

# 144MHz FM PORTABLE TRANSCEIVER model **CQ-P2200E**

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## INSTRUCTION MANUAL



**NEC** Nippon Electric Co., Ltd. TOKYO, JAPAN

78021741  
Printed in Japan

**NEC CQ-P2200E 2m FM Transceiver incorporates features as follows:**

1. Transmission output power is switchable to 3W and 1W. Low power consumption by switching to 3W for distance, and 1W for local QSO.
2. Using high gain  $5/8 \lambda$  antenna, which also enables  $1/4 \lambda$  by shortening until upper 4 steps.
3. Cartridge system for easy battery replacement.
4. Meter Circuit serving as S-meter during receiving, and as battery check during transmission.
5. On air indicator, using LED, to indicate transmission mode.
6. Built-in AXC circuit, to adjust detuning of other partner. Switchable with one push switch for RIT adjustment.
7. Using FET for RF stage and IC for IF stage, realizing excellent sensitivity, cross-modulation and limiting characteristics.

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## Specifications

### General

Frequency range:	144.00 ~ 146.00 MHz
Channels:	12 channels
	TX: 145.000      145.525      145.000
	145.025      145.050      145.075
	145.100      145.125      145.150
	145.175      145.200      145.225
	RX: 145.000      145.525      145.600
	145.625      145.650      145.675
	145.700      145.725      145.750
	145.775      145.800      145.825
Microphone:	Dynamic type (10K $\Omega$ )
Speaker:	3W, 8 $\Omega$
Supply voltage:	Built-in batt. DC12V UM-2 x 8, external power supply 13.5 V
Current consumption:	900mA at transmission 110mA at reception
Semiconductors in use:	29 transistors 3 FET's 16 diodes 2 IC's 1 light emitting diode (LED)
Dimensions:	196 (W) x 69 (H) x 219 (D) mm
Weight:	Approx. 2.6kg (including batteries)

### Transmitter

Emission type:	F3
Transmitting power:	3W (at HIGH), approx. 1W (at LOW)
Antenna impedance:	50 $\Omega$
Maximum frequency deviation:	$\pm 10$ KHz
Modulation:	Crystal controlled variable reactance modulation
Multiplication:	12
Undesired radiation:	-60 dB or less
Repeater tone:	1750 Hz $\pm 2$ Hz

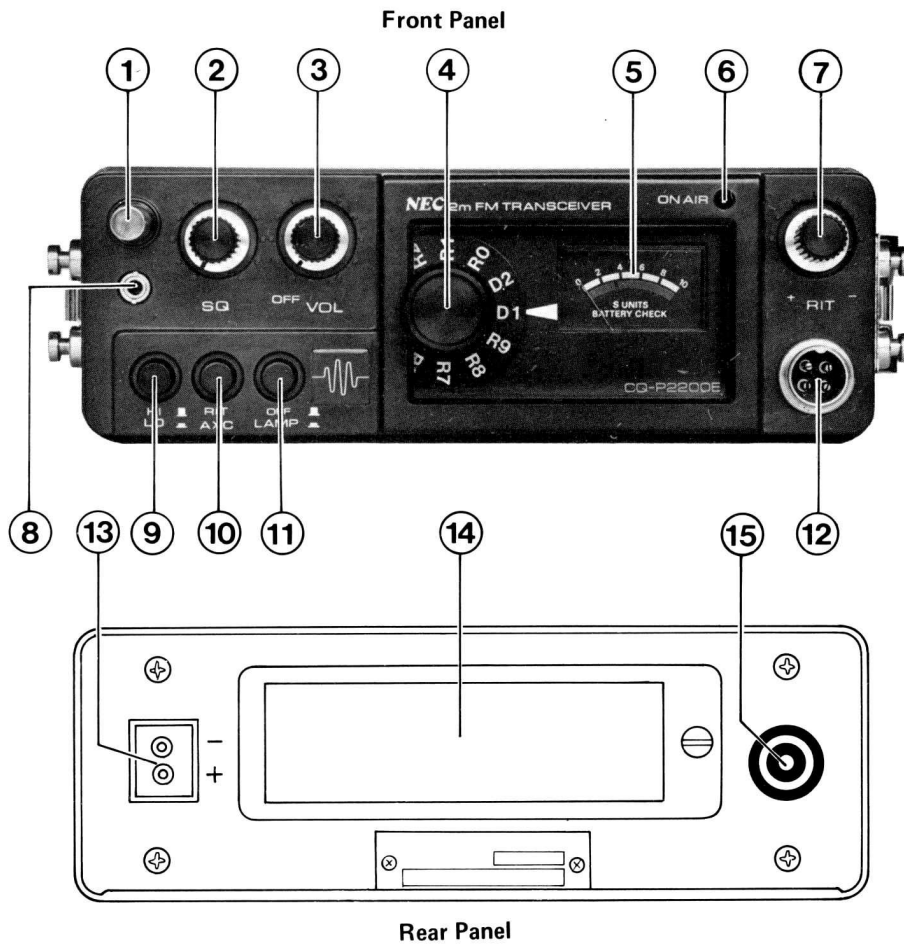
### Receiver

Receiving system:	Double superheterodyne
Intermediate frequency:	First IF 10.7 MHz Second IF 455 KHz
Sensitivity:	S/N 30 dB or more at 1 $\mu$ V input
Squelch:	-6 dB or less
Pass band width:	$\pm 10$ KHz or more (at -6 dB)
Filter:	Ceramic filter
Low frequency output:	0.5W (rated output)
Overall distortion:	10% or less at 1,000 Hz 0.5W

