INSTRUCTION MANUAL CPU-2500R

YAESU MUSEN CO , LTD.

TOKYO JAPAN.

TABLE OF CONTENTS

VER

UNIT

of memory or dial frequencies, up/
ng control, auxiliary repeater split
up to 4 MHz, and two-tone input for
control link purposes.

other exciting features of the CPU-
utomatic or manual tone burst/tone
, selectable power output of 25W/3W,
nory backup feature for holding
requencies when the transceiver is
A fully adjustable subaudible tone
ch (TGS) is available as an option.

su design features include automatic
on for the output transistors, as well
polarity protection for the supply
PU-2500R is supplied complete with
hardware, cables, and accessories
nobile use, as well as a stand for base
The solid state devices used in the
J-2500R assure you of many years of
peration.

SPECIFICATIONS

Frequency range:
144 – 148 MHz*
144.000 – 147.995 MHz receive
144.010 – 147.995 MHz transmit
*Factory modified to 144 – 146 MHz, if required by local regulations.

Synthesizer steps:
10 kHz, with 5 UP switch for intermediate steps.

Emission type:
F3 variable reactance frequency modulation.

Deviation:
± 5 kHz factory preset, ± 16 kHz maximum

Power output:
25 watts (HI), 3 watts (LOW) @ 13.6 VDC into 50 ohm load.

Spurious emissions:
Better than 60 dB down.

Antenna impedance:
50 ohms nominal.

Microphone impedance:
600 ohms

Tone burst frequency:
1800 Hz (USA model),
1750 Hz (Europe, etc.)

Receiver type:
Double conversion superheterodyne.

Receiver sensitivity:
0.3 μV for 20 dB QS

Selectivity:
±6 kHz at 6 dB down, ±12 kHz at 60 dB down.

First IF:
10.7 MHz

Second IF:
455 kHz

Audio output:
1.5 watts @ 10% THD.

Audio output impedance:
8 ohms.

Voltage requirement:
13.6 volts ± 10%

Current consumption:
0.5 A receive
6.0 A transmit (HIGH), 2.5 A (LOW)

Case dimensions:
180 (W) x 72 (H) x 270 (D) mm.

Weight:
3.2 kg.

SEMICONDUCTOR COMPLEMENT

Integrated Circuits

MN9003 (CPU)	1
MC14011B	5
MC14042B	1
MC14069B	1
MC14410	1
MC14556B	1
MSM5576	1
TA7060P	1
TC5081P	1
μPC575C2	1
μPC577H	1
μPC14305	1
μPD857C	1
78L05	2
VP-20A	1

Field-Effect Transistors

2SK19BL	1
2SK19GR	3
2SK30AY	1
3SK40M	3
3SK51	3

Transistors

2SA496Y	1
2SA564Q	9
2SA719P	4
2SC373	1
2SC496Y	2
2SC535A	3
2SC741	1
2SC1000GR	1
2SC1815Y	32
2SD235-O	1

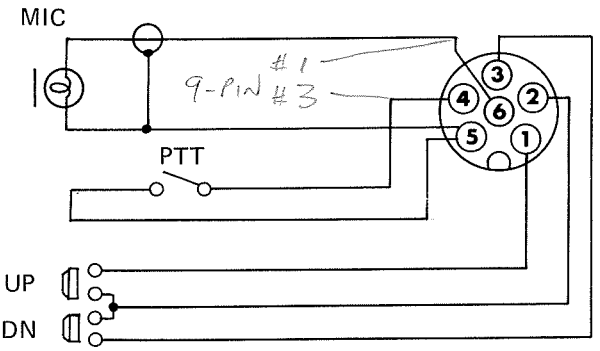
er		Varactor Diodes		LED Display	
	2	1S2209	5	5082-7740	7
		1SV50	1		
des					
	11	Varistor Diode			
		MV103	1		
	28	Zener Diode			
	1	RD8.2EB	1		

Specifications subject to change without notice or obligation.

ACCESSORIES

ONE 1 ea.

microphone comes with a flexible, 6 pin connector for insertion into microphone jack. The microphone switch and UP/DOWN scanner con- board microphone includes a tone e programming controls.



ONE HANGER 1 ea.

y be installed wherever convenient to the microphone.

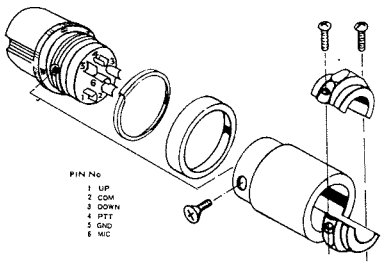
ORD 1 ea.

l comes equipped with a 10 ampere ine.

JSES 1 ea.

e for replacement if the line fuse placing fuses, be absolutely certain ment fuse of 10 amps rating.

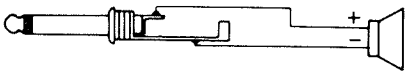
DOES NOT COVER DAMAGE MPROPER FUSE REPLACEMENT.



Standard Microphone Connector

MOUNTING BRACKET 1 ea.

nstallations, a universal mounting ied.

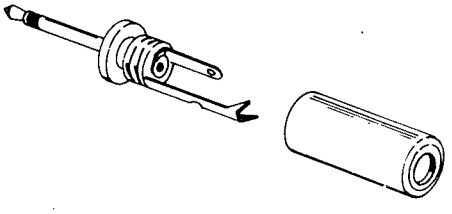


1 ea.

g in base station use.

RE PHONE PLUG 1 ea.

phones or an external speaker.



Speaker Plug

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display will
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cuit.

(16) BUSY

This lamp lights when the squelch is tripped by an incoming signal, thus indicating that the frequency is occupied.

(17) ON AIR

This lamp lights up during transmission.

(18) DISPLAY

Full frequency readout is provided by the digital display. As well, the memory channel selected is displayed at the right-hand side.

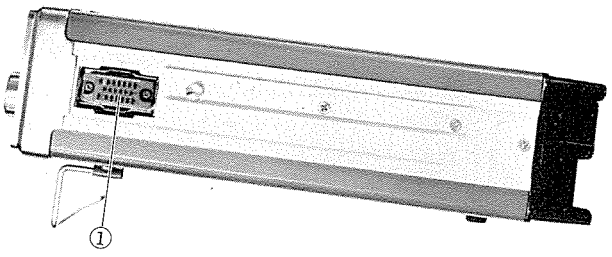
(19) MR (MEMORY RECALL)

This button transfers control from the main dial to the memory channels.

(20) DIL (DIAL)

This switch, when pressed, transfers control from the memory channels to the main tuning dial.

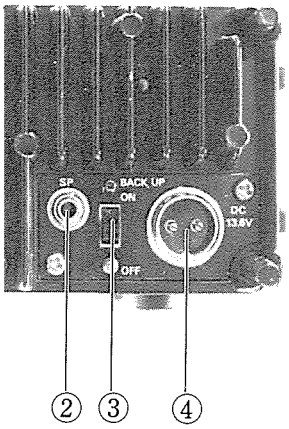
CABINET RIGHT SIDE



(1) KEYBOARD MIC JACK

When the keyboard microphone is used, its input is through this jack.

IS AND SWITCH



ctor, the memory circuits will still be held in ing condition. If DC power is removed, ı, the memorized frequencies will be lost.

OWER

ceptacle accommodates the power cord. A located in the power cord, rated at 10 amps. REPLACING FUSES, BE CERTAIN TO A FUSE OF 10 AMPS RATING. OUR ANTY DOES NOT COVER DAMAGE ED BY IMPROPER FUSE REPLACEMENT.

SWITCHES

OW POWER SWITCH

LOW position, power output will be ap- ıately 3 watts, and in the HIGH position, output will be approximately 25 watts.

ONE SQ

the optional tone squelch unit is installed, g this switch in the ON position will activate baudible encoder/decoder.

URST/CALL

this switch is placed in the BURST position, cond tone burst will be generated whenever T switch is activated. In the CALL position, g the PTT switch will cause no tone to be The front panel CALL button will send a nd activate the PTT circuit for as long as the is pushed, regardless of the position of the T/CALL switch.

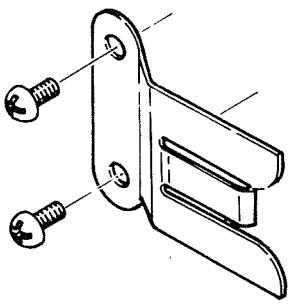
ALLATION

Connect the RED lead of the power cord to the POSITIVE (+) battery terminal, and connect the BLACK lead to the NEGATIVE (−) terminal. If it is necessary to extend the power cable, use #16 AWG insulated copper wire, and use the minimum length practicable to reduce voltage drop.

CAUTION

BEFORE CONNECTING THE POWER CABLE TO THE TRANSCEIVER, CHECK THE BATTERY VOLTAGE WITH THE ENGINE RUNNING (BATTERY CHARGING). IF THE VOLTAGE EXCEEDS 15 VOLTS DC, THE REGULATOR SHOULD BE READJUSTED SO THAT THE HIGHEST CHARGING RATE DOES NOT EXCEED 15 VOLTS. ALSO, BE ABSOLUTELY CERTAIN THAT THE CORRECT BATTERY POLARITY IS OBSERVED WHEN MAKING CONNECTIONS. REVERSED POLARITY WILL NOT DAMAGE THE CPU-2500R BECAUSE OF THE PROTECTIVE CIRCUITRY INCORPORATED IN DESIGN. HOWEVER, THE CPU-2500R WILL NOT OPERATE UNDER CONDITIONS OF REVERSED SUPPLY POLARITY.

Connect the power cable to the POWER receptacle on the rear apron, connect the coaxial cable from the antenna to the rear apron ANT receptacle, and connect the microphone to the jack appropriate for the microphone in use. An external speaker may be connected to the rear apron SP jack, if desired. Use the speaker plug supplied with the transceiver. Insertion of a plug into this jack automatically cuts off the internal speaker.



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SIDERATIONS

d for operation using an
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protection circuitry will
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to secure full output

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base station operation
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h gain directional array

, the most popular
length vertical and the
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wavelength vertical. See
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e use.

oaxial cable, as much
ossy transmission line.
A/U type of coax may
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ations, use type RG8A/
ery long runs, type
ted "foamflex" coax, or
may be used.

