INSTRUCTION MANUAL FT-730R

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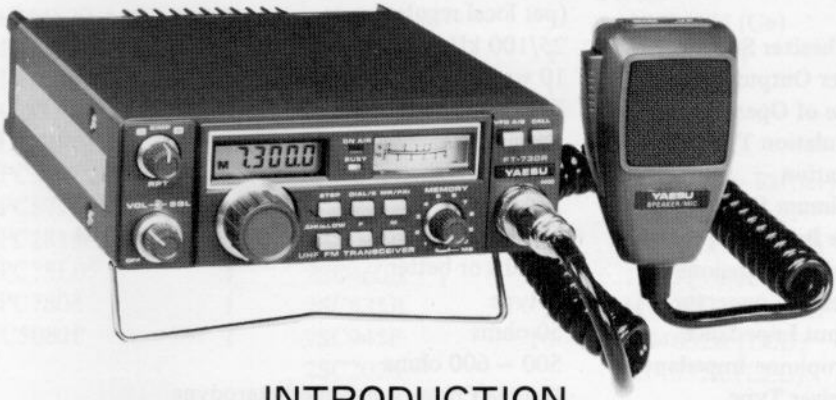
Model Chart

MODEL	A	B	C	X
Frequency Range	440.000 – 449.975 MHz	430.000 – 439.975 MHz	430.000 – 439.975 MHz	430.000 – 439.975 MHz
Frequency Step	25/100 kHz	25/100 kHz	25/100 kHz	25/100 kHz
Repeater Shift	± 5 MHz	- 7.6 MHz/REV	+ 1.6 MHz/REV	± 5 MHz
Tone Call/Burst	1800 Hz	1750 Hz	1750 Hz	1800 Hz
Tone Squelch	FTS-32R (Optional)	–	–	FTS-32R (Optional)
Output (Hi/Low)	10W	10W/1W	10W/1W	10W

FT-730R

0.7 METER FM TRANSCEIVER



INTRODUCTION

The FT-730R is a microprocessor controlled, compact synthesized FM transceiver that provides a full 10 watts of RF power output on the 0.7 meter amateur band. With ten memories and two VFOs, selectable 25 kHz or 100 kHz tuning rates, and priority channel functions all controllable manually or automatically via the scanner, the FT-730R leaves nothing out.

Additionally, the FT-730R utilizes a large-digit Liquid Crystal Display with some new developments in optics permitting an unusually wide viewing angle and spectacular illumination for the ultimate in frequency and function indication under all lighting environments. Tone Calling and Tone Squelch (or Hi/Lo power in European Models) are easily selected from the front panel. A lithium battery is included for memory backup with an estimated lifetime of 5 years or more.

The extremely small size and light weight of the FT-730R make it a truly remarkable unit for the best in FM mobile operation today.

We recommend that you read this manual in its entirety so as to understand clearly the many features of the exciting new FT-730R. With proper care in operation, this equipment will provide many years of reliable performance.

SPECIFICATIONS

Frequency Coverage	430.000 – 439.975 MHz or 440.000 – 449.975 MHz (per local regulations)
Synthesizer Steps	25/100 kHz
Power Output	10 watts
Mode of Operation	F3(FM)
Modulation Type	Variable Reactance
Deviation	±5 kHz maximum
Maximum Bandwidth	16 kHz
Tone Burst Frequency	1800 Hz (Model A, X), 1750 Hz (Model B, C)
Spurious Emissions	-60 dB or better
Antenna Connector	N-type
Output Impedance	50 ohms
Microphone Impedance	500 – 600 ohms
Receiver Type	Double Conversion Superheterodyne
First IF	46.255 MHz
Second IF	455 kHz
Sensitivity	0.25 μV for 12 dB SINAD 1 μV for 30 dB S/N
Selectivity	±7.5 kHz (-6 dB), ±15 kHz (-60 dB)
Audio Output	1.0 watt @ 8 ohms
Audio Output Impedance	8 ohms
Power Requirements	13.8 V DC (negative ground)
Current Consumption	3.0A on transmit (RF 10W output) 0.3A on receive
Case Size	150 (W) x 50 (H) x 174 (D) mm
Weight	Approx. 1.5 kg

Specifications subject to change without notice.

Options*

YM-47	Scanning Microphone
YM-49	Speaker/Microphone
YM-50	DTMF Microphone
FTS-32R	CTCSS Encoder/Decoder
FTS-32E	CTCSS Encoder
FTE-36	CTCSS Encoder
FP-80A	AC Power Supply

* Some options may be included as standard accessories with certain Models in certain countries.

SEMICONDUCTOR COMPLEMENT

ICs:

HD44820-A62	1
MN1252A	1
MN14069UB	2
MC3357P	1
M57704M	1
μPC575C2	1
μPC577H	1
μPC2819C	1
μPC78L05	1
μPC7808	1
TC5082P	1

FETs:

2SK125	3
2SK168D	1
2SK192A-GR	1
2SK193F	2
2SK241GR	1
3SK97	1

Transistors:

2SA715C	1
2SC460B	3
2SC535B	5
2SC945P	10
2SC2026	3
2SC2407	1
2SD892Q	1

Diodes:

1S188FM (Ge)	3
1S1555(Si)	4
1SS53 (Si)	18
V06C (Si)	3
1SS97 (Schottky Barrier)	3
S11 (Si)	1
FC53M (Varactor)	1
1T25 (Varactor)	5
MV103 (Varactor)	1
BG4632K (LED)	1
PR4632K (LED)	1

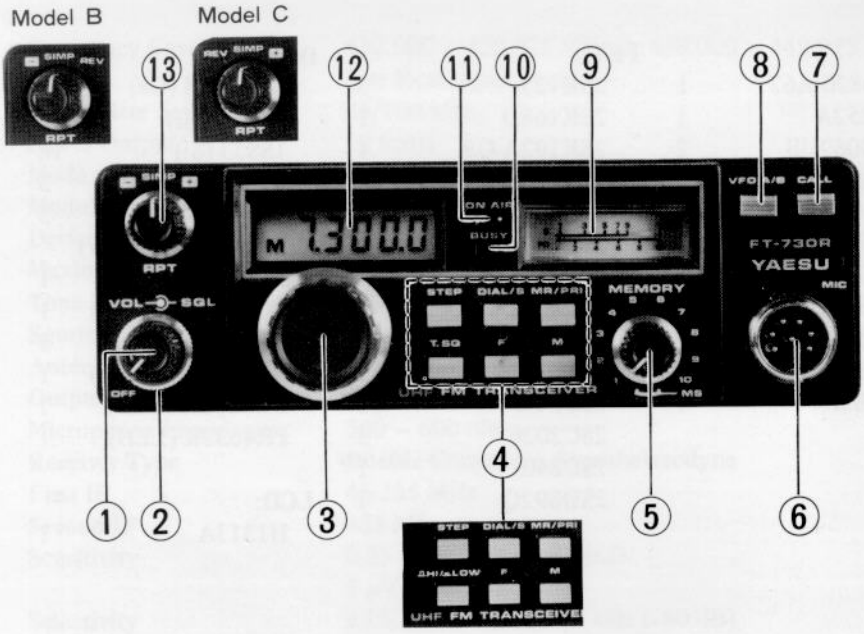
LCD:

H1313A	1

ACCESSORIES

MICROPHONE (WITH HANGER)	YM-47, -49, or -50		1
EXTERNAL SPEAKER PLUG	C-107	(P1090139)	1
DC POWER CORD		(T9002805)	1
CIGARETTE LIGHTER PLUG	CP-103	(P0090067)	1
SPARE FUSE 5A		(Q0000005)	1
MOUNT BRACKET ASSY		R0074200	1
WIRE STAND		R0062300A	1

FRONT PANEL CONTROLS AND SWITCHES



Models B & C

(1) VOL/OFF

The volume control adjusts the audio output and, when rotated fully counter-clockwise, switches the transciever off.

(2) SQL

The squelch control silences the receiver when no stations are being received on the frequency. Advance the squelch control clockwise just to the point where the background noise is silenced. Further rotation will reduce sensitivity to weak signals.

(3) Main Dial

The main tuning dial is used for selection of operating frequencies using the two VFOs. Tuning steps are 25 kHz or 100 kHz as selected by the STEP button (4-1).

(4) Push Button Switches

1) STEP

Push this momentary pushbutton switch to change the PLL tuning rate for either the main tuning dial or the scanner.

2) DIAL/S

When this button is pushed tuning will be accomplished by the main dial on either VFO A or VFO B, unless the F button (4-5) is pushed first (up to 3 seconds before), in which case the memory split mode will be selected; and the transciever will receive on the selected memory while transmitting on the VFO frequency (until DIAL/S is pressed again).

3) MR/PRI

This momentary pushbutton selects either the memory channel or priority channel recall. If only this button is pressed, the memory channel selected by the MEMORY rotary selector will be recalled. If the F button (4-5) is pressed first (up to three seconds before) and then the MR/PRI button, the priority channel is recalled.

4) T. SQ (or HI/LO)

The T. SQ two-position pushbutton switch activates the tone squelch option when installed in the USA version. In the B and C models this HI/LO switch select either 10 watts (out position) or 1 watt (in position) RF output.

5) F

This (Function) button activates either the priority channel mode or the memory split mode when pressed before pressing the MR/PRI or DIAL/S buttons (by alerting the microprocessor that a function change command will follow.) If either the MR/PRI or DIAL/S button is not pressed within three seconds after pressing F, the F command will be cancelled automatically.

6) M

Press this button to store the displayed frequency into the memory channel selected by the MEMORY selector. When stored, an "M" will appear on the left side of the display.

(5) MEMORY Selector

This 12-position rotary selector switch selects the memory channel to be used. In the (two) MS positions, the FT-730R will scan the 10 memory channels when directed by the scanning controls on the microphone.

(6) MIC

This seven pin jack accepts microphone audio input, scanning control lines, and the PTT (Push-to-Talk) control line. Microphone input impedance is 500–600 ohms.

(7) CALL

When this button is pressed an 1800 Hz tone is superimposed on the transmitter audio line and the PTT switch line is grounded, activating the transmitter. This feature allows manual-length tone access of repeaters requiring a burst tone.

(8) VFO A/B

This button selects one of the two internal VFOs in the FT-730R. Depress this switch to change from one VFO to the other. This switch has an "in" position for one VFO and an "out" position for the other, so that you can see by the switch position which VFO you have selected.

(9) S/PO Meter

The meter gives you a relative indication of incoming signal strength during receive and power output during transmit.

(10) Busy and (11) ON AIR LEDs

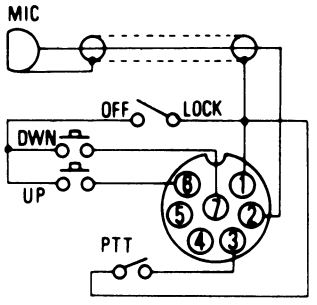
The red ON AIR LED indicator lights up in the transmit mode, while the green BUSY LED lights up during receive when the squelch is opened by an incoming signal.