### Accessories

Microphone [Dynamic type 10K $\Omega$ (with curl cord connector)] :	1
Earphone:	1
Power plug:	1
Sholder band:	1
Mike hanger:	1
Cassette type battery case:	1

## Parts Nomenclature and Functions



- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Rod antenna</li> <li>2. Squelch (noise squelch)</li> <li>3. Volume control with power switch</li> <li>4. Channel selector</li> <li>5. Meter (S-Meter at reception. Battery check at transmission)</li> <li>6. On-air indicator (lights when radio waves are transmitted)</li> <li>7. RIT (permits shift of receiving frequency up to about <math>\pm 3</math> KHz)</li> </ol> | <ol style="list-style-type: none"> <li>8. Earphone jack</li> <li>9. Transmitter power selector (3W/1W selector)</li> <li>10. RIT. AXC Selector (Automatic Crystal Control)</li> <li>11. Lamp switch</li> <li>12. Microphone Socket</li> <li>13. External Power Receptacle (DC 13.5V)</li> <li>14. Battery case cover</li> <li>15. External antenna connector (SO239)</li> </ol> |
|---|---|

## Basic Operation at Transmission and Reception

### Operation at Reception

In case of reception, take the following steps to operate the transceiver:

1. Insert 8 dry batteries (UM-2 x 8) into the battery case and set the battery case in the main body. Also, in case of using regulated power supply, connect an adequate wire to the attached plug, making sure that polarity of the power supply is correct. The supply voltage should be DC 13.5V with minus grounding.
2. The squelch knob should be set fully counter-clockwise.
3. Connect an external antenna to the antenna connector. For portable use, stretch the built-in rod antenna. When fully stretched, the rod antenna becomes  $5/8 \lambda$ .
4. Turn ON of the "POWER SW" knob clockwise, and noise or a station can be heard.
5. Set the channel selector knob to a desired channel. Reception can be accomplished if a signal is present. An up-scale reading on the S-Meter shows the field-strength of the received signal.
6. Turn the SQ knob clockwise. Then, the annoying noise will be eliminated and only the signal can be heard.
7. Depress the AXC/RIT selector push-switch. Then, receiving signals can be shifted up to  $\pm 3$  KHz by means of the RIT knob (AXC means automatic receiving frequency correction).

### Operation at Transmission

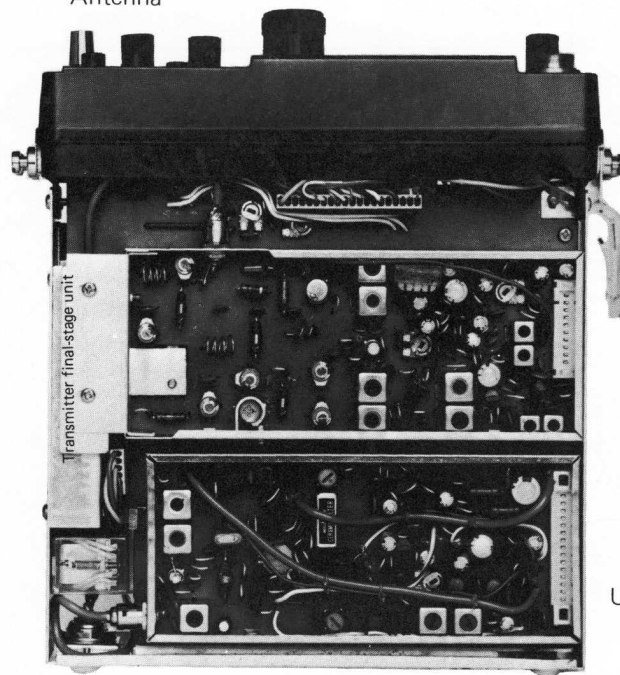
- Insert the microphone into the MIC connector and depress the press-talk switch. Then, a signal can be transmitted immediately and the ON-AIR lamp lights red. The meter indicates now supply voltage.  
When the meter needle comes into red zone, the supply voltage is less than 10V. When using the transceiver for a long time, replace the batteries.
- When the HI/LOW push-switch is depressed, the transmitting power becomes about 1W and less battery consumption and more economical use can be achieved.
- When the press-talk switch is turned OFF, a signal of 1,750 Hz is transmitted during 0.2 sec. by means of an oscillator contained in the microphone.