ERATION

To recall a memorized frequency, press the MR button. Now frequency control is in the memory circuitry. Rotating the MEMORY CHANNEL SELECTOR to positions M1–M4 will select the desired frequency. To return frequency control to the main tuning dial, push DIL.

For holding memorized frequencies after the transceiver is turned off, activate the rear apron BACK UP switch (before the CPU-2500R is turned off). Remember that power must be applied to the rear apron power connector for this backup function to be performed. Current drain during backup operation is approximately 30 mA.

SCANNER OPERATION

Press the front panel DIL and MAN switches. Pressing the UP switch will now cause the CPU scanner to scan higher in frequency in 10 kHz steps. Pressing the microphone PTT switch or the front panel CALL button will halt the scan without transmitting a signal. A second press of the PTT or CALL switch will cause the transmitter to be activated.

In like fashion, pressing the DOWN button will cause the scanner to scan lower in frequency. Press the PTT or CALL buttons to halt the scan.

If frequencies are programmed in the memory slots, pressing MR and either the UP or DOWN button will cause the four memory channels to be scanned. The scan may be halted as described previously.

To secure automatic stopping of the scan at a desired frequency, set the SCAN STOP switch to AUTO. Now, when the SCAN STOP MODE switch is in the BUSY position, the scanner will hold on the first channel it finds which is occupied (containing a signal strong enough to trip the squelch). When the SCAN STOP MODE switch is in the CLEAR position, the scanner will stop when it finds a clear channel. Note that, when the SCAN STOP MODE switch is in the BUSY position, the squelch must be adjusted to mute the receiver under no-signal conditions; otherwise, if the SQL control is fully counter-clockwise, for example, the scanner will only advance one channel at a time, thinking that a busy channel has been found.

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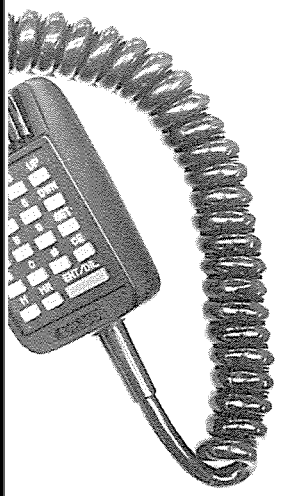
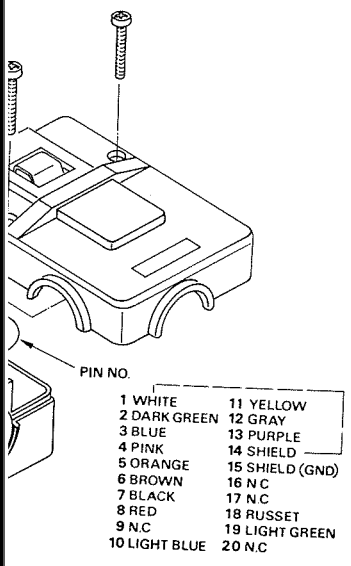


ICROPHONE YM 2500



KEYBOARD MICROPHONE OPERATION

The keyboard microphone for the CPU 2500R allows remote programming of memory frequencies, dialing in of transceive frequencies, remote actuation of the scanner, and remote programming of auxiliary splits for repeaters.

PTT and scanning operation is identical to that of the standard microphone.

When the PTT switch is depressed for transmission, the keyboard becomes a tone pad for accessing autopatch facilities on repeaters, or for other control purposes. The two-tone audio frequencies are shown in Fig. 2. VR_{901}, located on the MONITOR UNIT (PB-1897), sets the level for the speaker monitor of the two-tone signal. VR_{901} sets the two-tone audio output level to the transmitter.

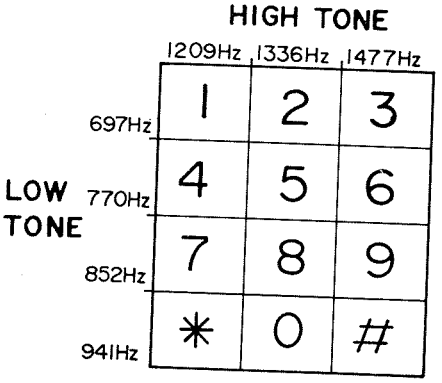
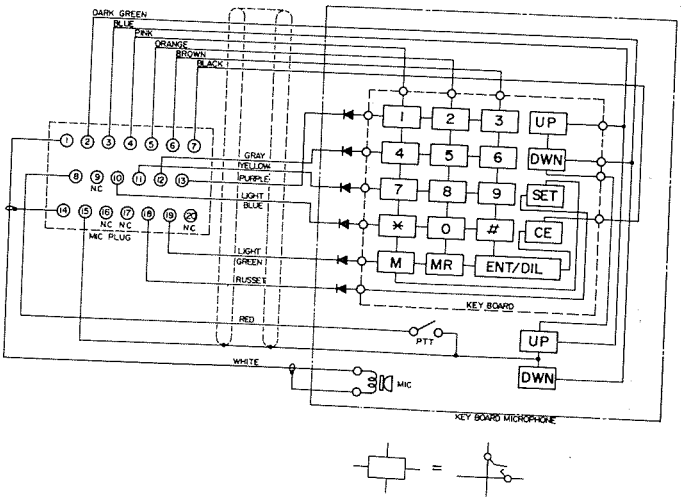


Fig. 2



For dialing in an operating frequency, place the front panel MEMORY CHANNEL SELECTOR switch in the KEY position. To dial in 146.52 MHz, press "652" and DIL. 146.52 MHz will now be your operating frequency. Do not press "6520", as the final digit is already programmed. If four numbers are addressed, the display will, when you press DIL, indicate "14E.__" which means an error has been made. Press CE (Clear Entry) to erase the mistake and return to the original operating frequency.

If you should press "6520" but not DIL, simply press "652" again, then DIL. The digits will simply be shifted in the register, making error correction easy. When "14E.___" is displayed, the transmitter will not function, thus preventing out-of-band operation.

Press	Display	Comments
DIL	146.450	Original frequency.
6	14 . 60	Program 146.520 MHz.
5	14 .650	
2	146.520	
ENT/DIL	146.520	Correctly programmed.

To store 146.940 MHz in memory position M1, press "694" and DIL. Now press "1" and M on the keyboard. 146.940 MHz will now be stored in M1. To store 146.520 MHz in M2, press "652" and DIL, then press "2" and M. To recall 146.940 MHz, press "1" and MR. To recall 146.520 MHz, press "2" and MR. The other memory channels may be treated in like fashion.

Press	Display	Comments
	146.520	Original frequency.
6	14 . 60	Now program 146.940 MHz.
9	14 .690	
4	146.940	
ENT/DIL	146.940	Correctly entered.
1	14 . 10	Enter 146.940 into memory position 1.
M	146.940	Correctly stored in M1.

The following examples will demonstrate typical input errors when using the keyboard microphone, as well as the remedial action required.

OVERFLOW ERROR CORRECTION

Press	Display	Comments
	146.520	Original frequency.
6	14 . 60	Now program 146.940 MHz.
9	14 .690	
4	146.940	
0	14 . 00	Overflow.
ENT/DIL	14E. 0	Error.
CE	146.520	Return to original frequency, try again.
6	14 . 60	
9	14 .690	
4	146.940	
ENT/DIL	146.940	Correctly entered.

IMPROPER MEMORY CHANNEL PROGRAMMING

Press	Display	Comments
	146.520	Original frequency
6	14 . 60	Program 146.940 into memory.
9	14 .690	
4	146.940	
ENT/DIL	146.940	
5	14 . 50	
M	14E. 0	No memory position 5, error detected.
CE	146.940	Clear, return to programmed frequency.
2	14 . 20	Try again.
M	146.940	146.940 correctly stored in memory position.2

SCANNING WITHOUT FREQUENCY DISPLAYED

Press	Display	Comments
	146.520	Original frequency.
6	146. 60	Program 146.940 MHz.
DN or UP	14 . 0	Scanning, no display.
CE	14 . 0	Scanning, no display, CE will not clear.
PTT sw.	146.680	Scan halted normally, scan stop frequency displayed.

USE OF OVERFLOW FOR ERROR CORRECTION

Press	Display	Comments
	146.520	Original frequency.
6	14 . 60	Program 146.940 MHz.
9	14 .690	
5	146.950	Pressed wrong button.
6	14 . 60	No need to clear, deliberately overflow.
9	14 .690	
4	146.940	
ENT/DIL	146.940	Correctly programmed.

FAILURE TO PRESS ENT/DIL

Press	Display	Comments
	146.520	Original frequency.
6	14 . 60	Program 146.940 MHz.
9	14 .690	
4	146.940	
PTT sw.	14E. 0	Transmit, did not press ENT/DIL.
PTT off	146.520	Returned to original frequency, no transmission occurred.
6	14 . 60	Try again.
9	14 .690	
4	146.940	
ENT/DIL	146.940	Correctly programmed.

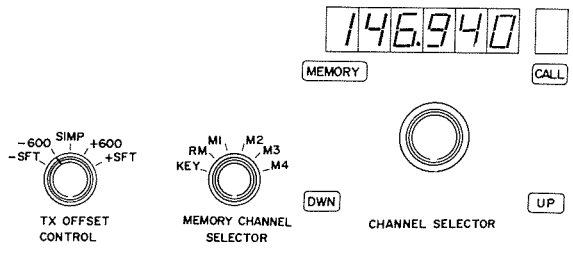
ATTEMPTS TO PROGRAM OUTSIDE BAND

Press	Display	Comments
	146.520	Original frequency.
8	14 . 80	Program 148.880 MHz.
8	14 .880	
8	148.880	
ENT/DIL	14E. 0	Error, frequency outside band.
CE	146.520	Return to original frequency.
	146.520	Original frequency.
8	14 . 80	Mistake, intended to press 7.
CE	14 . 0	Clear register.
7	14 . 70	Program 147.390 MHz.
3	14 .730	
9	147.390	
ENT/DIL	147.390	Correctly programmed.
	146.520	Original frequency.
8	14 . 80	Program 148.880 MHz.
8	14 .880	
8	148.880	
ENT/DIL	14E. 0	Error, frequency outside.
DN or UP	14E. 0	Pressed scan switch with no frequency programmed.
CE	14E. 0	CE does not clear here.
PTT sw.	14E. 0	
CE	146.520	Return to original frequency.