(12) Digital Display

The Liquid Crystal Display indicates the operating frequency and special functions. The last five digits of the operating frequency are shown with resolution to 0.1 kHz. When a MEMORY channel is selected and displayed an "M" will appear at the lower left side of the display. When the priority channel is selected and displayed a large P will appear for about one second in the leftmost MHz frequency display position. When the F button is pressed, summoning the microprocessor for a special function, a large horizontal bar will appear at the left side of the frequency display for about 3 seconds, during which time the DIAL/S or MR/PRI buttons must be pressed (or the "F" button command will be "forgotten"). Additional display features are described in the OPERATION section.

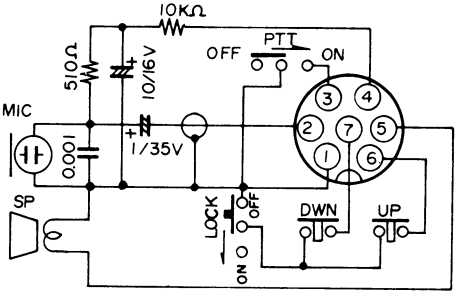
(13) RPT

This three-position switch selects either simplex or standard offsets for repeater operation. In the "A" Model these offsets are plus or minus 5 MHz. In the "B" Model they are minus 7.6 MHz and TX-RX reverse, while in the "C" Model offsets are plus 1.6 MHz and TX-RX reverse. For non-standard offsets use the memory-VFO system described in the OPERATION section.



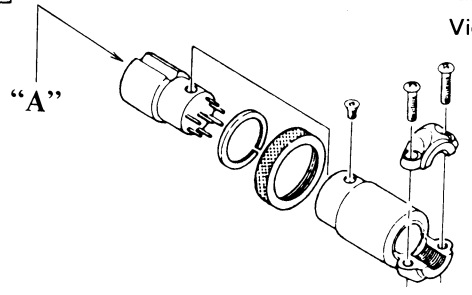
Viewed from "A" Side

YM-47



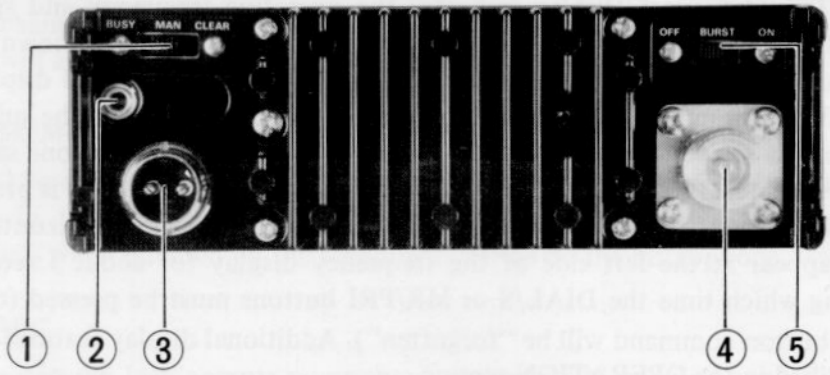
Viewed from "A" Side

YM-49



YM-47, YM-49 MICROPHONE CONNECTIONS

REAR APRON SWITCHES AND JACKS



(1) BUSY-MAN-CLEAR

This three position slide switch selects the scan-stop mode. In the BUSY position the scanner will stop at any occupied channel, while in the CLEAR position it will stop at any clear channel. In the MAN position the automatic scanning is disabled and scanning is then controlled manually by the scan switches on the microphone only. When the BUSY or CLEAR automatic scanning functions are active and the scanner has stopped on a channel, it will resume scanning again automatically within about five seconds unless one of the microphone switches (PTT, UP or DWN) is pressed. Once one of these switches is pressed the automatic scanning will cease until the UP or DWN switch is pressed again.

> **NOTE**
>
> If the scanning is halted with the PTT switch, or the automatic scanning is cancelled with the PTT switch, the PTT switch must be released and pressed again before transmission can occur.

(2) EXT SP

Use this jack for connecting an external speaker via a mini phone plug. Inserting the plug into this jack will disable the internal speaker. Output impedance is 8 ohms.

(3) DC 13.8 V

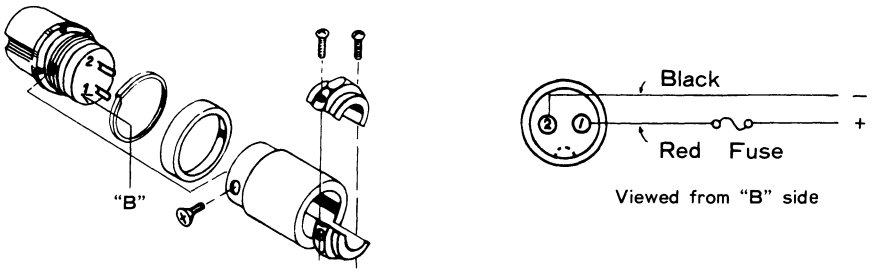
Use the special power connector supplied with the FT-730R for connecting 13.8 VDC ONLY to this jack. Never apply AC power, or DC voltage higher than 15 V to this jack. Be absolutely certain that the proper polarity is applied, and if you change DC plugs, that the new plug is wired correctly. Failure to observe these simple precautions will void any and all warranties on this equipment.

(4) ANTENNA

This is an N-type coaxial connector for use with a 50 ohm coaxial cable and antenna.

(5) OFF-BURST-ON

This two-position ON/OFF switch provides a tone burst at the beginning of each transmission when set to the ON position. No tone burst is applied when OFF.



DC POWER CORD PLUG CONNECTIONS

INSTALLATION

ANTENNA CONSIDERATIONS

The FT-730R is designed for operation with a 50 ohm resistive load. While some departure from this value is of little significance, it is possible to damage the transmitter circuitry if the transmitter is activated when no antenna is connected.

For base station applications any of the popular vertical antennas, beam or phased arrays will provide excellent performance, so long as they present the proper 50 ohm impedance to the transmitter (using 50 ohm coaxial cable). For mobile applications be sure to use an antenna designed for the 0.7 meter amateur band, make the coaxial cable as short as possible, and locate the antenna away from the engine and in the middle of a flat metal surface such as the roof or trunk lid (if at all possible) for best performance. Also, where ground connections are made, scrape the surface clean of all paint and corrosion to ensure adequate electrical contact. Lossy ground connections can have seriously detrimental effects on the antenna system impedance and radiation pattern. Use an SWR meter to tune the antenna to the center of the band.

MOBILE INSTALLATION

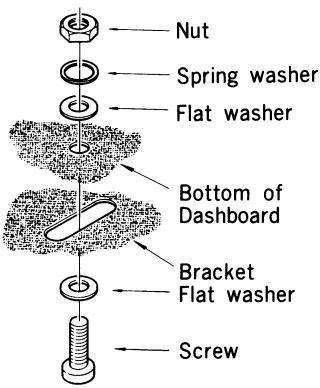
Do not install the FT-730R in cars that do not have negative ground. For mobile service the FT-730R should be installed where the digital display, controls and microphone are easily accessible for operation. The transceiver may be installed in any position without affecting its performance, but it must not interfere with normal operation of the vehicle or driver vision. A universal bracket is supplied with the FT-730 for mobile installation. Refer to Page 11 for mounting details.

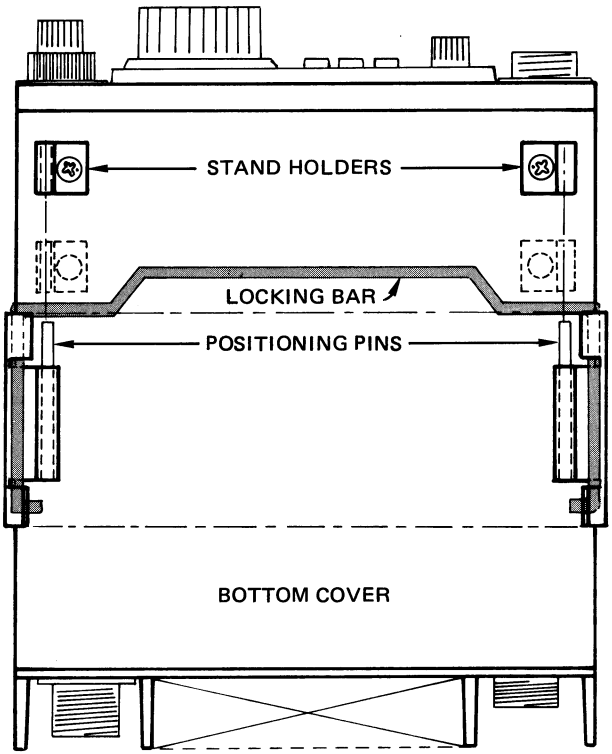
1. Use the mounting bracket as a template for positioning the mounting holes. Use a 3/16" diameter bit for drilling the holes, allowing clearance for the transceiver, its cables and microphone, and access to the controls. Secure the mounting bracket with the screws, washers and nuts supplied, as shown in the drawing.

2. Screw the two stand holders (R0058542) into either of the positions on the bottom cover of the transceiver, depending on the desired final mounting position (the front holes will cause the transceiver to project a shorter distance forward from the bracket).

3. Route the power and antenna cables through the bracket, and connect them to the transceiver. Then slide the transceiver into the bracket until the positioning pins on the bracket mate with the stand holders. Pull the locking bar up until it latches over the stand holders, securing the transceiver in the bracket. (To remove the transceiver, simply press the locking bar down and slide the transceiver forward.)

4. Install the microphone bracket so as to provide convenient access to the microphone.





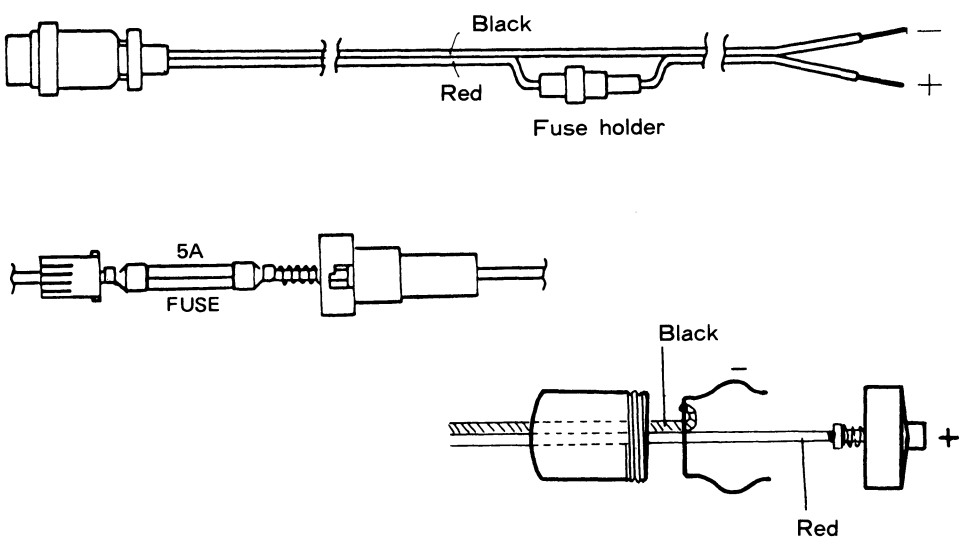
BOTTOM VIEW

Power connections should be made directly to the automobile battery. Connection to the cigarette lighter or another accessory circuit may cause the fuse to blow in that circuit. Connecting the supplied DC power cable independently of the automobile electrical system will avoid possible ignition noise pickup and excessive supply voltage drop during transmission.