### Others

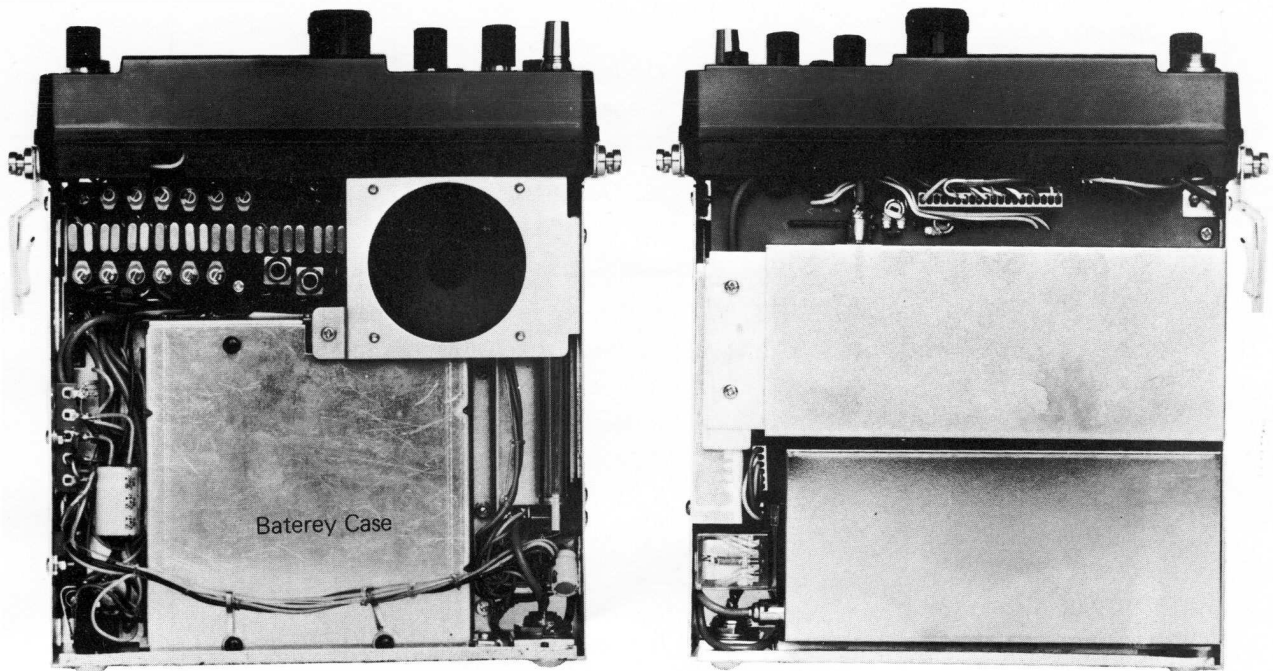
- When using the transceiver in nighttime, depress the LAMP push-switch. A green lamp will light.
- Using the transceiver as fixed station, avoid humidity and direct sun-light.
- The antenna impedance is  $50\Omega$ . Hence, use a  $50\Omega$  coaxial cable of 5D-2V, etc. as short as possible. Also, for the antenna cable a (M-Type) plug (mm -Size) should be used.
- Radio waves at 144 MHz are generally used in vertical polarization. The antenna, therefore, should be used vertically.

# Location of Each Unit

Antenna



Upper part



Lower part

Circuit No.	Parts No.	Name	QTY
TR113, 114	35003906	TR, 2SA-640F	2
TR111	35047216	TR, 2SC945 P	1
TR104, 105, 107, 109, 110, 112, 115, 208, 209, 210, 211, 601	35047218	TR, 2SC945R	12
TR204	35049806	TR, 2SC1216F	1
TR108, 201	35120327	FET, 2SK-19GR	2
TR101	35260112	FET, 3SK40 L	1
TR116	35921517	TR, 2SB548Q	1
TR206	35940770	TR, 2SC-730	1
TR205	35941300	TR, 2SC-741	1
TR103, 106, 202, 203 301, 303, 501	35942512	TR, 2SC1675 L	7
TR102, 302	35943311	TR, 2SC-1674K	2
TR207	35946200	TR, 2SC-1590	1
TR115	35961517	TR, 2SD-414Q	1
D110, 601	36001522	Diode, 1S-953	2
D603	36001529	Diode, 1S2764	1
D101, 102, 103, 104, 106, 107, 108, 203, 204, 401	36002511	Diode, 0A-90	10
D105, 201, 202	36901014	Diode, 1S2339	3
D602	36904005	Diode, Light-E SL-104	1
D109	38005051	Diode, 1S1209	1
IC101	37001005	IC, TA-7061AP	1
IC601	37901033	IC, PC14308	1
R166	40121609	R, Carbon 2.2H ±5% ½W	1
R402	40121673	R, Carbon 1.0K ±5% ¼W	1
R604	40215025	R, Metal 5.6H ±10% 2W	1
R244	40342637	R, Metal 33H ±5% ¼W	1
R164, 165	40951001	R, Metal 0.47H ±5% ¼W	2
R221	40983125	R, Metal 10H ±5% ¼W	1
R224	40983133	R, Carbon 22H ±5% ¼W	1
R102, 105, 126, 207, 211, 215, 216, 218, 219, 243	40983141	R, Carbon 47H ±5% ¼W	10
R120, 125, 127, 132, 143, 208, 212, 222, 230, 242, 501	40983149	R, Carbon 100H ±5% ¼W	11
R163, 303	40983157	R, Carbon 220H ±5% ¼W	2