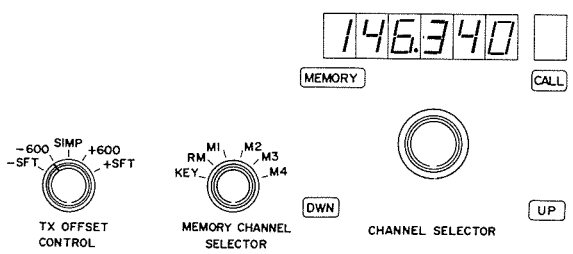
REPEATER OPERATION

Repeater operation is easily accomplished with the CPU-2500R. Placing the front panel TX OFFSET SELECTOR switch in the +600 or –600 position will provide transmit frequency offset of +600 kHz or –600 kHz, respectively. In the United States, –600 kHz shift is generally used between 144 and 147 MHz, while +600 kHz is used above 147 MHz.

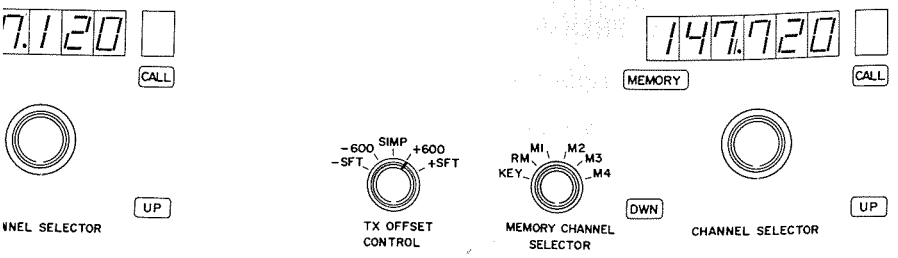
STANDARD ± 600 kHz REPEATER SHIFT OPERATION



Choose receive frequency on dial.
TX OFFSET to –600.

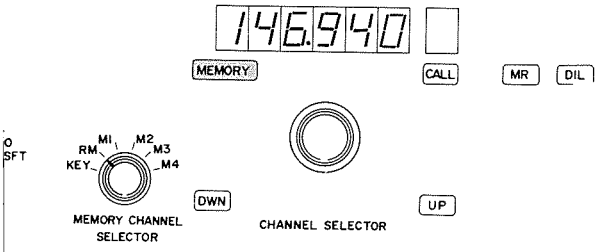


Press PTT switch; TX frequency displayed.

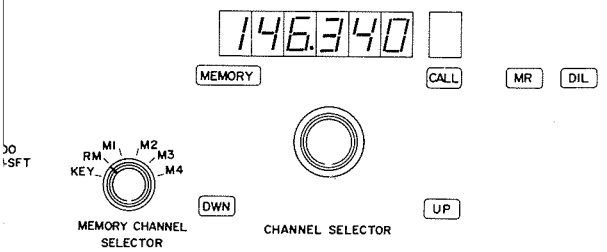


al. TX OFFSET **Press PTT switch; TX frequency displayed.**

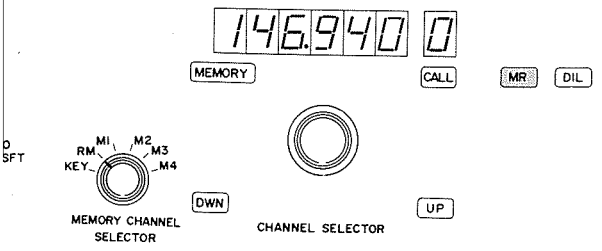
en using the standard type microphone, set the CPU-2500R dial to the er output frequency). Rotate the MEMORY CHANNEL SELECTOR ry) position. Press the MEMORY switch to store the receive frequency in ning dial to the desired transmitting frequency. Press the MR switch, and orized frequency (stored in the M0 position), while transmitting on the change the transmit frequency, press DIL again, dial in a new TX fre- iew combination will be programmed.



eceive frequency and press MEMORY switch.
Y CHANNEL SELECTOR to RM.



Choose transmit frequency.



ss MR switch to recall receive frequency.

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desired transmit
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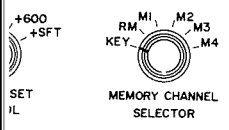
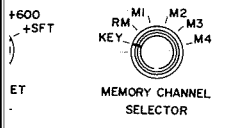
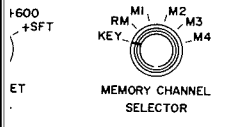
to program the



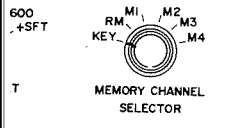
et to –SFT.



et to +SFT.



00 kHz shift.



No shift.

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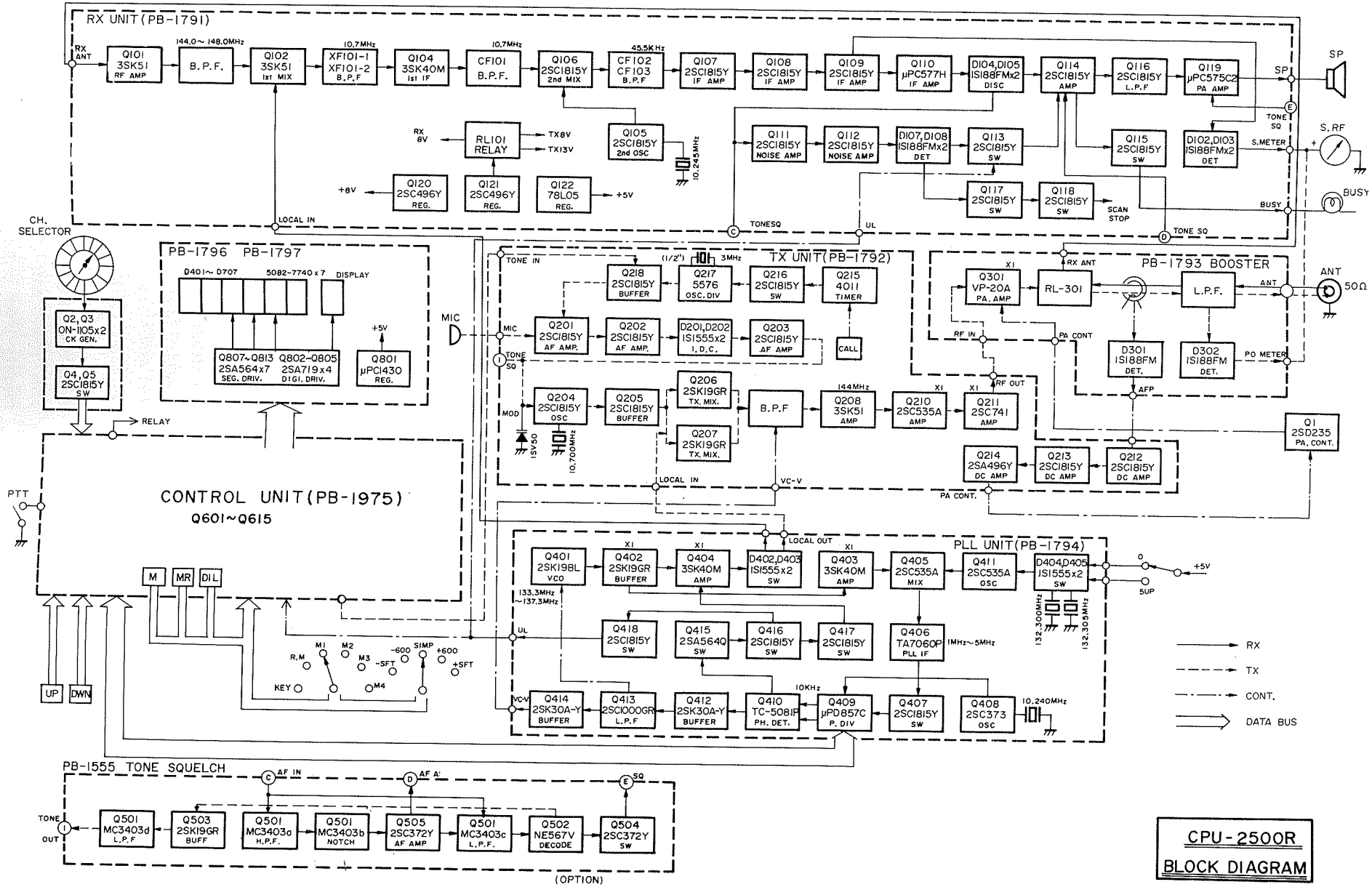