Connect the RED lead of the power cord to the POSITIVE (+) battery terminal, and the BLACK lead to the NEGATIVE (–) terminal. If it is necessary to extend the power cable, use #16 AWG insulated copper wire, and in all cases use the minimum length practicable to keep voltage drop at a minimum.

WARNING

NEVER APPLY AC POWER TO THE REAR PANEL POWER JACK OF THE TRANSCEIVER. NEVER CONNECT A DC VOLTAGE SOURCE OF MORE THAN 15 VOLTS TO THE REAR PANEL POWER JACK. ALWAYS REPLACE FUSES WITH A FUSE OF THE PROPER RATING. FAILURE TO OBSERVE THESE SIMPLE PRECAUTIONS WILL VOID ALL WARRANTIES ON THIS EQUIPMENT.



Connect the power cable to the POWER receptacle on the rear panel, connect the coaxial cable from the antenna to the rear panel ANT receptacle, and connect the microphone to the MIC jack. An external speaker may be connected to the rear panel mini phone jack, if desired, disabling the internal speaker.

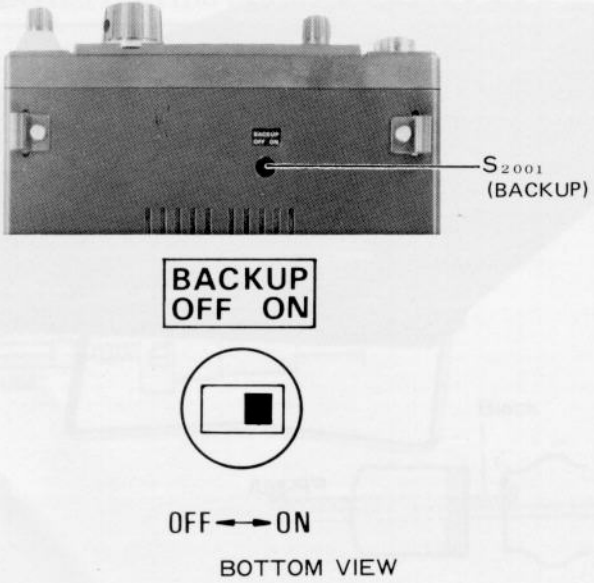
BASE STATION INSTALLATION

A base station mounting stand is supplied with the FT-730, to provide easier viewing of the display and controls and clearance for the internal speaker. A power supply capable of supplying at least 6 amps continuous at 13.8 VDC is required for operation from the AC line. The FP-80 AC power supply option is available from your Yaesu dealer for this purpose.

FP-80A

MEMORY BACKUP INFORMATION

The FT-730R memory channels are protected by a memory backup lithium cell in the transceiver. When the transceiver leaves our factory the memory backup switch is in the OFF position in order to clear the information in the memory. To activate the memory backup, switch the memory backup switch under the soft rubber plug on the bottom panel of the FT-730R to the ON position. Once this switch is turned on, it is not necessary to turn it off because of the extremely low current consumption of the memory, approximately 0.1 μA. The estimated life of the cell is more than five years, regardless of whether the FT-730R is connected to a power source, or switched ON or OFF. If, after this period, the memory backup becomes intermittent, ask your Yaesu dealer for a replacement cell. Keep the rubber plug in the hole to keep out contamination. If you keep the backup switch in the OFF position, the memories will be cleared whenever the FT-730R is switched off. We recommend that you keep the memory backup ON, as this will not affect the life of the lithium cell noticeably.



BOTTOM VIEW

OPERATION

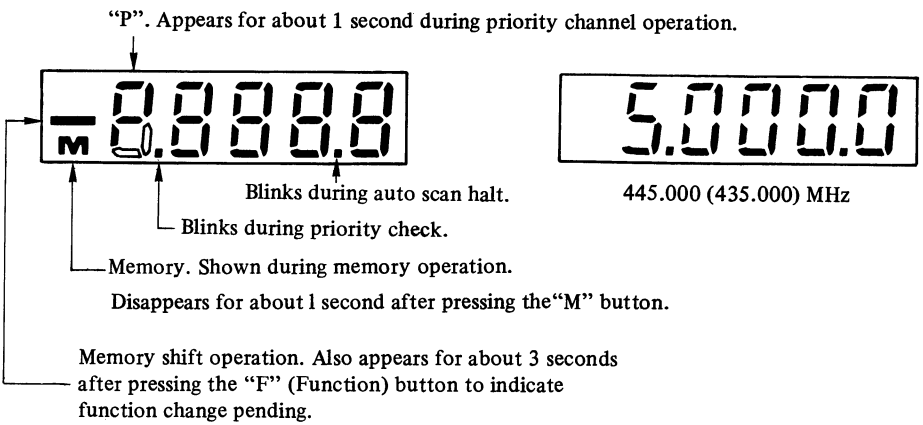
The tuning procedure for this transceiver is not complicated. However, because microcomputer circuitry is used extensively throughout the transceiver, this section should be read carefully so that you clearly understand all of the features that are available.

INITIAL CHECK

Before operating the transceiver be certain that the power cable is wired correctly with respect to polarity, and that it and the antenna are properly connected to the FT-730R as described in the INSTALLATION section. Also check the backup switch inside the bottom cover. If it is off, we recommend that you switch it on (See MEMORY BACKUP INFORMATION, page 14).

FREQUENCY READOUT

The Liquid Crystal Display shows the last five digits of the operating frequency to 0.1 kHz. Thus, for example, 445.000.0 MHz (435.000.0 MHz in Models B, C, X) will appear on the display as 5.000.0.



When operating on a memory channel, the letter "M" will appear on the left side of the display. The memory channel number is shown by the MEMORY Selector switch position, and the memorized frequency is shown on the display.

Preset the controls and switches as follows:

VOL	OFF (fully counterclockwise)
SQL	fully conterclockwise
MEMORY	Channel position 1
T.SQ or HI/LO	OFF or HI (out)
BURST (on rear panel)	OFF
BUSY-MAN-CLEAR (on rear panel)	MAN

Rotate the VOL control out of the click-stop and adjust the volume for a comfortable listening level. The LCD should indicate the operating frequency. When the channel is clear, adjust the SQL control so that the background noise just disappears. This threshold point is the point of maximum sensitivity, and advancing the control beyond this will inhibit the receiver from responding to weak signals.

The memory backup will store the frequency, VFO mode (dial or memory) and tuning step automatically so that whenever you switch the FT-730R OFF and later ON, these functions will remain the same. The STEP switch is used to select the desired synthesizer steps for tuning, 25 kHz or 100 kHz. When you rotate the main tuning dial, initially the synthesizer will provide whatever step rate was used before the unit was last switched off. Press the STEP button once to change the tuning to the alternate step rate, and press it again to return.

Rotate the main tuning dial until the desired frequency is displayed. To transmit close the PTT switch on the microphone and speak with a clear, normal voice. Release the PTT switch to receive.

For repeater operation, switch the RPT switch to + or – according to the frequency scheme of the repeater you wish to use, assuming it has the standard offset for your area. In Models B and C, the REV function sets the

FT-730R to receive on the repeater input frequency, and transmit on the repeater output frequency. This selection can be made either during main dial or memory operation.

For operation on odd splits, use a combination of the memory system and the main tuning dial as described in the MEMORY SPLIT OPERATION section, page 20.

The front panel CALL switch activates a manual-length 1800 Hz (or 1750 Hz) tone for repeater access. When this button is pressed, the transmitter is activated and the access tone is superimposed on the transmit signal.

MEMORY OPERATION

Ten memory channels are available for storage and recall of favorite operating frequencies. The procedure for entry and recall of memory channels is extremely simple.

Push the DIAL/S switch for normal tuning, using the main tuning dial. When tuned to a frequency you wish to store in memory, rotate the MEMORY selector to 1 (channel 1) and push the M (memory store) button. If you wish to store another frequency in channel 2, rotate the main dial to that frequency, rotate the MEMORY switch to channel 2, and push M, and so forth. This procedure may be repeated for all 10 memory channels.

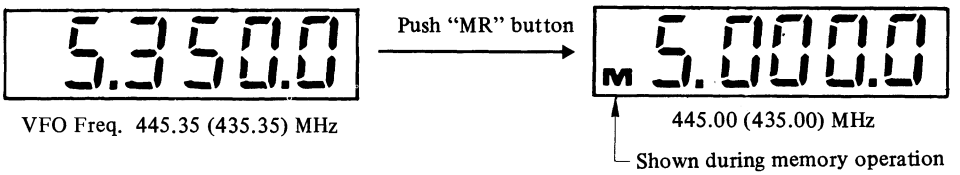
445.000 (or 435.000) MHz

Push "M" button (Memory store)

Automatically turns off for about 1 second after pushing "M" button.

To recall these frequencies, push the MR/PRI button (memory recall) and rotate the MEMORY selector to select the desired channel. One push of the

MR/PRI button will keep you on memory operation until the DIAL/S button is pushed again to return you to main dial tuning. Note that there is no formal erasure procedure for memory channels. When you push the M button, the previous frequency stored in that position will be erased.



VFO Freq. 445.35 (435.35) MHz

445.00 (435.00) MHz

Shown during memory operation

SCANNER OPERATION

The UP/DWN scanning controls on the microphone may be used to control the operating frequency.

When in the DIAL mode, one push of the UP button will cause the frequency to advance upward by one step of the synthesizer (the step size being programmed by the STEP button). If you hold the UP button down for more than 1/2 second, the scanner will become engaged, and you will begin scanning up the band. Push the UP or DWN button or the PTT switch to halt the scan and, if using the PTT switch for halting, push it again to transmit. Scanning toward a lower frequency is achieved by the same procedure, using the DWN button on the microphone.

To scan only the memory channels, rotate the MEMORY selector to either of the MS (Memory Scan) positions, and press the MR button. Now, when you push and hold (for 1/2 second) the UP or DWN button, the scanner will search the memory channels only. Manual halting of the scan is accomplished by pushing the UP, DWN or PTT buttons as before.