Circuit No.	Parts No.	Name	QTY
R118, 153, 220	40983161	R, Carbon 330H ±5% ¼W	3
R133, 161, 306, 505	40983165	R, Carbon 470H ±5% ¼W	4
R108, 112, 123, 144, 147, 309	40983167	R, Carbon 560H ±5% ¼W	6
R157	40983171	R, Carbon 820H ±5% ¼W	1
R109, 113, 128, 129, 139, 159, 214, 217, 227, 245, 304, 401, 602, 603	40983173	R, Carbon 1.0K ±5% ¼W	14
R238	40983175	R, Carbon 1.2K ±5% ¼W	1
R115	40983177	R, Carbon 1.5K ±5% ¼W	1
R146, 152, 162, 210, 235	40983181	R, Carbon 2.2K ±5% ¼W	5
R119, 142, 158, 241	40983185	R, Carbon 3.3K ±5% ¼W	4
R106, 117, 240	40983189	R, Carbon 4.7K ±5% ¼W	3
R135, 151, 155, 156, 504	40983191	R, Carbon 5.6K ±5% ¼W	5
R201, 202	40983193	R, Carbon 6.8K ±5% ¼W	2
R111, 122, 130, 136, 149, 167, 205, 229, 233, 234, 237, 302, 308, 503	40983197	R, Carbon 10K ±5% ¼W	14
R134, 236, 502	40983199	R, Carbon 12K ±5% ¼W	3
R107, 124, 131, 213, 231, 232, 305	40983201	R, Carbon 15K ±5% ¼W	7
R138, 150	40983205	R, Carbon 22K ±5% ¼W	2
R121, 301, 307	40983207	R, Carbon 27K ±5% ¼W	3
R103, 116, 203, 204, 209, 601	40983209	R, Carbon 33K ±5% ¼W	6
R104, 206, 223, 226, 228, 239	40983213	R, Carbon 47K ±5% ¼W	6
R101, 140, 141, 145	40983221	R, Carbon 56K ±5% ¼W	4
VR603	41050034	R, Variable 5K 0.1W	1
VR604	41050035	R, Variable 5K SW	1
VR202, 601	41086061	R, Variable 50K 0.1W	2
VR101	41086062	R, Variable RV8P-B500H	1
VR102, 602	41950016	R, Variable 10K	2
VR201	41950025	R, Variable 5K, B	1



Circuit No.	Parts No.	Name	QTY
C104, 015, 107, 121, 133, 242, 244, 250, 304, 603, 604, 605	42110913	C, Ceramic 50V 1000PF	12
C108, 203, 225, 226, 230, 233, 236, 237, 239, 305	41220921	C, Ceramic 50V 4700PF	10
C216, 219, 222, 234, 238, 257, 301, 303, 310, 405, 503, 601, 602, 606	42110929	C, Ceramic 50V 0.01 $\mu$ F	14
C113, 114, 115, 116, 117, 119, 120, 122, 123, 125, 126, 127, 128, 129, 130, 131, 141, 158, 207, 208, 213	42110929	C, Ceramic 50V 0.022 $\mu$ F	21
C608	42110933	C, Ceramic 50V 0.047 $\mu$ F	1
C212	42312102	C, Ceramic 50V 150PF	1
C124, 258	42331043	C, Ceramic 50V 82PF	2
C109, 221, 229, 307	42332001	C, Ceramic 5V 1PF	4
C112, 215	42332002	C, Ceramic 50V 2PF	2
C210	42332008	C, Ceramic 50V 3PF	1
C204, 260A	42332010	C, Ceramic 50V 5PF	2
C260B, 404	42332012	C, Ceramic 50V 7PF	2
C314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 325, 325	42332015	C, Ceramic 50V 10PF	12
C103	42332023	C, Ceramic 50V 12PF	1
C232	42332025	C, Ceramic 50V 15PF	1
C138, 406	42332029	C, Ceramic 50V 22PF	2
C137	42332035	C, Ceramic 50V 39PF	1
C224, 401, 402	42332037	C, Ceramic 50V 47PF	3
C302, 312, 313	42332045	C, Ceramic 50V 100PF	3
C403	42332049	C, Ceramic 50V 22PF	1
C259	42332051	C, Ceramic 50V 33PF	1
C228	42333010	C, Ceramic 50V 3PF	1
C101, 106, 306	42333012	C, Ceramic 50V 5PF	3
C110, 220, 308	42333014	C, Ceramic 50V 7PF	3
C231	42333017	C, Ceramic 50V 10PF	1
C223, 235	42333023	C, Ceramic 50V 10PF	2
C217	42333027	C, Ceramic 50V 15PF	1

