-11	8p		ceramic
C108	1-108-509-12	0.0047		mylar
C109	1-101-923-11	0.01		ceramic
C110	1-101-923-11	0.01		ceramic
C111	1-121-469-11	10	10V	elect
C201	1-107-235-11	510p		mica
C202	1-101-923-11	0.01		ceramic
C203	1-121-391-11	1	50V	elect
C204	1-108-517-12	0.022		mylar
C205		----------		
C206	1-108-517-12	0.022		mylar
C207	1-108-517-12	0.022		mylar
C208	1-108-517-12	0.022		mylar
C209		----------		
C210	1-108-513-12	0.01		mylar
C211	1-108-513-12	0.01		mylar
C212	1-121-469-11	10	10V	elect
C213	1-121-469-11	10	10V	elect
C214	1-121-391-11	1	50V	elect
C215	1-108-517-12	0.022		mylar
C301	1-108-521-12	0.047		mylar
C302	1-108-521-12	0.047		mylar

Ref. No.	Part No.			Description
C303	1-108-521-12	0.047		mylar
C304	1-101-918-11	1,000p		ceramic
C305	1-121-403-11	33	16V	elect
C306	1-121-403-11	33	16V	elect
C307	1-121-469-11	10	10V	elect
C308	1-121-413-11	100	6.3V	elect
C309	1-121-413-11	100	6.3V	elect
C310	1-108-505-12	0.0022		mylar
C311	1-121-352-11	47	10V	elect
C312	1-121-413-11	100	6.3V	elect
C313	1-121-413-11	100	6.3V	elect
C314	1-108-513-12	0.01		mylar
C315	1-108-513-12	0.01		mylar
C316	1-108-525-12	0.1		mylar
C317	1-121-469-11	10	10V	elect
C318	1-121-421-11	220	16V	elect
C319	1-121-403-11	33	16V	elect
C320	1-121-469-11	10	10V	elect
C321	1-121-415-11	100	16V	elect
C322	1-101-923-11	0.01		ceramic
C323	1-101-918-11	1,000p		ceramic
C324	1-108-513-12	0.01		mylar
C325	1-127-022-11	0.47	10V	solid aluminum
C326	1-108-517-12	----------		
C327	1-108-501-12	0.001		mylar
C328	1-108-513-12	0.01		mylar
C329	1-108-230-12	0.01		mylar
C330	1-102-971-11	82p		ceramic
C331	1-108-230-12	0.01		mylar
C401	1-102-953-11	18p		ceramic
C402	1-102-923-11	0.01		ceramic
C403	1-102-962-11	30p		ceramic
C404	1-121-391-11	1	50V	elect
C405	1-101-923-11	0.01		ceramic
C406	1-102-961-11	27p		ceramic
C407	1-107-089-11	150p		mica
C408	1-102-971-11	82p		ceramic
C409	1-107-088-11	130p		mica

RESISTORS

All fixed resistors are in Ω, ¼W, ±5% carbon film type unless otherwise specified. k = 1,000, M = 1,000k

Ref. No.	Part No.	
R101	1-244-673-11	1k
R102	1-240-460-11	360
R103	1-244-735-11	390k
R104	1-244-716-11	62k
※R105	1-244-697-11	10k
	1-244-704-11	20k
	1-244-708-11	30k
※R105	1-244-711-11	39k
R106	1-240-473-11	1k
R107	1-244-691-11	5.6k
R108		----------
R109	1-244-735-11	91k
R110	1-244-705-11	22k
R111	1-244-697-11	10k
R112		----------
R113	1-244-715-11	56k
R114	1-244-721-11	100k
※R201	1-244-727-11	180k
	1-244-728-11	200k
	1-244-729-11	220k
	1-244-730-11	240k
R202	1-244-669-11	820
R203	1-244-714-11	51k
R204	1-244-671-11	820
R205	1-244-665-11	470
R206	1-244-690-11	5.1k
R207	1-244-656-11	200
R208	1-244-739-11	560k
R209	1-244-715-11	56k
R210	1-244-673-11	1k
R211	1-244-690-11	5.1k
R212	1-244-697-11	10k
R213	1-244-697-11	10k
R214	1-244-649-11	100
R215	1-244-697-11	10k
R216	1-244-741-11	680k
※R301	1-240-502-11	16k
	1-240-503-11	18k
	1-240-504-11	20k
	1-240-505-11	22k
R302	1-244-679-11	1.8k
R303	1-244-649-11	100
R304	1-244-679-11	1.8k
R305	1-244-679-11	1.8k
R306	1-244-719-11	82k
R307	1-240-520-11	91k
R308	1-244-697-11	10k
R309	1-244-699-11	12k
R310		----------
R311		----------
R312	1-244-680-11	2k
R313	1-244-609-11	2.2
R314	1-244-673-11	1k
R315	1-240-477-11	1.5k
R316	1-244-625-11	10
R317	1-244-653-11	150
R318	1-244-656-11	200