RX UNIT (PB-1791)
RX ANT
Q101 3SK51 RF AMP
144.0~148.0MHz
B.P.F.
Q102 3SK51 1st MIX
10.7MHz
XF101-1 XF101-2 B.P.F
Q104 3SK40M 1st IF
10.7MHz
CF101 B.P.F.
Q106 2SC1815Y 2nd MIX
45.5KHz
CF102 CF103 B.P.F
Q107 2SC1815Y IF AMP
Q108 2SC1815Y IF AMP
Q109 2SC1815Y IF AMP
Q110 μPC577H IF AMP
DI04,DI05 1SI88FMx2 DISC
Q114 2SC1815Y AMP
Q116 2SC1815Y L.P.F
Q119 μPC575C2 PA AMP
SP
TONE SQ
S.METER
S.RF
BUSY
RX 8V
RL101 RELAY
TX8V
TX13V
Q105 2SC1815Y 2nd OSC
10.245MHz
Q111 2SC1815Y NOISE AMP
Q112 2SC1815Y NOISE AMP
DI07,DI08 1SI88FMx2 DET
Q113 2SC1815Y SW
Q115 2SC1815Y SW
DI02,DI03 1SI88FMx2 DET
Q117 2SC1815Y SW
Q118 2SC1815Y SW
SCAN STOP
+8V
Q120 2SC496Y REG.
Q121 2SC496Y REG.
Q122 78L05 REG.
+5V
LOCAL IN
TONESQ
UL
TONE SQ
CH. SELECTOR
PB-1796 PB-1797
D401~D707
5082-7740x7 DISPLAY
Q807~Q813 2SA564x7 SEG. DRIV.
Q802~Q805 2SA719x4 DIGI. DRIV.
+5V
Q801 μPC1430 REG.
Q2,Q3 ON-1105x2 CK GEN.
Q4,Q5 2SC1815Y SW
RELAY
TX UNIT (PB-1792)
TONE IN
(1/2") 10H 3MHz
Q218 2SC1815Y BUFFER
Q217 5576 OSC. DIV
Q216 2SC1815Y SW
Q215 4011 TIMER
CALL
MIC
Q201 2SC1815Y AF AMP.
Q202 2SC1815Y AF AMP.
DI201,DI202 1SI555x2 I.D.C.
Q203 2SC1815Y AF AMP
TONE SQ
MOD
Q204 2SC1815Y OSC
Q205 2SC1815Y BUFFER
Q206 2SK19GR TX. MIX.
Q207 2SK19GR TX. MIX.
1SV50
10.700MHz
B.P.F
144MHz
Q208 3SK51 AMP
Q210 2SC535A AMP
Q211 2SC741 AMP
RF OUT
Q214 2SA496Y DC AMP
Q213 2SC1815Y DC AMP
Q212 2SC1815Y DC AMP
LOCAL IN
VC-V
PA CONT.
PB-1793 BOOSTER
RX ANT
Q301 VP-20A PA. AMP
RL-301
L.P.F.
ANT
50Ω
RF IN
PA CONT
D301 1SI88FM DET.
D302 1SI88FM DET.
PO METER
AFP
Q1 2SD235 PA. CONT.
MIC
PTT
CONTROL UNIT (PB-1975)
Q601~Q615
M
MR
DIL
UP
DWN
R.M
M1
M2
M3
M4
-SFT
-600
SIMP
+600
+SFT
KEY
PLL UNIT (PB-1794)
LOCAL OUT
Q401 2SK19BL VCO
Q402 2SK19GR BUFFER
Q404 3SK40M AMP
DI402,DI403 1SI555x2 SW
Q403 3SK40M AMP
Q405 2SC535A MIX
Q411 2SC535A OSC
DI404,DI405 1SI555x2 SW
0
+5V
5UP
133.3MHz ~137.3MHz
132.300MHz
132.305MHz
Q418 2SC1815Y SW
Q415 2SA564Q SW
Q416 2SC1815Y SW
Q417 2SC1815Y SW
Q406 TA7060P PLL IF
1MHz~5MHz
VC-V
Q414 2SK30A-Y BUFFER
Q413 2SC1000GR L.P.F
Q412 2SK30A-Y BUFFER
10KHz
Q410 TC-5081F PH. DET.
Q409 μPD857C P. DIV
Q407 2SC1815Y SW
Q408 2SC373 OSC
10.240MHz
RX
TX
CONT.
DATA BUS
PB-1555 TONE SQUELCH
AF IN
AF A'
SQ
TONE OUT
Q501 MC3403d L.P.F
Q503 2SK19GR BUFF
Q501 MC3403a H.P.F.
Q501 MC3403b NOTCH
Q505 2SC372Y AF AMP
Q501 MC3403c L.P.F.
Q502 NE567V DECODE
Q504 2SC372Y SW
(OPTION)
CPU-2500R
BLOCK DIAGRAM

fied by
voltage
.ication
;mitter.
output
m D_{302}
ı of the

antenna
esent at
ower is
M), pro-
onducts
VR_{302},
rrent of
tor volt-
Q_{212} to
the PA
ent. The
it is also
3 watts
he LOW
is set by

ıg gener-
BURST/
C voltage
generates
he pulse
C voltage
signal is
ucing an
nal is fed
$_{201}$. The
ı manual
as well as
is set by
y VR_{205}.

through a
$_2$, C_{301} –
RF ampli-
amplified
high-Q co-
(3SK51).
high im-
er spurious
tem noise

erated by the PLL
sisting of a voltage
a reference crystal
ivider, and a phase

9GR) generates a
oscillator frequency
de D_{401} (1S2209),
of a tuned circuit
d C_{404}, C_{406} in ac-
upplied from phase

amplified by buffer
nd Q_{404} (3SK40M)
$_{402}$/D_{403} (1S1555)
ixers.

Q_{404} is fed through
M) to a PLL mixer
1–5 MHz PLL IF
ne PLL heterodyne

is generated by an
oscillator Q_{411}

$_{05}$ (1S1555) select
rdance with the TX
nd the 5 UP switch.
1 to the PLL mixer

2373) generates a
put is fed to scaler/
ere a 10 kHz refer-

$_{1}$ (TC5081P) com-
signal with that of
y phase difference
recting voltage. This
ed through buffer
er Q_{413} (2SC1000-
which changes the
th that of the refer-

voltage at
2SA564Q),
SC1815Y)
or of Q_{416}
DC voltage
$_{404}$. When
the emitter
eration of

eversed in
applied to
or of Q_{418}
. The volt-
Y), which
$_{114}$.

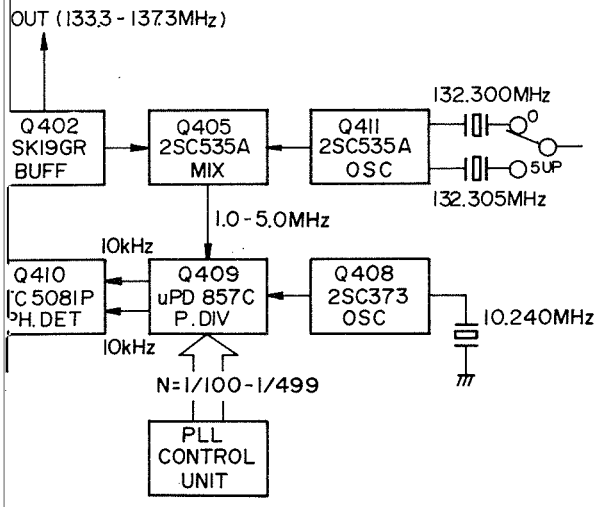
or DC volt-
off; simul-
l, silencing
until VCO

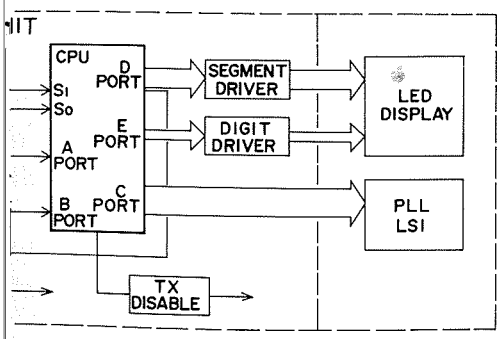
PLL CONTROL

Control of the PLL circuitry is by means of a 4-bit central processing unit (CPU). The CPU controls frequency selection by means of the main tuning dial, the scanners, the memory, and the keyboard microphone. The necessary memory storage capability is provided for in a read-only memory, located within the CPU.

DISPLAY

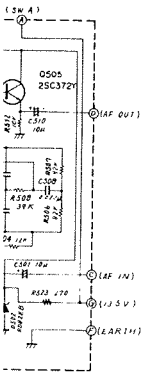
The digital display consists of 7 seven-segment light emitting diode display digits, D_{701}–D_{707} (5082–7740). Drivers Q_{802}–Q_{805} (2SA719) and segment drivers Q_{807}–Q_{813} (2SA564) provide the necessary input to drive the display correctly.

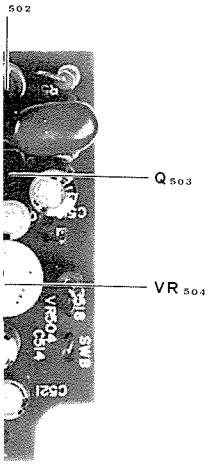




Q_{504} conducts, re-
ience disabling the

Circuit is operative
hed in, the BUSY
hannel is occupied,
n should be made
rators.





※	R 524 ※
Ω	15KΩ
Ω	8.2KΩ

OPTION)

& ALIGNMENT

ROUTINE MAINTENANCE

Routine maintenance should be limited to keeping the transceiver clean, and making periodic checks of the transmitter power output and the receiver sensitivity.

Cleaning:

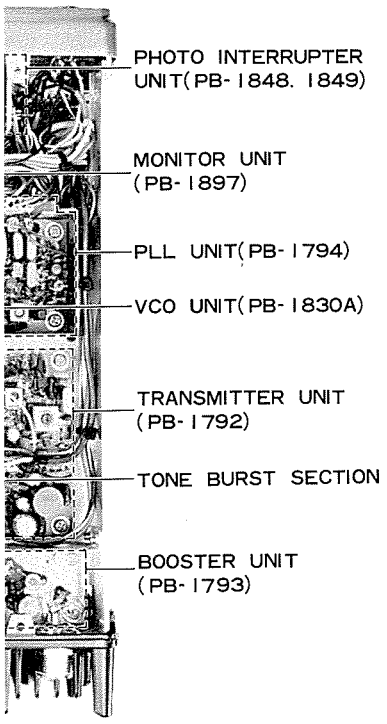
When the transceiver has been used in a dusty or sandy area, the interior may require periodic cleaning. A vacuum cleaner may be used for loose dirt, while caked or otherwise accumulated dirt may be removed with a soft brush. Check the interior to make sure that it is completely dry before replacing the case and operating the transceiver. The exterior may be wiped with a damp cloth as often as needed.

VIEW

'VM range, as required, to obtain approxi-
ltely a full scale reading on the VTVM.
NOT change the VOLUME control setting
er this adjustment is made.