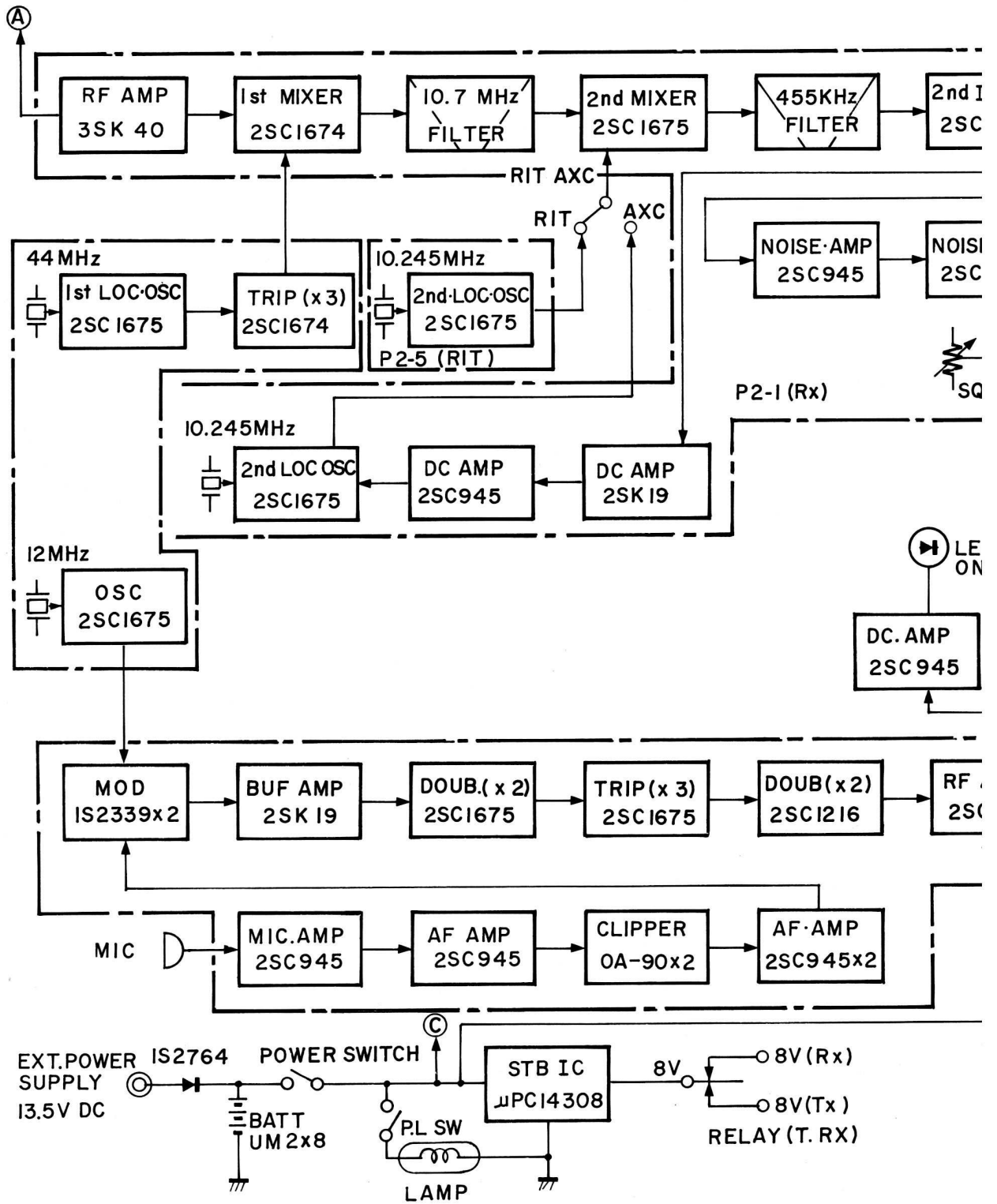
Circuit No.	Parts No.	Name	QTY
C102, 111, 309	42333031	C, Ceramic 50V 22PF	3
C209	42333039	C, Ceramic 50V 47PF	1
C201, 211, 218	42333041	C, Ceramic 50V 56PF	3
C140, 205, 206, 501	42333047	C, Ceramic 50V 100PF ± 5%	4
C139, 502	42333049	C, Ceramic 50V 120PF	2
C214	42333056	C, Ceramic 50V 22PF	1
C202, 311	42407029	C, Mica 50V 220PF	2
C155	42701013	C, Mylar 50V 1000PF	1
C253	42701016	C, Mylar 50V 3300PF	2
C243, 252, 255	42701017	C, Mylar 50V 4700PF	3
C152	42701019	C, Mylar 50V 0.01μF	1
C134	42701021	C, Mylar 50V 0.022μF	1
C143	42701022	C, Mylar 50V 0.333μF	1
C135, 136, 146, 157	42701023	C, Mylar 50V 0.047μF	4
C149	42701025	C, Mylar 50V 0.1μF	1
C148	43011002	C, Elec. 6.3V 33μF	1
C132, 142, 144, 154, 245, 247	43011028	C, Elec. 16V 10μF	6
C227, 248	43011031	C, Elec. 16V 47μF	2
C156	43011032	C, Elec. 16V 100μF	1
C145, 151, 153, 246 254	43011042	C, Elec. 25V 4.7μF	5
C609	43011047	C, Elec. 25V 100μF	1
C607	43011050	C, Elec. 25V 470μF	1
C147, 241, 249, 251, 256	43011066	C, Elec. 50V 1μF	5
TC201, 202	44208003	C, Trimer	2
TC301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312	44208004	C, Trimer 30PF	12
TC203, 204, 205, 206	44208005	C, Trimer	
VC501	44950004	Tuning C, Air 20PF	1
T201	45219013	AF Trans. (Output)	1
L106, 501	61006004	Filter-coil	2
L221	41052041	Filter-coil, S102K	1
L104, 105	61091004	Rilter-coil 2200μH	2
CF102	61131003	Filter-C, Ceramic 455KHz	1
CF101	61136009	Filter-A, Cermaic 10.7MHz	1
L201	61901053	Coil	1
L202	61901054	Coil	1
L203	61901055	Coil	1