On the rear panel, the BUSY-MAN-CLEAR switch allows selection of one of three scan halt modes. In the MAN (Manual) position, scanning is halted as discussed above. If the BUSY position is selected (see page 8), the scanner will search until a busy channel (one occupied by a station strong enough to break the main squelch) is received. The scan will then pause on

that frequency for five seconds. If you choose to stay on that frequency, press one of the scan control buttons or the PTT switch. While in the PAUSE mode, the decimal point farthest to the right will blink; when you push a button to cancel the resumpton of the scan, the blinking will stop.

To scan for a clear channel (one where the squelch does not open), set the BUSY-MAN-CLEAR switch to CLEAR. The scan will halt, and the decimal point will blink, as in the previous section. Press the UP, DWN, or PTT switch to cancel the pause/resume feature and hold on the frequency you stopped at. If you pushed the PTT switch, release it and push again to transmit. Memory scan halting follows the same format as main dial scanning.

PRIORITY CHANNEL OPERATION

Priority channel operation uses a combination of the main dial VFO and the memory. It can be used in conjunction with the automatic scan stop feature of the microprocessor, if desired. The steps for priority channel operation are detailed below.

(1) Program into memory the desired priority channel. Do not recall the channel at this time.

(2) Dial up a basic operating frequency on the main VFO (you may, of course, change this frequency later without affecting priority operation). This will be your main operation channel during priority channel operation.

(3) Set the BUSY-MAN-CLEAR switch to BUSY or CLEAR, as desired.

(4) Now push the F button, followed immediately by a press of the MR/PRI button. The letter "P" will appear for one second in the MHz position on the digital display, signifying priority channel operation. The display will then show the VFO frequency, with a flash every five seconds to the priority memory channel being checked for activity. When the priority memory channel is busy or clear (depending on your instructions at the BUSY-MAN-CLEAR Switch), the scanner will halt on the memory channel. The pause/restart feature does not function in this mode; to restart, simply press the F and MR/PRI buttons again.

(5) If the scan stop switch is set to the MAN position, the CPU will have no instructions for halting the scan on the priority channel. Simply press the DIAL/S or MR/PRI button to select the desired channel (VFO or priority) under this mode of operation. If you press the PTT switch during manual priority channel operation, the checking of the priority channel will be delayed by five seconds.

Whenever priority checking is in operation the MHz decimal point will blink.

MEMORY SPLIT OPERATION

The memory split operation mode is useful for covering unusual repeater splits or other occasions where the receive frequency may be fixed, but the transmit frequency is variable. In this mode, you receive on a memory channel, while transmitting on a VFO.

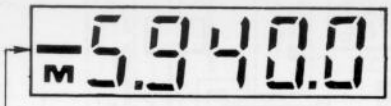
(1) Store the desired receive frequency into a memory channel.

(2) Dial up the desired transmit frequency on the main dial.

(3) Now press the F and DIAL/S buttons. You will be receiving on the memory, while transmitting on the VFO.

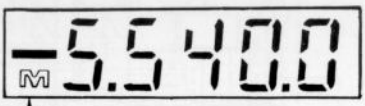
(4) If you desire to listen on several memory channels, the memory channel selector may be rotated as desired. If you wish to save this transmit frequency, simply depress the VFO A/B button. You will now activate the alternate VFO whose frequency you can display on receive by pressing the DIAL/S button. To return to your odd split, set the memory channel selector to the channel storing the receive frequency, press VFO A/B, F, and DIAL/S.

During memory split operation the bar will appear to the left of the operating frequency on the display. The small M will also appear below the bar during receive only.



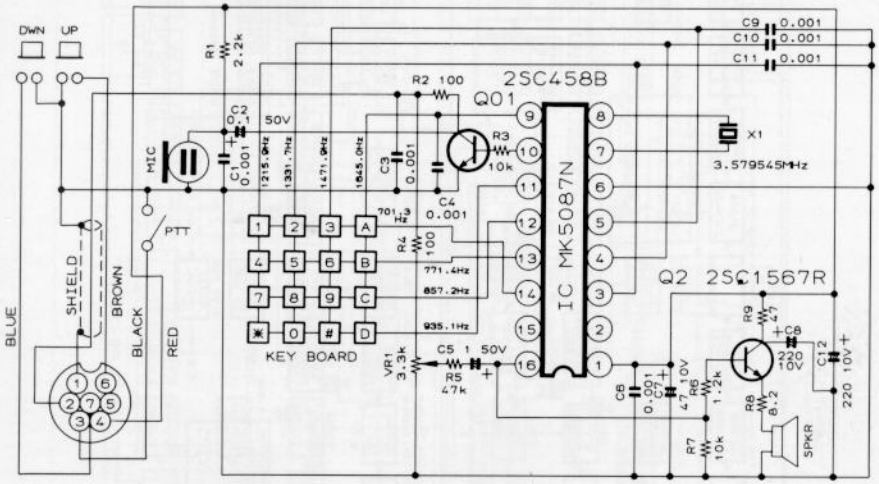
Receive

Shown during memory split operation.

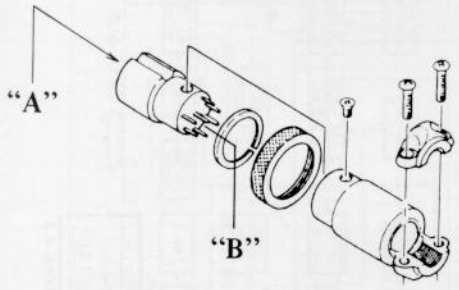


Transmit

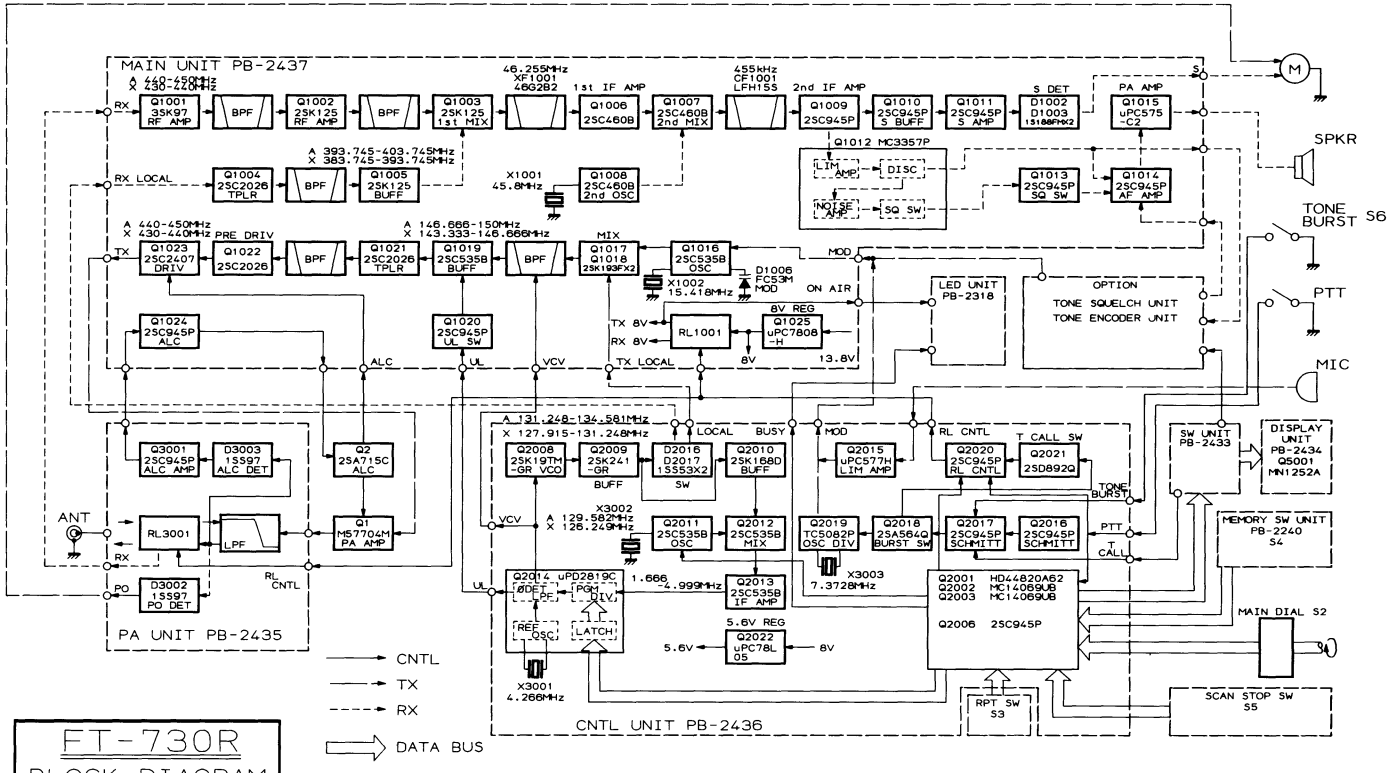
"M" indicator appears only during receive.