; the signal generator to the receiving fre-
ency of the transceiver, and adjust the out-
t amplitude of the signal generator until the
'VM reads 1/100th (20 dB decrease) of the
ding in step (b). The signal generator out-
t voltage at this point is the 20 dB quieting
sitivity, and the level should be approxi-
tely 0.3 μV.

ove performance checks indicate the need
gnment, it is recommended that the unit be
l to your dealer for servicing. The sophisti-
PU and control circuitry, in particular, are
:al that they should not be touched by
an an experienced technician. Attempts to
the transceiver tuned circuits without the
test equipment may result in degraded
'er performance.



c) Disconnect the sweep generator and scope. Measure the RF injection voltage to the second gate of Q_{105}. A nominal value is 1 volt RMS.

(3) S-Meter Sensitivity

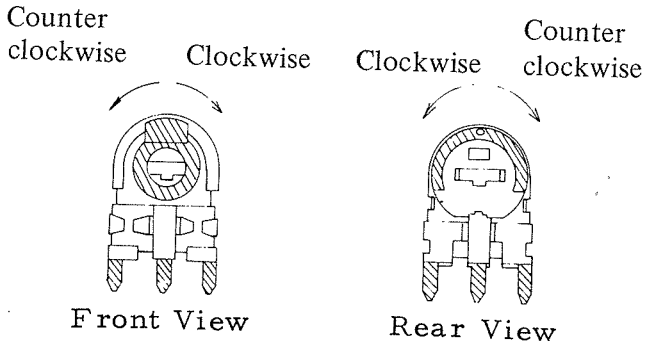
a) Apply the output from the signal generator to the antenna receptacle. Peak T_{103} for a maximum S-meter reading on the generator signal.

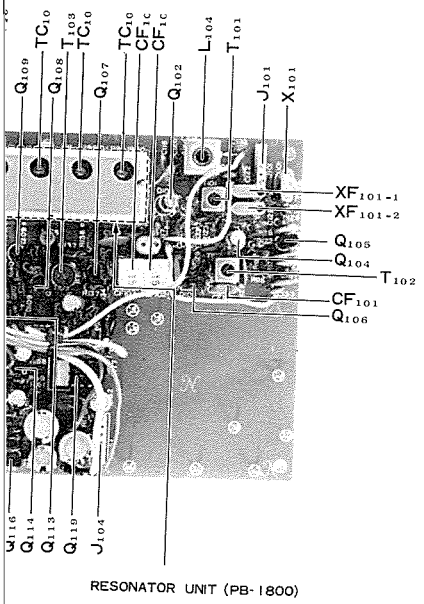
b) Set the output level of the signal generator to 20 dB, and adjust VR_{101} for a full-scale deflection of the S-meter.

(4) Noise Squelch Threshold

a) Apply a 0 dB signal from the signal generator at 147.000 MHz.

b) Set the front panel SQL switch to the fully clockwise position. Adjust VR_{102} until the squelch just opens. Do not advance VR_{102} past the threshold point.





RESONATOR UNIT (PB-1800)

R UNIT(PB-1791)

the ON
r output

squelch
VR_{103}

rol until
3ack off
so that
v apply
ator. A
should

146.000

protec-
ertain to
ng con-
ly. If no
is out of
may be

(1) **10.7 MHz TX Alignment**

a) Connect the RF probe of a VTVM to TP_{201}.

b) Adjust T_{201} for a maximum indication on the VTVM. A nominal value is 550 mV RMS.

c) Connect a frequency counter to TP_{201}, and adjust L_{202} for a reading of 10.700 MHz ± 100 Hz on the counter.

(2) **Mixer/Interstage Alignment**

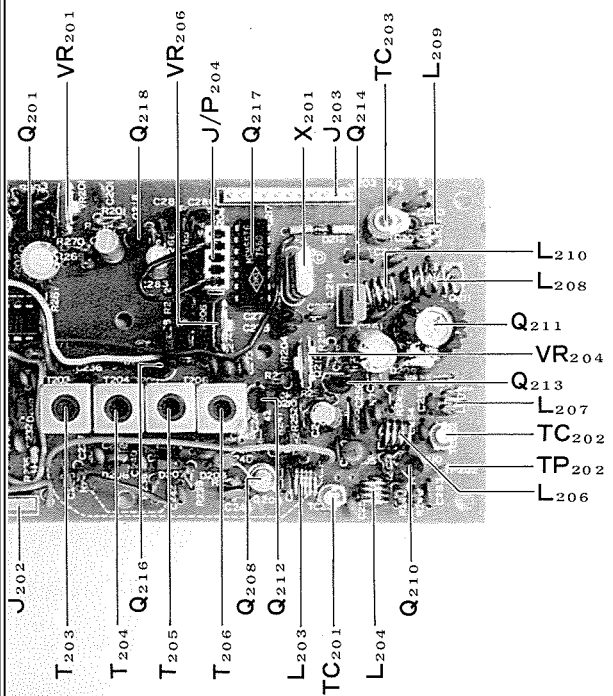
a) Connect a dummy load/wattmeter to the antenna jack.

b) Connect the RF probe of a VTVM to gate 1 of Q_{208}.

c) Close the microphone PTT switch, and adjust T_{201}–T_{206} for a maximum VTVM indication. A nominal reading is 100 mV RMS.

d) Connect a DC voltmeter to TP_{202}, and adjust T_{201}–T_{206} and TC_{201} for a maximum reading on the DC voltmeter.

e) Remove the DC voltmeter, and adjust T_{201}–T_{206} and TC_{201}–TC_{203} for maximum power output as indicated on the wattmeter.



SMITTER UNIT(PB-1792)

e front panel CALL switch.

t an oscilloscope to the center VR_{202}, and confirm that oscil-
f the circuit is taking place.

t a frequency counter to the
pin of VR_{206}, and confirm that
st signal is of the proper fre-
(1800 Hz for the USA model,
elease the CALL switch.

to step a) of section 3, "Modu-
lignment". Adjust VR_{206} while
the CALL switch to establish
FM deviation is ± 3.5 kHz with
ion of the burst signal. Release
L button after this alignment.

istening on a monitor receiver,
ne BURST/CALL switch in the
position, and close the micro-
PTT switch. Confirm that the
ignal is of the desired duration
set at 0.5 second). VR_{205} pro-
justment of the burst length.

PO Meter, and Local Output

t a dummy load/wattmeter to the
receptacle.

t a DC voltmeter (+) lead to the
of D_{301}, and the (–) lead to
Adjust VR_{301} for minimum
voltage.

tages

ode, connect the RF to the emitter of Q_{111}. stage is oscillating at a tely 180 mV RMS.

tmeter using a 10 volt ust TC_{401} to secure a s.

loscope to TP_2, and T_{403} for a maximum scope.

robe of a VTVM to the D_{403}. Adjust T_{401} for ing on the VTVM. A 540 mV RMS.

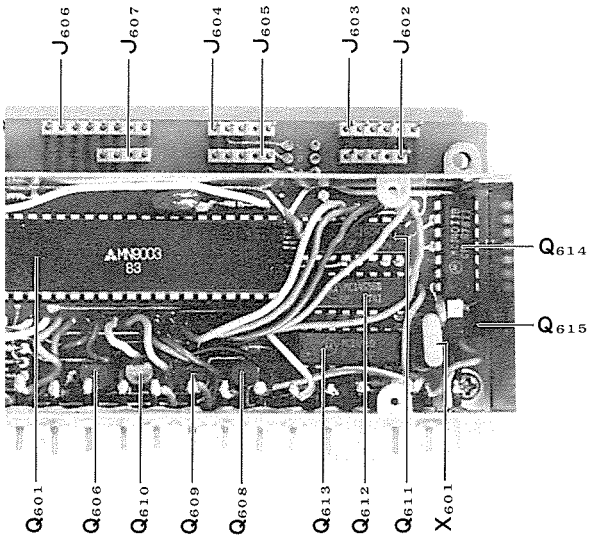
ency counter to the D_{403}.

a reading of 135.300 the counter.

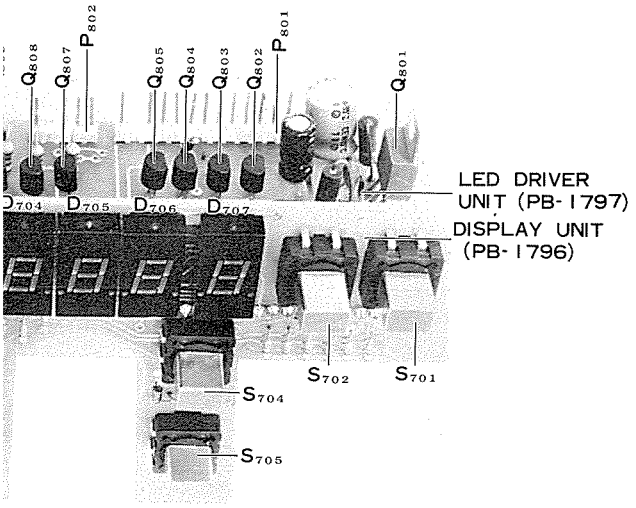
anel 5 UP button, and a reading of 135.305 the counter.

und. Digits 3, 4, and 5 should be blanked to ck.