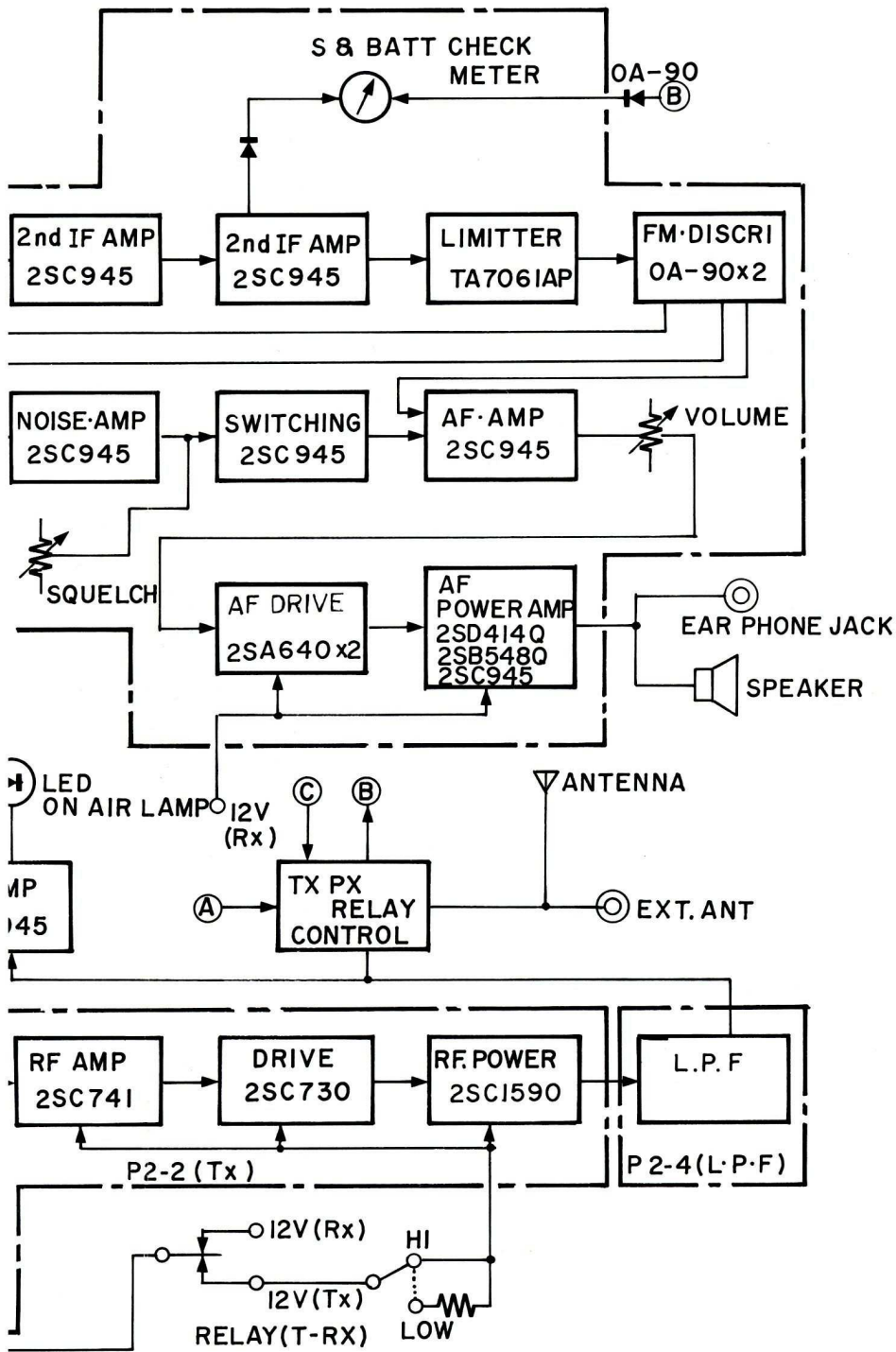
Circuit No.	Parts No.	Name	QTY
L204	61901056	Coil	1
L205	61901057	25MHz Coil	1
T101	61902026	1st IF Coil	1
T102	61902027	1st IF Coil	1
T103	61902028	2nd IF Coil	1
T104	61902029	2nd IF Coil	1
T105	61994119	Coil, DIS	1
T106	61904120	Coil, DIS	1
L101	61904318	RF Coil	1
L102	61904319	RF Coil	1
L103	61904320	RF Coil	1
L211	61904321	RF Coil	1
L212, 219	61904322	RF Coil B	2
L213	61904323	RF Coil C	1
L217	61904326	RF Coil F	1
T301	61904328	OSC Coil	1
L401, 402, 403	61904330	Coil, Filter L402	3
L214	61904346	Coil, RFC	1
L206	61911058	25MHz Coil	1
L207	61911059	75MHz Coil	1
L208	61911060	Coil, 75MHz	1
L209	61911061	140MHz Coil	1
L210	61911062	140MHz Coil	1
L216	61911063	Coil (M)	1
L220	61911064	Coil (M)	1
L218	61911065	Coil (O)	1
T302	69111066	Coil	1
T303	61911067	Coil	1
	62044002	Telescopic Antenna	1
	63001312	Speaker 66MM 8H	1
	63561011	Earphones	1
	63971057	Microphone	1
X101, 501	64920510	X'tal, 10.245MHz	2
X301	64920610	X'tal, 44.76666MHz	1
X302	64920611	X'tal, 44.94166MHz	1
*X303	64920612	X'tal, 44.96666MHz	1
*X304	64920613	X'tal, 44.97500MHz	1
*X305	64920614	X'tal, 44.98333MHz	1
*X306	64920615	X'tal, 44.99166MHz	1
*X307	64920616	X'tal, 45.00000MHz	1
*X308	64920617	X'tal, 45.00833MHz	1