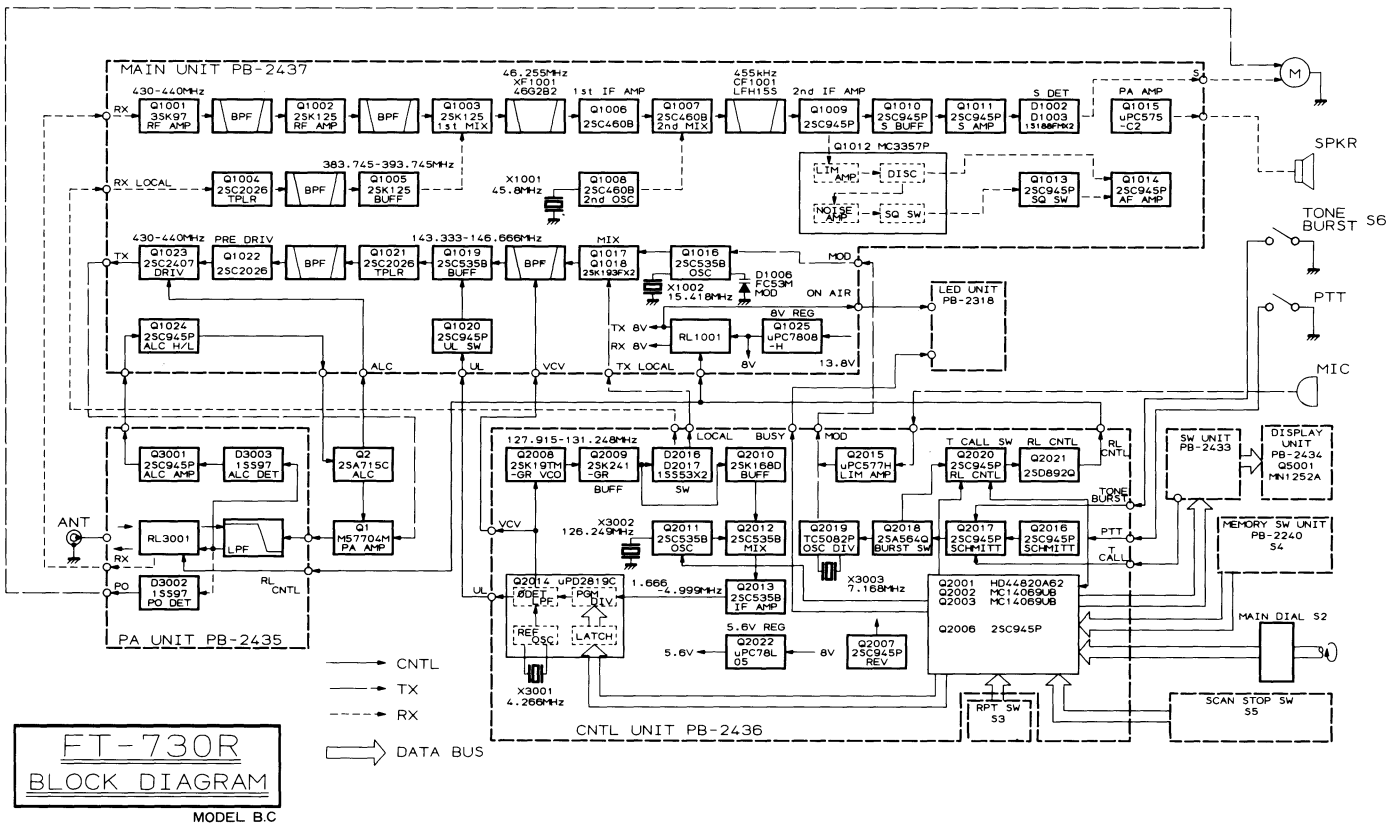


Viewed from "B" side



YM-50 DTMF MICROPHONE


MAIN UNIT PB-2437
PA UNIT PB-2435
CNTL UNIT PB-2436
FT-730R
BLOCK DIAGRAM
MODEL A.X
CNTL
TX
RX
DATA BUS



FT-730R
BLOCK DIAGRAM

MODEL B.C

CIRCUIT DESCRIPTION

The following description together with the block diagram will provide an understanding of the design and function of the circuitry of this transceiver. Please refer to the schematic diagram for specific component details. Frequencies shown in parentheses ( ) are for Model A.

RECEIVER

The incoming RF signal from the antenna jack is fed through a lowpass filter (L_{3001}, C_{3001} and C_{3006}) and antenna relay RL_{3001} on the PA Unit **(PB-2435)** before delivery to the Main Unit **(PB-2437)**.

On the Main Unit the signal is first amplified by Q_{1001} **(3SK97)** and then passed through bandpass cavity resonator CV_{1001} to 2nd RF amplifier Q_{1002} **(2SK125)**, followed by another bandpass cavity resonator, CV_{1002}. This dual amplifier and filter scheme assures a pure input to the 1st mixer, free from unwanted signals that could cause inter-or cross-modulation. 1st mixer Q_{1003} **(2SK125)** also receives the 1st local signal delivered from the Control Unit **(PB-2436)** through local tripler Q_{1004} **(2SC2026)**, bandpass cavity resonator CV_{1003}, and buffer Q_{1005} **(2SK125)** on the Main Unit.

The resulting 46.255 MHz product from the mixer is passed through monolithic filter XF_{1001} **(46G2B2)** with 3dB bandwidth of ±7.5 kHz, and then amplified by 1st IF amplifier Q_{1006} **(2SC460B)** before being applied to 2nd mixer Q_{1007} **(2SC460B)** along with the 45.8 MHz 2nd local signal from crystal oscillator Q_{1008} **(2SC460B)**.

The 455 kHz product from the 2nd mixer is passed through ceramic filter CF_{1001} **(LF-H15S)** with 6dB bandwidth of ±7.5 kHz, and then amplified by 2nd IF amplifier Q_{1009} **(2SC945P)** which feeds the signal into the limiter amplifier section of Q_{1012} **(MC3357P)**. Here any amplitude variation of the signal is removed before it is passed to the discriminator section, which then produces an audio output in response to the frequency modulation on the 455 kHz IF signal.

When no carrier is present in the 455 kHz IF, the high frequency noise at the discriminator output is passed through a highpass filter to the noise amplifier section of Q_{1012}, the output of which is then rectified by D_{1003} **(1S1555)**. The resulting DC voltage activates the squelch switch within Q_{1012}, in turn activating squelch switch Q_{1013} **(2SC945P)** and thereby disabling audio amplifier Q_{1014} **(2SC945P)**. Q_{1012} also signals the Microprocessor and activates the BUSY LED through Q_{2006} on the Control Unit.

When a signal appears in the IF the audio from the discriminator is amplified by Q_{1014} and then Q_{1015} **(μPC575C2)** before delivery to the speaker. A portion of the discriminator output is also delivered to the optional Tone Squelch Unit, when installed, for tone decoding.

A sample of the 2nd IF signal from Q_{1009} is taken for S-meter indication. This signal is buffered by Q_{1010} **(2SC945P)** and amplified by Q_{1011} **(2SC945P)** before rectification by D_{1001} and D_{1002} **(1S188FM x 2)** to provide DC for delivery to the S-meter.

TRANSMITTER

The speech signal from the microphone is delivered to the Control Unit **(PB-2436)**, where it is amplified and limited by Q_{2015} **(μPC577H)**. Pre-emphasis is then applied by L_{2010}, C_{2078} and C_{2079} before the signal is passed through deviation control VR_{2003} and delivered to the Main Unit.

On the Main Unit, the modulating audio is applied to varactor D_{1005} **(FC53M)** in the modulation oscillator circuit composed of Q_{1016} **(2SC535B)** and 15.4183 MHz crystal X_{1002}, thus frequency modulating the oscillator. The FM signal is fed to balanced mixer Q_{1017} and Q_{1018} **(2SK193F x 2)**, which also receives the 127.9–131.2 (131.2–134.6) MHz TX local signal delivered from the PLL on the Control Unit. The resulting 143–146 (146–150) MHz product is then passed through a varactor controlled auto-tune bandpass filter and buffer Q_{1019} **(2SC535B)** to tripler Q_{1021} **(2SC2026)**. The 430–440 (440–450) MHz output from the tripler is passed through bandpass cavity resonator CV_{1004} and then amplified by Q_{1022} **(2SC2026)** and driver Q_{1023} **(2SC2407)**, bringing the RF signal up to 200mW for delivery to the PA Unit **(PB-2435)**.

On the PA Unit, the transmit signal is passed to power amplifier module Q_1 **(M57704M)** for final amplification up to 10 watts. This signal is then passed through two sections of lowpass filtering to antenna relay RL_{3001}, and then through one more lowpass filter before delivery to the antenna.

Automatic Level Control Circuit

The RF output before RL_{3001} is sampled and rectified by D_{3003} **(1SS97)** to provide a DC voltage for automatic level control. This voltage, adjustable by VR_{3002} for high power setting, controls Q_{3001} **(2SC945P)**, which in turn controls Q_{1024} **(2SC945P)** on the Main Unit and Q_2 **(2SA715C)** on the chassis via the PA Unit. Q_{1024} and Q_2 thus serve to regulate the output of driver Q_{1023} and the voltage to the power module according to the RF voltage at the output of the power module. On those models equipped for HI/LOW power selection, the control line between Q_{3001} and Q_{1024} is switched through VR_{1006} to ground by the HI/LOW power switch, and thus VR_{1006} becomes the level setting control for low power operation.

Another sample of the RF output is rectified by D_{3002} **(1SS97)** and delivered to the meter for PO indication during transmission.

Tone Burst Circuit

When the CALL button is pressed, burst switch Q_{2018} **(2SA564Q)** on the Control Unit is manually activated for as long as the button is held. Q_{2018} activates burst oscillator Q_{2019} **(TC5082P)**, which then delivers a 1750 (or 1800) Hz audio tone to modulation oscillator Q_{1016} on the Main Unit. Q_{2018} also activates switch Q_{2020} **(2SC945P)**, which closes the PTT line. Closing the PTT line either manually or via the CALL switch signals the microprocessor to shift to the transmit fequency, and when the PLL has locked the microprocessor then activates T-R relay control Q_{2021} **(2SD892 O)**, activating the TX8V line via relay RL_{1001} on the Main Unit. TX8V is then delivered to the Schmitt trigger composed of Q_{2016} and Q_{2017} **(2SC945P x 2)** on the Control Unit. When the BURST switch is on, the Schmitt trigger activates Q_{2018} to produce a short tone burst in the same manner as the CALL button, but automatically, at the beginning of each transmission.

PLL CIRCUIT

The PLL circuit generates both the 1st local signal for the receiver and the TX local signal for the transmitter, controlled by instructions from the microprocessor. Composed essentially of a VCO (voltage-controlled oscillator), PLL local crystal oscillator and PLL local mixer, the circuit also employs a **μPD2819C** chip, Q_{2014}, which contains a programmable divider and latch (for dividing instructions from the microprocessor), and reference oscillator and phase detector/lowpass filter. The PLL circuit is located on the Control Unit, and uses a synthesis scheme with 3.3 kHz steps throughout the required frequency range.

VCO Q_{2008} **(2SK19TMGR)** generates a 127.9–131.2 (131.2–134.6) MHz signal, the exact frequency determined by the capacitance of varactor diode D_{2015} **(1T25)**, adjusted by means of a VCV control voltage from the phase detector/lowpass filter section of Q_{2014}.

The output of VCO Q_{2008} is buffered by Q_{2009} **(2SK241GR)** and Q_{2010} **(2SK168D)** and applied to PLL mixer Q_{2012} **(2SC535B)**. Buffered output from Q_{2009} is also applied to switching diodes D_{2016} and D_{2017} **(1SS53 x 2)**, from which the VCO signal is delivered to either local tripler Q_{1004} to produce the first local signal during receive, or to TX mixer Q_{1017}/Q_{1018} during transmit. PLL mixer Q_{2012} also receives the 126.248 (129.582) MHz PLL local signal generated by VCXO Q_{2011} **(2SC535B)** and crystal X_{3002}, shifted by a control signal from the microprocessor to offset the operating frequency by 5 kHz when required.

The resulting 1.6–5 MHz product from the PLL mixer is amplified by Q_{2013} **(2SC535B)** and passed to the programmable divider section of Q_{2014}, the dividing ratio of which is determined by operating frequency instructions from the microprocessor fed through the latch section, so as to provide a constant 3.3 kHz output. The reference oscillation section of Q_{2014} produces a 3.3 kHz signal from 4.266 MHz reference crystal X_{3001}, and the two 3.3 kHz signals are then fed to the phase detector/lowpass filter section of Q_{2014}. Any phase difference between the reference and PLL frequency there results in a DC voltage which is fed back to varactor D_{2015} in the VCO as the VCV (varactor control voltage), thus locking the VCO to the reference.