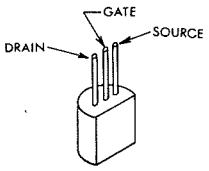
xtremely
nstances
ignment



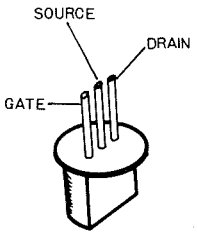
)NTROL UNIT(PB- 1795)



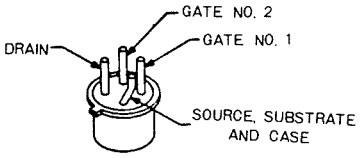
TRANSISTOR & IC CONNECTIONS



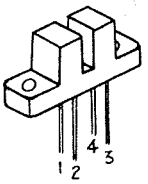
2SK30Y



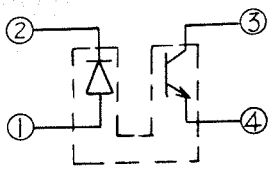
2SK19BL
2SK19GR

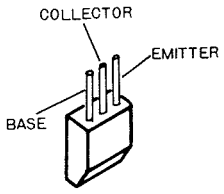


3SK40M
3SK51

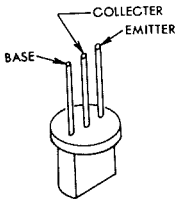


ON1105

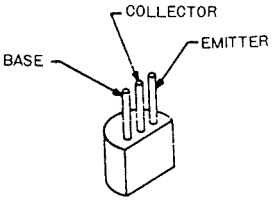




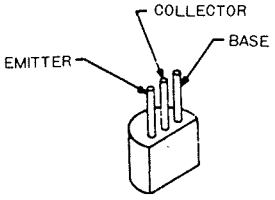
2SC535A



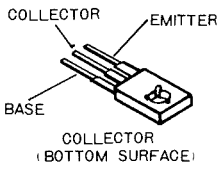
2SC373
2SC1000GR



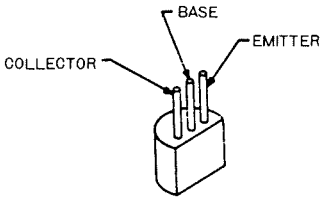
2SA564A Q
2SA719P
2SC1815Y



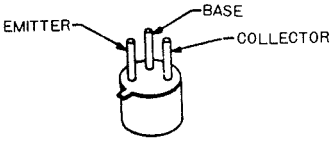
2SC2053
2SC710D,



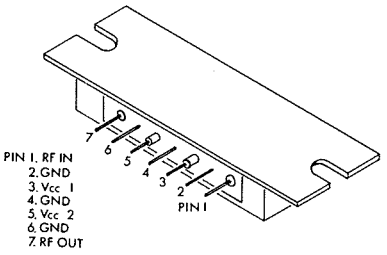
2SA496Y,O
2SC496Y,O



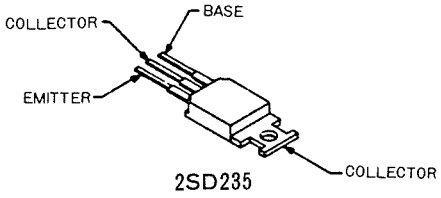
MPSA13



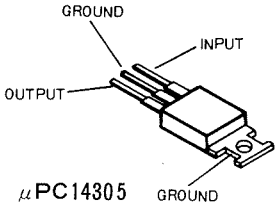
2SC730
2SC741



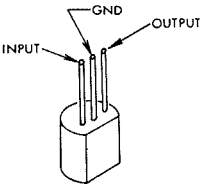
VP20A



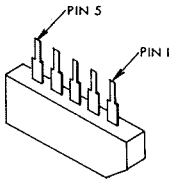
2SD235



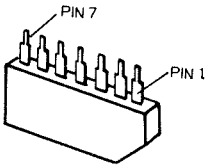
μPC14305



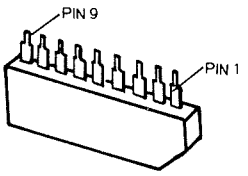
78L05/08



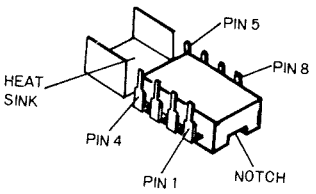
TA7060P



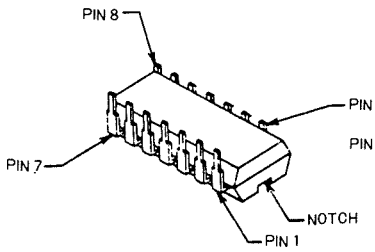
μPC577H



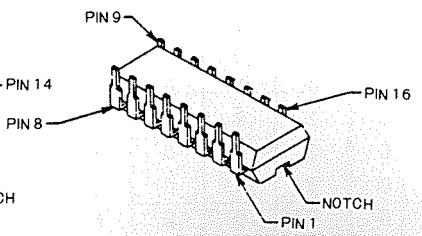
TC5081P



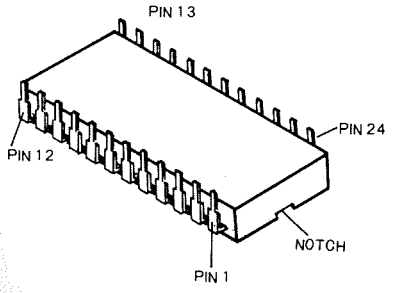
μPC575C2



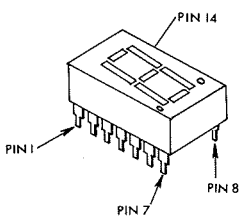
MC14011B
MC14081B
MSM5576
MC14069B
MC14410
MC14556B



MSM561 MC14049B
MC14008B MC14510B
MC14028B MC14511B
MC14042B MC14519B



μPD857C



5082-7740

Q409 (μPD857C) PROGRAMMABLE DIVIDER CODE

Q409 PIN NUMBER →		1	2	3	4	5	6	7	8	9	10	11
P/J403 →		1	2	3	4	5	6	7	8	9	10	11
DIAL DISPLAY ↓	PROGRAMMABLE DIVIDER RATIO ↓	P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9	P_{10}	P_{11}
144.000	1/100	0	0	0	0	0	0	0	0	1	0	0
4.010	1/101	1	0	0	0	0	0	0	0	1	0	0
4.020	1/102	0	1	0	0	0	0	0	0	1	0	0
4.030	1/103	1	1	0	0	0	0	0	0	1	0	0
4.040	1/104	0	0	1	0	0	0	0	0	1	0	0
4.050	1/105	1	0	1	0	0	0	0	0	1	0	0
4.060	1/106	0	1	1	0	0	0	0	0	1	0	0
4.070	1/107	1	1	1	0	0	0	0	0	1	0	0
4.080	1/108	0	0	0	1	0	0	0	0	1	0	0
4.090	1/109	1	0	0	1	0	0	0	0	1	0	0
144.100	1/110	0	0	0	0	1	0	0	0	1	0	0
4.110	1/111	1	0	0	0	1	0	0	0	1	0	0
4.120	1/112	0	1	0	0	1	0	0	0	1	0	0
4.130	1/113	1	1	0	0	1	0	0	0	1	0	0
4.140	1/114	0	0	1	0	1	0	0	0	1	0	0
4.150	1/115	1	0	1	0	1	0	0	0	1	0	0
4.160	1/116	0	1	1	0	1	0	0	0	1	0	0
4.170	1/117	1	1	1	0	1	0	0	0	1	0	0
4.180	1/118	0	0	0	1	1	0	0	0	1	0	0
4.190	1/119	1	0	0	1	1	0	0	0	1	0	0
144.200	1/120	0	0	0	0	0	1	0	0	1	0	0
4.300	1/130	0	0	0	0	1	1	0	0	1	0	0
4.400	1/140	0	0	0	0	0	0	1	0	1	0	0
4.500	1/150	0	0	0	0	1	0	1	0	1	0	0
4.600	1/160	0	0	0	0	0	1	1	0	1	0	0
4.700	1/170	0	0	0	0	1	1	1	0	1	0	0
4.800	1/180	0	0	0	0	0	0	0	1	1	0	0
4.900	1/190	0	0	0	0	1	0	0	1	1	0	0
145.000	1/200	0	0	0	0	0	0	0	0	0	1	0
5.010	1/201	1	0	0	0	0	0	0	0	0	1	0
5.020	1/202	0	1	0	0	0	0	0	0	0	1	0
5.030	1/203	1	1	0	0	0	0	0	0	0	1	0
5.040	1/204	0	0	1	0	0	0	0	0	0	1	0
5.050	1/205	1	0	1	0	0	0	0	0	0	1	0
5.060	1/206	0	1	1	0	0	0	0	0	0	1	0
5.070	1/207	1	1	1	0	0	0	0	0	0	1	0
5.080	1/208	0	0	0	1	0	0	0	0	0	1	0
5.090	1/209	1	0	0	1	0	0	0	0	0	1	0
145.100	1/210	0	0	0	0	1	0	0	0	0	1	0
5.200	1/220	0	0	0	0	0	1	0	0	0	1	0
5.300	1/230	0	0	0	0	1	1	0	0	0	1	0
5.400	1/240	0	0	0	0	0	0	1	0	0	1	0
5.500	1/250	0	0	0	0	1	0	1	0	0	1	0
5.600	1/260	0	0	0	0	0	1	1	0	0	1	0
5.700	1/270	0	0	0	0	1	1	1	0	0	1	0
5.800	1/280	0	0	0	0	0	0	0	1	0	1	0
5.900	1/290	0	0	0	0	1	0	0	1	0	1	0
146.000	1/300	0	0	0	0	0	0	0	0	1	1	0
147.000	1/400	0	0	0	0	0	0	0	0	0	0	1
147.990	1/499	1	0	0	1	1	0	0	1	0	0	1

※1 HIGH LEVEL (5V)
※0 LOW LEVEL (0V)

	KNOB	
37	FT-30T(Channel Selector)	
41	FT-16P(Volume)	
42	FT-16PA(Tx Offset, Memory)	
40	FT-16PD(Squelch)	
	TERMINAL BOARD	
02	1L4P 2-0-2	
02	1L5P 3-0-2	