Circuit No.	Parts No.	Name	QTY
*X309	64920618	X'tal, 45.01666MHz	1
*X310	64920619	X'tal, 45.02500MHz	1
*X311	64920620	X'tal, 45.03333MHz	1
*X312	65920621	X'tal, 45.04166MHz	1
X313	64920622	X'tal, 12.08333MHz	1
X314	64920623	X'tal, 12.12708MHz	1
*X315	64920624	X'tal, 12.08333MHz	1
*X316	64920625	X'tal, 12.08541MHz	1
*X317	64920626	X'tal, 12.08750MHz	1
*X318	64920627	X'tal, 12.08958MHz	1
*X319	64920628	X'tal, 12.09166MHz	1
*X320	64920629	X'tal, 12.09375MHz	1
*X321	64920630	X'tal, 12.09583MHz	1
*X322	64920631	X'tal, 12.09791MHz	1
*X323	64920632	X'tal, 12.10000MHz	1
*X324	64920633	X'tal, 12.10208MHz	1
		(* UK: Option X-tal)	
	65901046	Rotary Switch, S22-2-2-12	1
	65910008	Reley DC12V 75MA	1
	67900103	Pilot Lamp 12V 100MA	1
	67905011	Level Meter 240UA	1
	70051023	Connector, AC Line	1
	70505002	Jack, Earphone	1
	70541023	DC Plug	1
	70905156	Connector 1P Plug	2
	70905157	Connector 1P Jack	2
	70906110	Min. Connector 6P 3022-6	1
	70906117	Min.-connecotor 3022-20	1
	70906201	Receptacle 4P	1
	70906309	Connector U-SB1502	1
	70906310	Connector U-SB1002	1
	70906311	Connector U-PA 1021	1
	70906312	Connector U-PA 1521	1
	70907098	Connector 3021-6	1
	70907099	Connector 3021-20	1
	71901029	Lug, Terminal 2E2	1
	72201331	PC Board P2-8	1
	72201901	RIT PWB	1
	72202251	PWB P2-1E	1
	72202261	PWB P2-2E	1
	72202271	PWB P2-3E	1
	72202281	PWB P2-4E	1
	72202291	PWB P2-6E	1