The VCV is also delivered to the Main Unit and there applied to varactors D_{1007}, D_{1008} and D_{1009} **(1T25 x 3)** in the auto-tune bandpass filter at the output of TX mixer Q_{1017}/Q_{1018}, thus maintaining the narrow characteristic of this filter throughout the operating frequency range. The phase detector/lowpass filter section of Q_{2014} also provides a signal whenever the PLL is unlocked, and this is delivered to unlock switch Q_{1020} **(2SC945P)** on the Main Unit, which in turn switches transmit buffer Q_{1019} off, interrupting the transmit signal path until the PLL is locked.

CONTROL CIRCUITS

The essence of the control system is 4-bit microprocessor Q_{2001} **(HD44820A-62)** developed especially for Yaesu, which processes all data for control of the operating frequency, display and special functions. On the Control Unit, Q_{2001} provides serial data to Q_{2014} in the PLL for frequency control and delivers serial display data via Switch Unit PB-2433 to display driver Q_{5001} **(MN1252A)** on Display Unit PB-2434, which in turn drives LCD DS_{5001} **(H1313A)** for display of the operating frequency and special function indications.

Pulses from the photo interrupter on the dial tuning shaft are shaped by hex inverter Q_{4003} **(MC14069UB)** to provide up/down input data to the microprocessor. Alternatively, when the scanning buttons on the microphone are pressed, three sixths of hex inverter Q_{4002} **(MC14069UB)** generate up/down input data for the microprocessor. The remaining gates of Q_{4002} are used for timing and display clock generation.

The software program is stored in ROM within the microprocessor, being programmed at the time of manufacture. Additionally, the frequency and special function data is stored in RAM and held by lithium backup cell BAT_{2001} when the transceiver is switched off (and BACKUP on).

MAINTENANCE AND ALIGNMENT

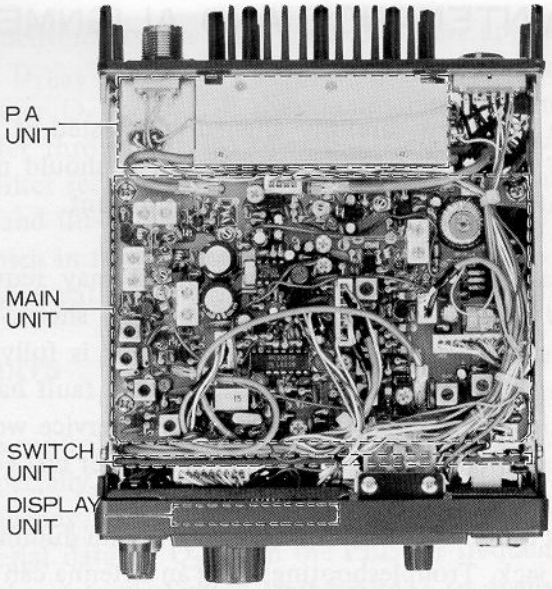
This equipment has been carefully aligned and tested at the factory prior to shipment. If the instrument is not abused, it should not require other than the usual attention given to electronic equipment.

Service or replacement of a major component may require considerable realignment. Under no circumstances, though, should realignment be attempted unless the operation of the transceiver is fully understood, the malfunction has been carefully analyzed, and the fault has definitely been traced to misalignment rather than part failure. Service work must only be performed by experienced personnel using the proper test equipment.

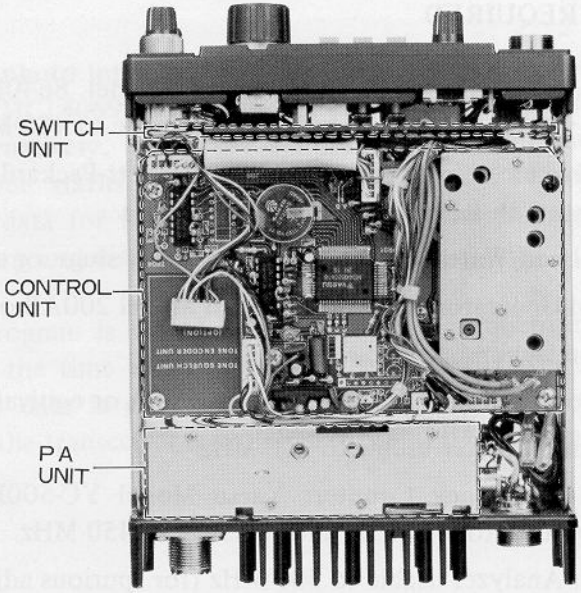
Never align this transceiver without having a 50 ohm dummy load connected to the antenna jack. Troubleshooting using an antenna can result in misleading indications on the test equipment.

EQUIPMENT REQUIRED

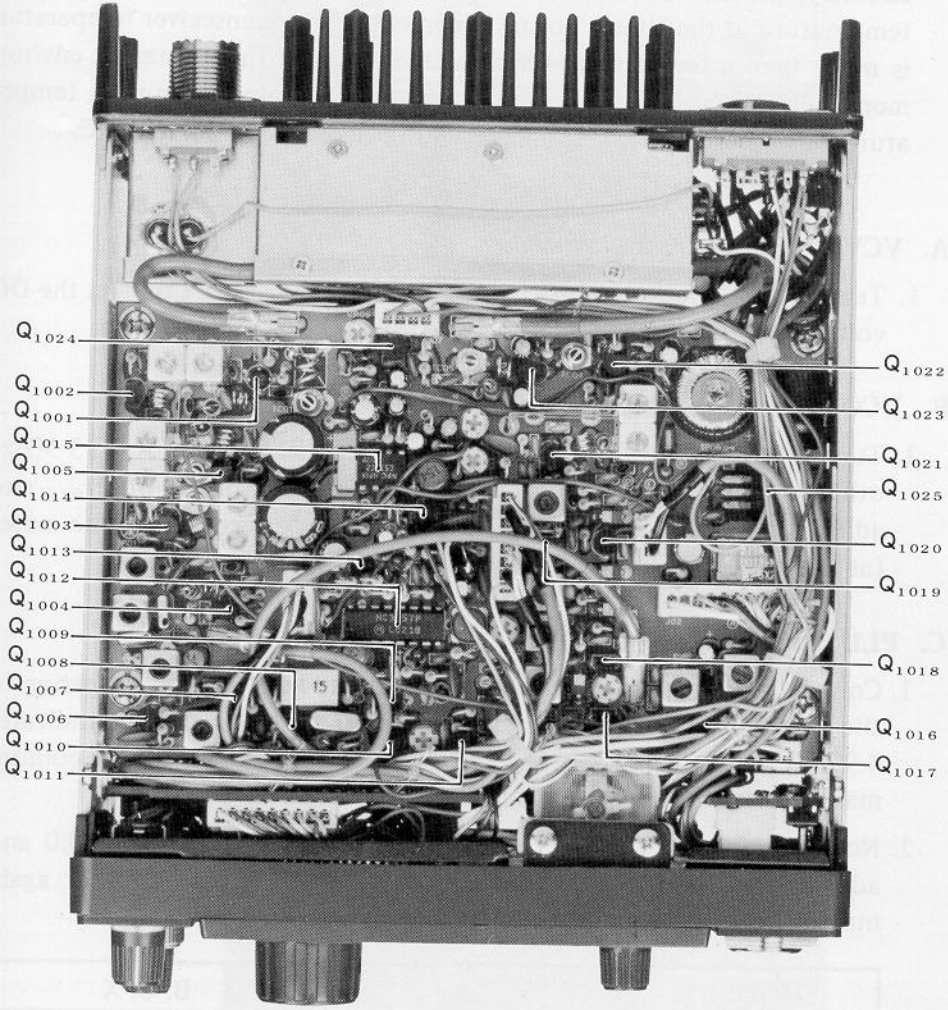
1. RF Signal Generator: Hewlett-Packard Model 8640B or equivalent with one volt output at 50 ohms, and coverage to 450 MHz
2. High Impedance Voltmeter (VTVM): Hewlett-Packard Model 410B or equivalent, with RF probe usable to 450 MHz
3. Dummy Load/Wattmeter: Bird 43 with UHF slugs, or equivalent
4. AF Signal Generator: Hewlett-Packard Model 200AB or equivalent
5. RF Sweep Generator usable to 450 MHz
6. Oscilloscope: Hewlett-Packard Model 1740A or equivalent
7. FM Deviation Meter usable to 450 MHz
8. Precision Frequency Counter: Yaesu Model YC-500E or equivalent, with resolution to 0.01 kHz and coverage to 450 MHz
9. Spectrum Analyzer usable to 500 MHz (for spurious adjustment)
10. SINAD meter or similar device for FM sensitivity measurements



TOP VIEW



BOTTOM VIEN


Q_{1024}
Q_{1002}
Q_{1001}
Q_{1015}
Q_{1005}
Q_{1014}
Q_{1003}
Q_{1013}
Q_{1012}
Q_{1004}
Q_{1009}
Q_{1008}
Q_{1007}
Q_{1006}
Q_{1010}
Q_{1011}
Q_{1022}
Q_{1023}
Q_{1021}
Q_{1025}
Q_{1020}
Q_{1019}
Q_{1018}
Q_{1016}
Q_{1017}

TOP VIEW

PLL CIRCUIT ALIGNMENT

Because of certain thermally sensitive, interacting components in the PLL circuitry, particular attention must be paid to assure a constant ambient temperature at the circuit during alignment. If the transceiver temperature is more than a few degrees different than that of the alignment environment, allow several hours for thermal equalization. Alignment temperature must be held constant and be within the range of 15 to 30°C.

A. VCV (Varactor Control Voltage)

1. Tune the transceiver so that the display shows 9.975.0. Connect the DC voltmeter to R_{2063} and adjust L_{2002} for 6.5 volts on the meter.