UNIT

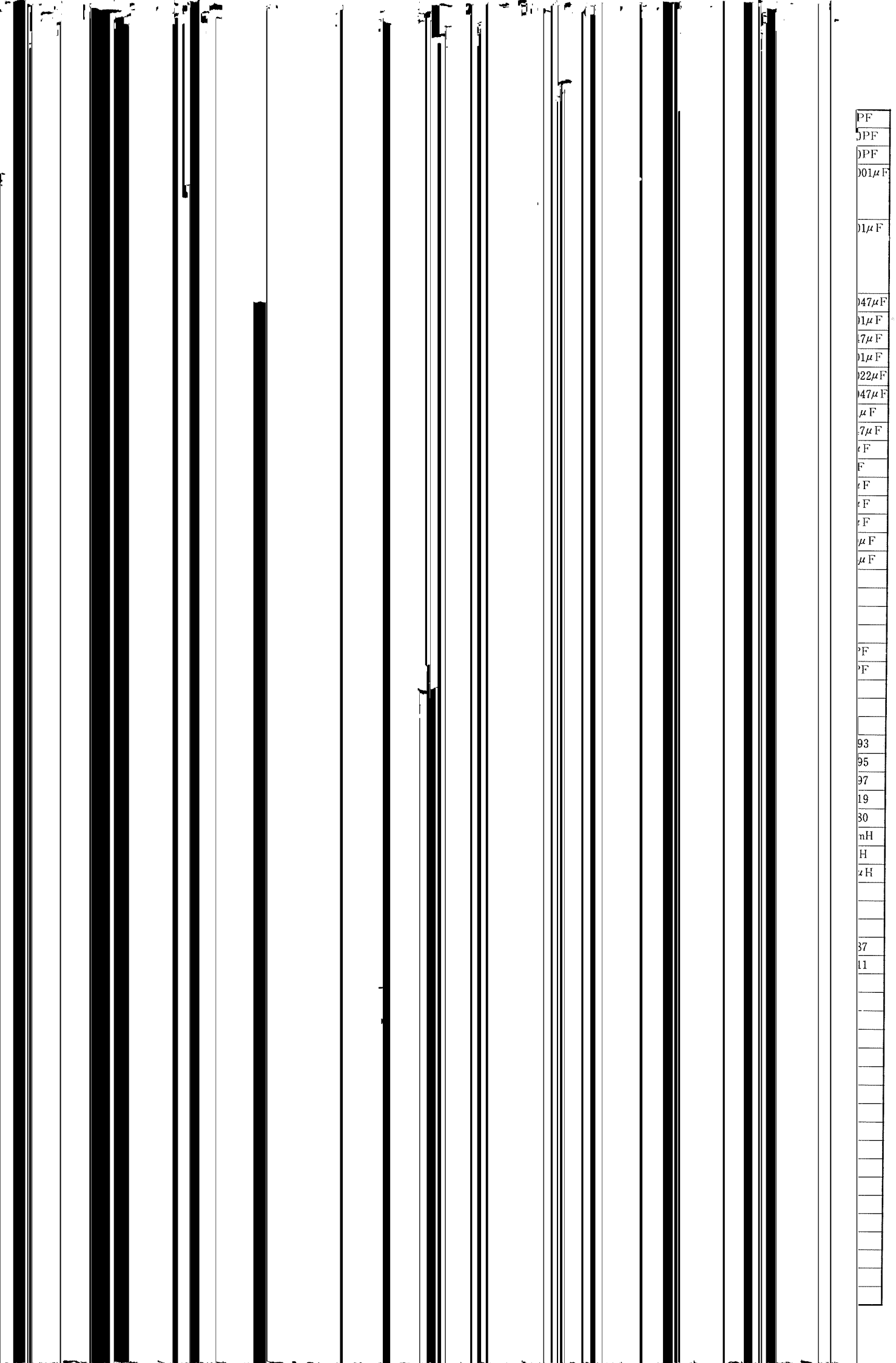
	Description	
AZ	RX UNIT and RESONATOR UNIT with components	
10	Printed Circuit Board	
	IC, FET & TRANSISTOR	
32	IC	78L05
75	〃	78L08
19	〃	μPC575C2
18	〃	μPC577H
01	FET	3SK40M
10	〃	3SK51
64	Transistor	2SC496Y
54	〃	2SC1815Y
	DIODE	
80	Germanium Diode	1S188FM
50	Silicon Diode	1S1555
39	Zener Diode	RD8.2EB
	CRYSTAL	
76	HC-18/U, 10.245MHz #210036	
	MONOLITHIC FILTER	
31	10M2B2	
	CERAMIC FILTER	
10	10.7MF-BR	
16	LFB-15	
	CERAMIC DISCRIMINATOR	
01	SFD455S4	
	RESISTOR	
220	Carbon Composition ½W GK	22Ω
560	Carbon Film ¼W VJ	56Ω
101	〃 〃 〃 〃	100Ω
121	〃 〃 〃 〃	120Ω
221	〃 〃 〃 〃	220Ω
331	〃 〃 〃 〃	330Ω

PARTS LIST

Carbon Film	¼W VJ	470Ω			INDUCTOR
〃	〃	1KΩ	L101,104	54140910	R12-4091 #220105
〃	〃	1.5KΩ	L102	53020004	Micro Inductor FL-4H 2R2M 2.2μH
〃	〃	2.2KΩ	L105	53010004	〃 〃 220μH
〃	〃	3.3KΩ	L106~108	53020009	〃 〃 FL-5H 102K 1mH
〃	〃	4.7KΩ			
〃	〃	5.6KΩ			
〃	〃	8.2KΩ			AF CHOKE
〃	〃	10KΩ	CH101	52000063	#50-13
〃	〃	15KΩ			
〃	〃	22KΩ			
					TRANSFORMER
〃	〃	47KΩ	T101,102	55000185	3005 #220187
			T103	55003084	7MC-312162NO #220188
〃	〃	56KΩ			
〃	〃	100KΩ			
					RELAY
〃	〃	120KΩ	RL101	70000036	AW6221-DC12V
〃	〃	150KΩ			
					MINI CONNECTOR
			P101	67040007	5048-04A
			P102,104	67050005	5048-05A
ERMISTOR			P105	67060004	5048-06A
SDT-250			P106	67080006	5048-08A
			P103	67140001	5048-14A
ENTIOMETER					
TR-11R300		5KΩB			
〃		10KΩB	J101	68040009	5047-04 with wire #240105
			J102	68050006	5047-05 〃 #240101
			J104	68050007	5047-05 〃 #240104
ACITOR			J105	68060015	5047-06 〃 #240100
Ceramic disc	50WV	CH 3PF	J106	68080008	5047-08 〃 #240099
〃	〃	CH 10PF	J103	68140008	5047-14 〃 #240105
〃	〃	SL 10PF			
〃	〃	SL 20PF			
〃	〃	CH 47PF			
〃	〃	SL 100PF			
〃	〃	SL 150PF		56000024	Ferrite Beads 4A-RI 3×3-1
〃	〃	0.001μF		91100008	Wrapping Terminal C
〃	〃	0.01μF			
〃	〃	0.047μF			
lylar Film	〃	0.001μF			
〃	〃	〃 0.0047μF			
〃	〃	〃 0.01μF			
〃	〃	〃 0.022μF			
〃	〃	〃 0.047μF			
〃	〃	〃 0.1μF			
antalum	35WV	0.47μF			
lectrolytic	50WV R	1μF			
〃	25WV R	4.7μF			
〃	16WV R	10μF			
〃	10WV R	47μF			
〃	〃	100μF			
〃	16WV R	100μF			
〃	〃 R	1000μF			

TX UNIT

Symbol Number	Parts Number	Description
	017922AZ	TX UNIT with components
PB-1792	60417920	Printed Circuit Board
		IC, FET & TRANSISTOR
Q215	25000114	IC MC14011B
Q217	25000155	〃 MSM5576
Q206,207	22800195	FET 2SK19GR
Q208	23800510	〃 3SK51
Q214	22104964	Transistor 2SA496Y
Q210	22305351	〃 2SC2053
Q211	22307410	〃 2SC741
Q201~205,212,213 216,218	22318154	〃 2SC1815Y


PF
)PF
)PF
)01μF
)1μF
)47μF
)1μF
:7μF
)1μF
)22μF
)47μF
μF
:7μF
μF
F
F
F
F
μF
μF
PF
PF
93
95
97
19
30
nH
H
μH
37
11

T		
Description		
LL UNIT and VCO BOARD ith components		
rinted Circuit Board		
ET & TRANSISTOR		
C		μPD857C
		TC-5081P
		TA-7060P
ET		2SK19GR
〃		2SK30A-Y
〃		3SK40M
ransistor		2SA564Q
〃		2SC373
〃		2SC535A
〃		2SC1000GR
〃		2SC1815Y
C		
licon Diode		1S1555
TAL		
C-18/U	10.240MHz	#210035
〃	44.100MHz	#210084-1
〃	44.10166MHz	#210084-2
TOR		
rbon Film	¼W VJ	22Ω
〃	〃 〃	56Ω
〃	〃 〃	100Ω
〃	〃 〃	470Ω
rbon Composition	½W GK	470Ω
rbon Film	¼W VJ	560Ω
〃	〃 〃	680Ω
〃	〃 〃	1KΩ
〃	〃 〃	1.2KΩ
〃	〃 〃	1.5KΩ
〃	〃 〃	2.2KΩ
〃	〃 〃	2.7KΩ
〃	〃 〃	4.7KΩ
〃	〃 〃	10KΩ
〃	〃 TJ	22KΩ
〃	〃 VJ	22KΩ
〃	〃 〃	47KΩ
〃	〃 〃	100KΩ
〃	〃 〃	150KΩ
〃	〃 〃	330KΩ
〃	〃 〃	1MΩ
ITOR		
ramic disc	50WV CH	2PF
〃	〃 SL	2PF
〃	〃 CH	4PF
〃	〃 SL	4PF

PARTS LIST

C417,459	31820050	Ceramic disc	50WV CH5PF
C412	31829050	〃	〃 SL5PF
C483	31820090	〃	〃 CH9PF
C414	31829100	〃	〃 SL10PF
C484	31829120	〃	〃 SL12PF
C433,434	31829180	〃	〃 SL18PF
C424,440,461,462	31820330	〃	〃 CH33PF
C443	31829470	〃	〃 SL47PF
C423,438,445,446~450 453~457,465,466,468 469	30820102	〃	〃 0.001μF
C413,415,416,418,419 422,426,427,431,432 435,444,451,458,460 476,480,485	30820103	〃	〃 0.01μF
C420,436,477~479 481,482	30820473	〃	〃 0.047μF
C470	36825103	Mylar Film	50WV 0.01μF
C471,473	36825473	〃	〃 0.047μF
C475	34320475	Electrolytic	25WV R 4.7μF
C421,437	34220106	〃	16WV R 10μF
C452	34120476	〃	10WV R 47μF
C472	34120107	〃	〃 〃 100μF
C474	36526104	Tantalum	35WV 0.1μF
C441	36824101	Styrol	50WV 100PF
C442	36824221	〃	〃 220PF
C467	36133105	Polyester Film	100WV 1μF
		TRIMMER CAPACITOR	
TC402~404	39000011	ECV-1ZW 20×53	20PF
		INDUCTOR	
L408	55003150	OSC COIL	#220205
L407	55003120	RFC	#220206
L406	53020033	Micro Inductor	10μH
L405	53020020	〃	15μH
L409	53020007	〃	22μH
L404	53020021	〃	220μH
		TRANSFORMER	
T401	54141020	R12-4102	#220111
T402,403	55003303		#220312
		MINI CONNECTOR	
P402	67040006	5048-04A	
P403	67110004	5048-11A	
P401	67120010	5048-12A	
J402	68040011	5047-4 with wire	#240097
J403	68110009	5047-11 〃	#240096
J401	68120008	5047-12 〃	#240105
		IC SOCKET	
QS401	68240001	116-24-30-114	