Ref. No.	Part No.	Description
R319	1-244-697-11	10k
R320	1-244-611-11	3
R321	1-244-608-11	2
R322	1-244-623-11	8.2
R323	1-244-628-11	13
R324	1-244-673-11	1k
R325	1-244-677-11	1.5k
R326	1-244-708-11	30k
R327	1-244-677-11	1.5k
R328		----------
R329	1-244-547-11	1.3M
R330	1-244-697-11	10k
R331	1-244-708-11	30k
R332	1-244-673-11	1k
R333	1-244-518-11	75k
R334	1-244-449-11	100
R335	1-244-681-11	2k
R336	1-244-634-11	33
R337	1-244-673-11	1k
R401	1-244-681-11	2.2k
R402	1-244-649-11	100
※R403	1-244-629-11	15
	1-244-632-11	20
	1-244-634-11	24
	1-244-635-11	27
	1-244-636-11	30
R404	1-244-700-11	13k

※ : to be selected

Ref. No.	Part No.	Description
VR1	1-224-066-00	50k (D), variable; VOLUME
VR2	1-224-065-00	1 M (D), variable; SQUELCH
VR3	1-221-499-00	20k (B), adjustable
VR4	1-221-359-00	10k (B), adjustable
VR5	1-221-372-00	500k (B), adjustable

MISCELLANEOUS

J1	1-507-165-00	jack, MIC
J2	1-507-165-00	jack, earphone
J3	1-507-165-00	jack, earphone
J4	1-507-127-00	jack, DC IN 12V
ME	1-520-132-00	meter, LEVEL/BATT CHECK
MIC	8-811-151-00	microphone unit
PL	1-518-146-00	lamp
SP	1-502-400-00	speaker
S1	1-516-142-00	switch, slide
S2	1-513-273-00	switch, slide
S3	1-513-254-00	switch, slide
S4	1-514-790-00	switch, leaf
S5	————	SQUELCH (included in VR2)
S6	————	BATT CHECK (included in VR1)
TEL ANT	1-501-097-00	antenna, telescopic
X1	1-527-075-11	crystal unit, rx; 26.630 MHz
X2	1-527-258-11	crystal unit, rx; 26.580 MHz
X3	1-527-055-11	crystal unit, tx; 27.085 MHz
X4	1-527-257-11	crystal unit, tx; 27.035 MHz
	1-507-901-00	nut, jack
	1-534-806-11	cord, microphone

—— Hardware Nomenclature ——

P – Pan Head Screw

PS – Pan Head Screw with Spring Washer

K – Flat Countersunk Head Screw

B – Binding Head Screw

RK – Oval Countersunk Head Screw

T – Truss Head Screw

R – Round Head Screw

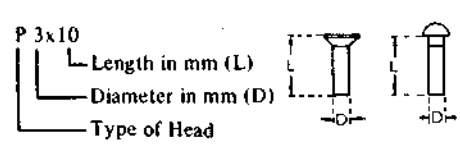
F – Flat Fillister Head Screw

SC – Set Screw

E – Retaining Ring (E Washer)

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

– Example –



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