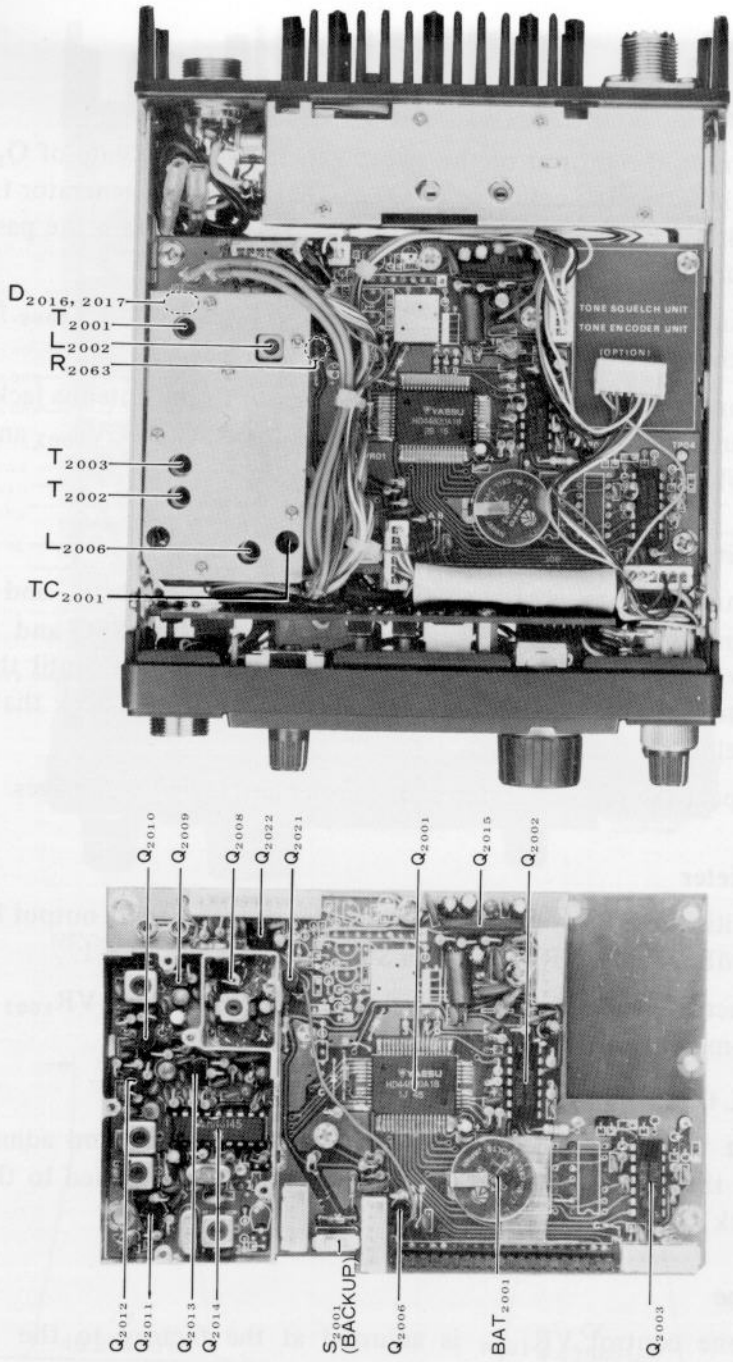
B. VCO and PLL Local Oscillator Output

1. Tune the transceiver to band center (445 MHz: Model A, 435 MHz: others). Connect the RF probe of the voltmeter to pin 14 of Q_{1019} and adjust T_{2001}, T_{2002} and T_{2003} for maximum deflection on the meter (at least 600 mVrms).

C. PLL Frequency

1. Connect the frequency counter to the cathode of D_{2016}. Referring to the chart below, tune the transceiver so that the display indicates 4.975.0 and adjust L_{2006} so that the frequency shown on the counter matches that shown in the chart.
2. Now tune the transceiver so that the display indicates 5.000.0 and adjust TC_{2001} so that the frequency shown on the counter again matches that shown in the chart.

MODEL	A		B, C, X	
DISPLAY FREQ	4.975.0	5.000.0	4.975.0	5.000.0
J_{2008} Freq. MHz	132.90666 ±30 Hz	132.91500 ±30 Hz	129.57333 ±30 Hz	129.58166 ±30 Hz
ADJ. POINT	L_{2006}	TC_{2001}	L_{2006}	TC_{2001}



PLL SECTION ALIGNMENT POINTS (BOTTOM VIEW)

RECEIVER

A. RF and IF Circuits

1. Connect the output of the sweep generator to the gate of Q_{1003}, and the input to the collector of Q_{1006}. Set the sweep generator frequency to 46.255 MHz and adjust T_{1001} – T_{1003} to obtain the passband of Figure 1.
2. Connect the oscilloscope to pin 9 of Q_{1012} and adjust T_{1005} for 6Vp-p on the scope display.
3. Connect the output of the sweep generator to the antenna jack, and the input to R_{1010}. Disconnect P_{14} and adjust CV_{1001}, CV_{1002} and TC_{1002} to obtain the passband of Figure 2.

B. Sensitivity

1. Connect the SINAD meter to the speaker terminals, and the SSG (signal generator) to the antenna jack. Tune the SSG and the transceiver to band center. Adjust the SSG output level until the SINAD meter (reading AC millivolts) indicates -12 dBμ. Check that the SSG level is less than -8 dBμ.
2. Repeat the preceding step at the upper and lower band edges.

C. S-Meter

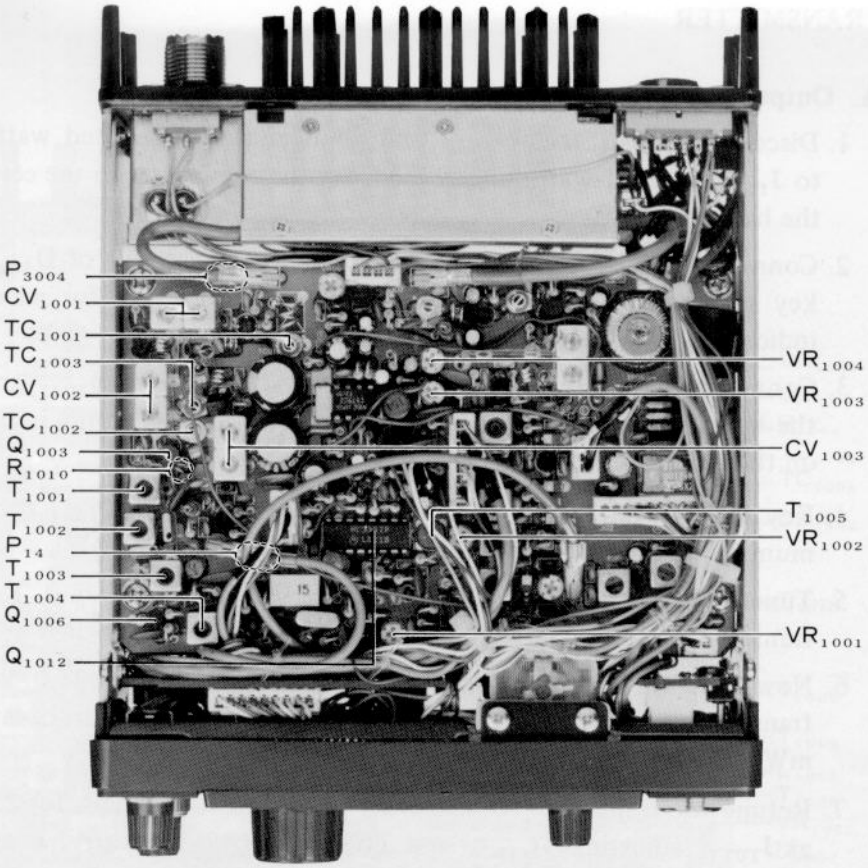
1. With the SSG connected to the antenna jack and its output level set for 0 dBμ, adjust VR_{1001} for an S-meter deflection of S-1.
2. Increase the SSG output level to 20 dBμ, and adjust VR_{1002} so that the S-meter reading is at least S9+20.

D. SQL Control Preset

1. Set the SQL control to the 12 o'clock position and adjust VR_{1003} to the squelch threshold point (with no signal applied to the antenna jack).

E. Tone

1. Tone control VR_{1004} is adjusted at the factory to the 12 o'clock position and may be reset for the operator's preference.



RECEIVER SECTION ALIGNMENT POINTS (TOP VIEW)

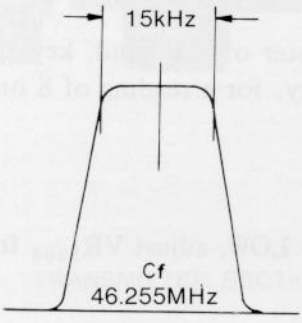


Figure 1

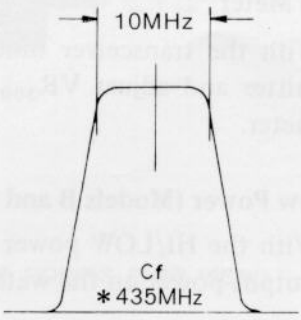


Figure 2

*MODEL A·····445MHz

TRANSMITTER

A. Output Power

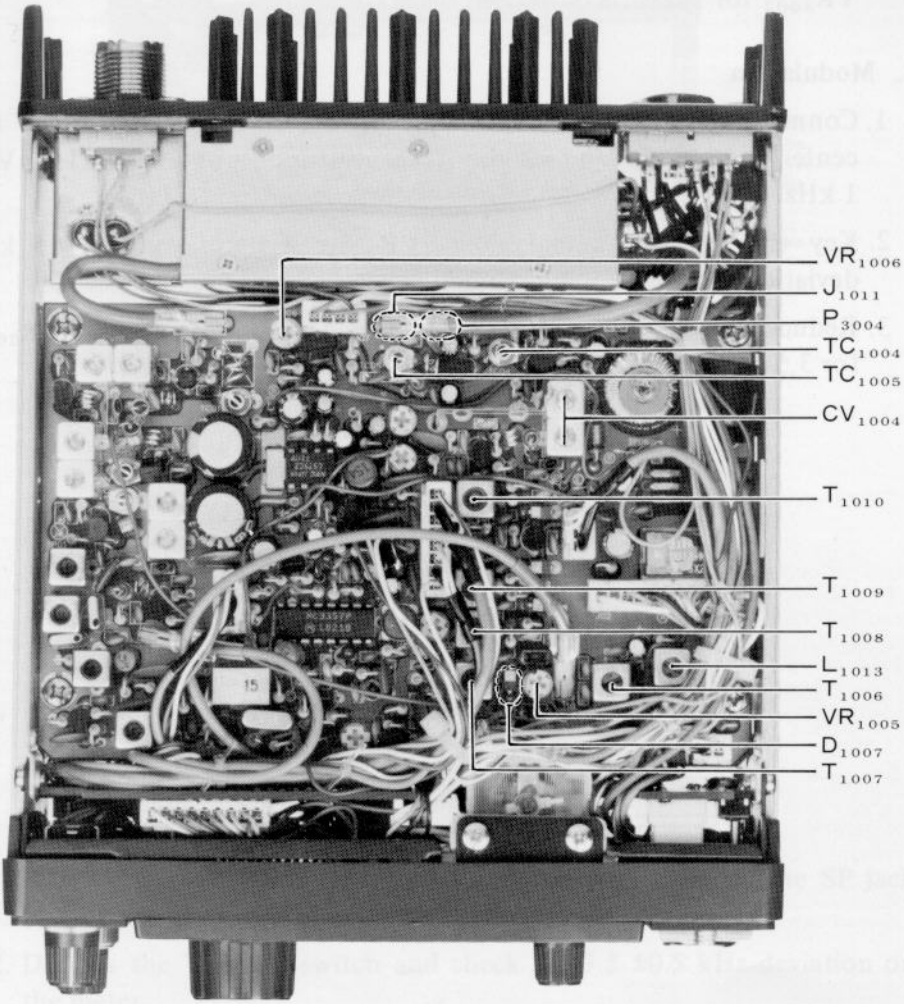
1. Disconnect P_{3004} from J_{1011} and connect the terminated wattmeter to J_{1011} with a 1-watt dummy load. Set the transceiver to the center of the band (5.000.0).
2. Connect the RF probe of the voltmeter to the cathode of D_{1007} and key the transmitter while adjusting T_{1006} and T_{1007} for maximum indication on the voltmeter.
3. Connect the RF probe of the voltmeter to the base of Q_{1021} and key the transmitter while adjusting $T_{1007} - T_{1010}$ for maximum indication on the voltmeter.
4. Key the transmitter and adjust CV_{1004}, TC_{1004} and TC_{1005} for maximum indication on the wattmeter at J_{1011} (at least 250 mW).
5. Tune the transceiver so that the display indicates 9.975.0. Key the transmitter and adjust one side of CV_{1004} to obtain 250 mW at J_{1011}.
6. Now tune the transceiver so that the display shows 0.025.0, key the transmitter, and adjust the other side of CV_{1004} to again obtain 250 mW at J_{1011}.
7. Retune the transceiver to the center of the band and check for 250 mW at J_{1011}, adjusting TC_{1004} and TC_{1005} again if necessary. Reconnect P_{3004} to J_{1011}.
8. Connect the 25 watt dummy load/wattmeter to the antenna jack and check for about 12 watts of power output across the band.