	80044711	PLL Case #004471
	80044721	〃 Cover A #004472
	80044731	〃 Cover B #004473
	80044741	Hex Spacer #004474
	91100008	Wrapping Terminal C

VCO BOARD (P/O PLL UNIT)

Symbol Number	Parts Number	Description
	018301AZ	VCO Board with components
PB-1830A	60418301	Printed Circuit Board
		FET
Q401	22800195	2SK19BL
		DIODE
D401	21022090	Varactor Diode 1S2209
		RESISTOR
R402,403	40143101	Carbon Film ¼W VJ 100Ω
R401	40143563	〃 〃 〃 56KΩ
		CAPACITOR
C409	31820030	Ceramic disc 50WV CH 3PF
C405,406	31827040	〃 〃 UJ 4PF
C404,407	31820070	〃 〃 CH 7PF
C402	31820100	〃 〃 CH 10PF
C408	31820120	〃 〃 CH 12PF
C401,411	30820102	〃 〃 0.001μF
C410	34220106	Electrolytic 16WV R 10μF
		TRIMMER CAPACITOR
TC401	39000080	TZ01Y010A 7PF
		INDUCTOR
L401	55003289	S6-B #220359A
L403	53020031	Micro Inductor 0.68μH
L402	53020010	〃 10μH
	80041041	VCO Case #004104
	80041051	VCO Cover #004105
	91100008	Wrapping Terminal C

Symbo
PB-1795
PB-1836
Q601
Q603～60
Q611
Q602
Q613
Q612
Q615
Q607
Q606,608
D601,~6(
D606～6(
X601
R623,62
R605,61(
R616
R620
R601,60
R613,61
R602,604
611,61
R621
RB601
C603
C604,60(
C601,60
C609
C611～6
P607
P602,60
P603
P601
P606
J607
J602

LIST

RESONATOR BOARD P.O.RX UNIT

Symbol Number	Parts Number	Description
-1800	60318000	Printed Circuit Board
	018000AZ	RESONATOR BOARD
		with components
		CAPACITOR
9,110,112,114	31820050	Ceramic 50WV CH5PF
7,115	31820150	〃 〃 〃 5PF
1,113	31820180	〃 〃 〃 18PF
		CERAMIC TRIMMER
101~104	39000010	ECV-1ZW 10×53 10PF
		INDUCTOR
03	55003293	#220409
	80044941	Resonator Case #004494
	91100008	Wrapping Terminal C

MONITOR UNIT

Symbol Number	Parts Number	Description
-1897A	60318971	Printed Circuit Board
	018971AZ	P.C.B with components
		RESISTOR
01,903	42144103	Carbon Composition ¼W GK 10KΩ
02	42144153	〃 〃 〃 〃 15KΩ
		POTENTIOMETER
901,902	49901203	EVL-S3AA 00B24 20KΩB
		CAPACITOR
01	36825224	Mylar Film 50WV 0.022μF

ACCESSORIES

Symbol Number	Parts Number	Description
	77000016	Microphone Assembly YE-17
		with Microphone Hanger, Screws
	67060001	Microphone Plug FM-146P
	96000020	Power Cord Assembly #240067
	67020006	Power Plug FM-142P
	69000002	Fuse Holder SN-1102
	73000005	Fuse 10A
	73000005	Fuse 10A
	67020003	External Speaker Plug P-2240
	80038631	Stand
	80038661	Mobile Bracket Assembly
		with Set Screws

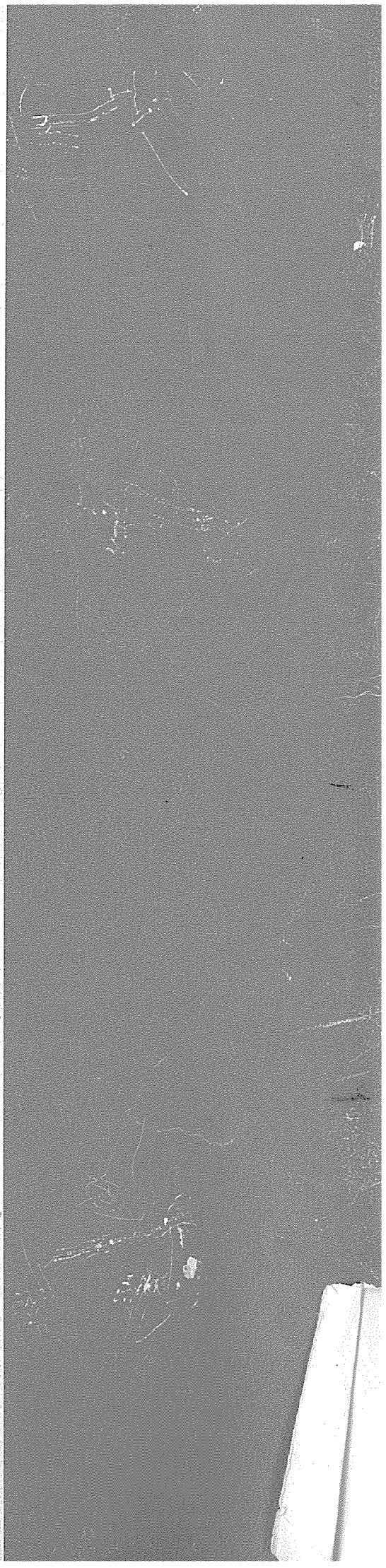
OPTIONAL KEYBOARD MICROPHONE

Symbol Number	Parts Number	Description
	77000015	Microphone Assembly YE-16
		with Microphone Hanger, Screws
	67200001	Microphone Plug P-1620A

PARTS LIST

TONE SQUELCH UNIT

Symbol Number	Parts Number	Description
PB-1555A	60315551	Printed Circuit Board
		IC, FET & TRANSISTOR
Q502	25000126	IC NE567V
Q501	25000125	〃 MC3403
Q503	22800195	FET 2SK19GR
Q504,505	22303724	Silicon Transistor 2SC372Y
		DIODE
D501,502	21090131	Zener Diode RD8.2EB
		RESISTOR
R518	42124151	Carbon Comoosition ½W GK150Ω
R523	40143271	Carbon Film ¼W VJ 270Ω
R517	40143472	〃 〃 〃 4.7KΩ
R513※,R524※	40143822	〃 〃 〃 8.2KΩ
R512	40143103	〃 〃 〃 10KΩ
R504	40143123	〃 〃 〃 12KΩ
R510,511,525	40143223	〃 〃 〃 22KΩ
R516※	40143333	〃 〃 〃 33KΩ
R502,508	40143393	〃 〃 〃 39KΩ
R501,505,521,522	40143473	〃 〃 〃 47KΩ
R506,507	40143823	〃 〃 〃 82KΩ
R509	40143154	〃 〃 〃 150KΩ
R514	40143274	〃 〃 〃 270KΩ
R503	40143474	〃 〃 〃 470KΩ
R515,519	40143105	〃 〃 〃 1MΩ
		POTENTIOMETER
VR502	49800084	TM062P 100KΩ(B)
VR504	49905102	SR-19R 1KΩ (B)
		CAPACITOR
C503	36825102	Mylar Film 50WV 0.001μF
C511	36825222	〃 〃 0.0022μF
C512	36825472	〃 〃 0.0047μF
C506,507,520	36825103	〃 〃 0.01μF
C502,504,505,508	36825223	〃 〃 0.022μF
C509	36825473	〃 〃 0.047μF
C516※	36825104	〃 〃 0.1μF
C523	36226154	Tantalum 35WV 0.15μF
C518	36226475	〃 〃 4.7μF
C514,522	34226105	Electrolytic 16WV 1μF
C501,510,513,521,524	34226106	〃 〃 10μF
C515,517,519	34226226	〃 〃 22μF
	91100008	Wrapping Terminal C



YAESU

906-E


R708
R804
Q02
Q03

401
0.01
R413
C42
10
2SC
R46
101
1S1555
4-7
R425
470
426
50K
15Y
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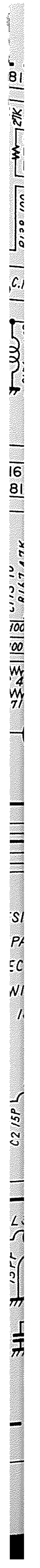

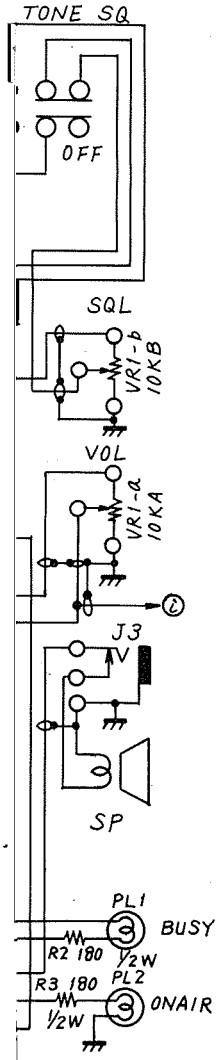

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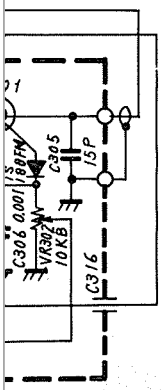

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