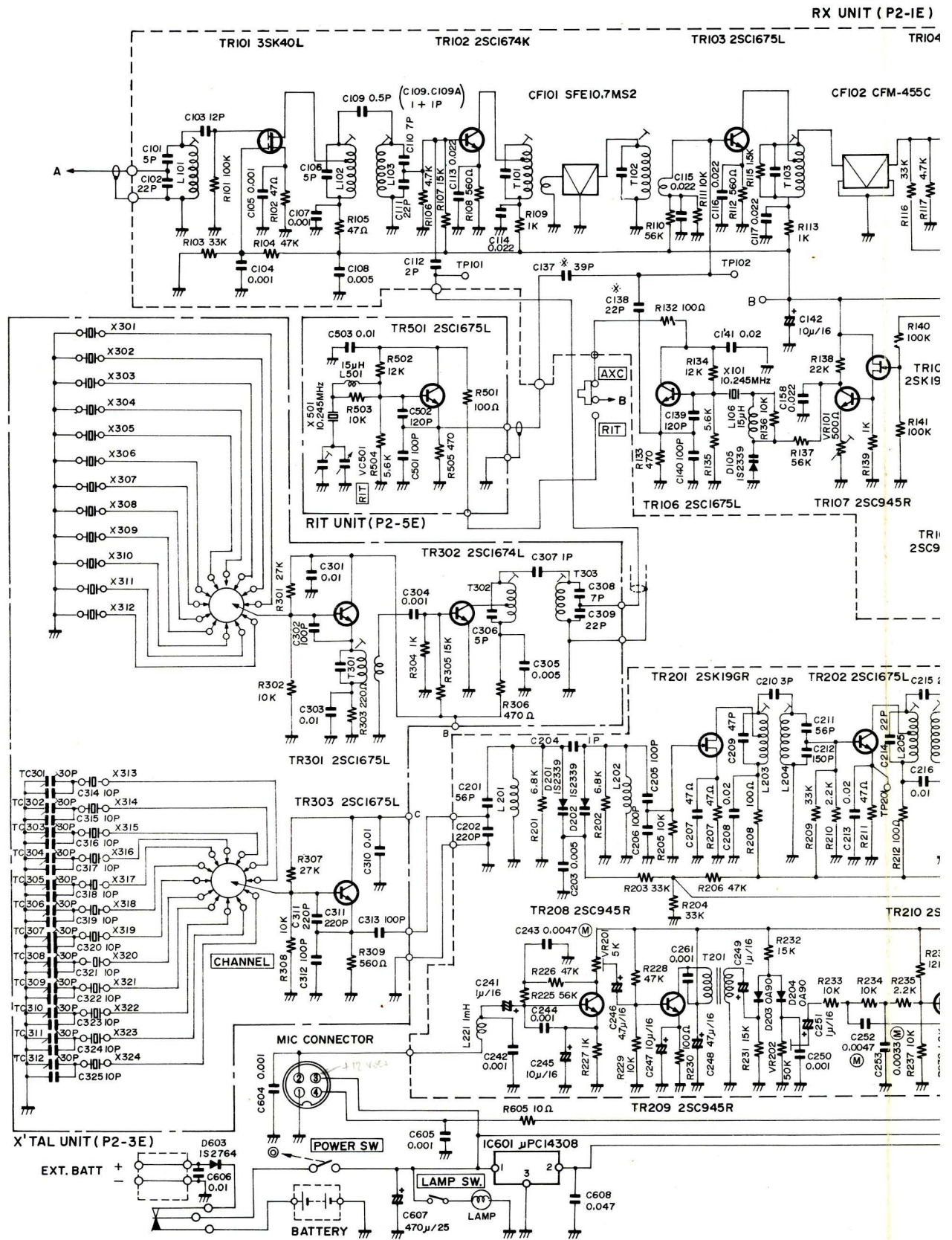
Circuit No.	Parts No.	Name	QTY
	78021741	Instruction Book	1
	79799019	X'tal-socket 12P	1
	79905690	Receptacle	1
	87942101	P2-1 PWB Unit Ass'y	1
	87942201	P2-2 PWB Unit Ass'y	1
	87942301	P2-3 PWB Unit Ass'y	1
	87942401	P2-4 PWB Unit Ass'y	1
	87942501	P2-5 PWB Unit Ass'y	1
	87942601	P2-6 PWB Unit Ass'y	1
	93982701	PB. Unit Ass'y P2-7	1

# Block Diagram





# Circuit Diagram



Note: Circuits and component values are subject to change with technical development.



UNIT (P2-1E)