B. PO Meter

1. With the transceiver tuned to the center of the band, key the transmitter and adjust VR_{3001}, if necessary, for a reading of 8 on the PO meter.

C. Low Power (Models B and C only)

1. With the HI/LOW power switch set to LOW, adjust VR_{1006} for 1 watt output power on the wattmeter.



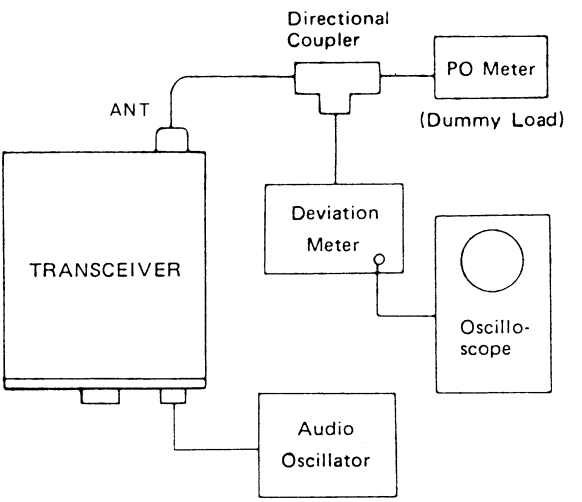
TRANSMITTER SECTION ALIGNMENT POINTS (TOP VIEW)

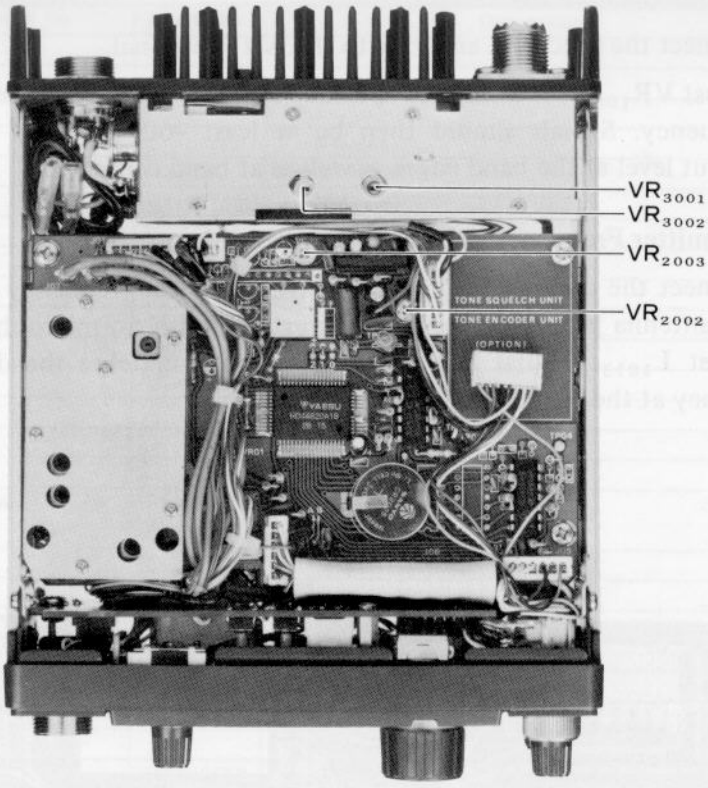
D. ALC

1. Set the HI/LOW power switch (on Models B and C) to HI, and adjust VR_{3002} for 11 watts output on the wattmeter.

E. Modulation

1. Connect the test equipment as shown below. Preset VR_{2002} to the center of its range, and set the AF generator output level for 15 mV at 1 kHz.
2. Key the transmitter and adjust VR_{2003}, if necessary, for 4.5 kHz deviation. The oscilloscope should display a sine wave.
3. Reduce the AF generator output level to 1.5 mV and adjust VR_{2002} for 3.5 kHz deviation.





PA SECTION ALIGNMENT POINTS (BOTTOM VIEW)

F. Tone Burst Check

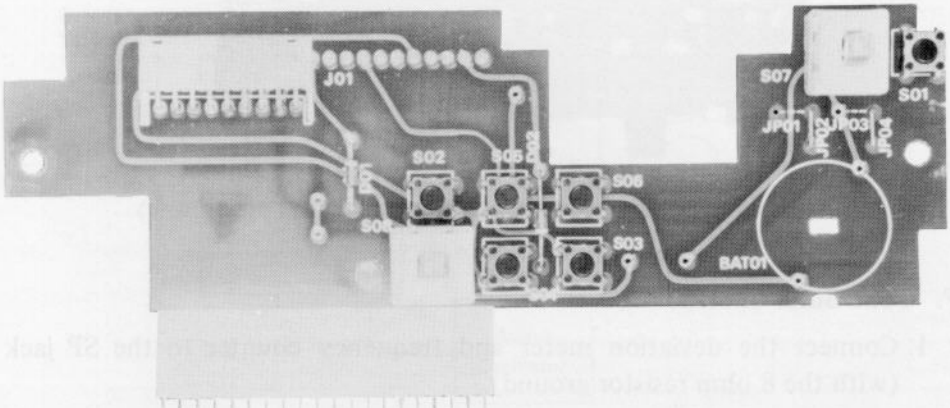
1. Connect the deviation meter and frequency counter to the SP jack (with the 8 ohm resistor ground).
2. Depress the T.CALL switch and check for 3.5 ±0.5 kHz deviation on the meter.
3. Check the frequency counter for 1800 ±1 Hz for model A, or 1750 ±1 Hz for models B, C.
4. With a monitor receiver at the same frequency as the transceiver, check for a 0.5 second burst when the PTT is closed and the BURST switch (rear panel) on.

G. Spurious Generation

1. Connect the spectrum analyzer to the ANT terminal.
2. Adjust VR_{1005} for minimum spurious at ±15.4 MHz from the operating frequency. Signals should then be at least -60 dB from the power output level at the band edges as well as at band center.

H. Transmitter Frequency Adjustment

1. Connect the dummy load and loosely couple the frequency counter to the antenna jack. Key the transmitter and, with no microphone input, adjust L_{1013} so that the counter frequency matches the display frequency at the center of the band.



SWITCH UNIT

PARTS LIST

MAIN CHASSIS		
Symbol No.	Part No.	Description
		IC
Q1	G1090225	M57704M (PA unit)
		TRANSISTOR
Q2	G3107150C	2SA715C (PA unit)
		DIODE
D2	G2090209	LED BG-4632K
D3	G2090208	〃 PR-4632K
D1	G2090232	Si S11
		LED BOARD
PB-2318A	F0002318A C023180A	Printed Circuit Board P C B with D2, D3
		RESISTOR
R1	J01215101	Carbon Film 1/8W TJ 100Ω
		POTENTIOMETER
VR1	J62800057	K12B61004-5N 1211-5KB, 10KA
		CAPACITOR
C1,2	K12171102	Ceramic 50WV 0.001μF (DD104E102P50V)
C3	K40129004	Electrolytic 16WV RE 10μF (16RE10)
		SWITCH
S2	Q9000193	EWT-XDDS 2050B
S3	N0190095	SRU-1023N
S4	N0190084	SRS101C
S5	N6090011	SSH-23-05
S6	N6090010	SSF-22-55
		MEMORY SWITCH BOARD
PB-2240	F0002240 C3001271	Printed Ciruit Board P.C.B. with S4

		CONNECTOR
J1	P0090244	FM214(2)-2S 2P (Power)
J2	P0090243	FM214-7SS (A) 7P (Microphone)
J3	P1090005	SG 8050 (External Speaker)
J4 (Model A,X,B,C)	P1090209	N-R (Antenna)
J4 (Model F)	P1090291	MR-10
		METER
M1	M0290038	
		SPEAKER
SP1	M4090052	VS-77 8Ω
	T9100302	SPEAKER CABLE
	T9100305	〃 〃
		RECEPTACLE
P1 (with wire)	T9204485	
P3 (〃 〃)	T9204484A	
P8 (〃 〃)	T9204486	
P9 (〃 〃)	T9204487	
P11(〃 〃)	T9204488	
P12(〃 〃)	T9204490A	Model A,X
P12(〃 〃)	T9204489A	Model F

MAIN UNIT

Symbol No.	Part No.	Description
PB-2437	F0002437	Printed Circuit Board
	C024370A	P C B with components
		IC
Q1012	G1090145	MC3357P
Q1015	G1090073	μPC575C2
Q1025	G1090294	μPC7808H

		FET	
Q1002,1003,1005	G3801250	2SK125	
Q1017,1018	G3801930F	2SK193F	
Q1001	G4800970	3SK97	
		TRANSISTOR	
Q1006—1008	G3304600B	2SC460B	
Q1016,1019	G3305350B	2 2SC535B	
Q1009—1011,1013 1014,1020,1024	G3309451P	2SC945AP	
Q1004,1021,1022	G3320260	2SC2026	
Q1023	G3324070	2SC2407	
		DIODE	
D1001,1002	G2001880F	Ge	1S188FM
D1003,1011,1012	G2015550	Si	1S1555
D1004	G2090027	Si	1SS53
D1007—1010	G2090107	Varactor	1T25
D1005	G2090179	〃	FC53M-4
	(G2090180)	〃	(FC53M-5)
D1006	G9090005	Varistor	MV103
D1013,1014	G2090211	Si	V06C
		CRYSTAL	
X1001	H0102375	HC-18/T	45.8MHz
X1002	H0102374	HC-18/T	15.4183MHz
		MONOLITHIC CRYSTAL FILTER	
XF1001	H1102068	46G2B2	
		CERAMIC FILTER	
CF1001	H3900204	LF-H15S	
		RESISTOR	
R1057	J02245229	Carbon film	¼W SJ 2.2Ω
R1080	J02245330	〃 〃	〃 〃 33Ω
R1003,1008,1076	J02245560	〃 〃	〃 〃 56Ω
R1089	J02245680	〃 〃	〃 〃 68Ω
R1010	J10246101	〃 Composition	〃 GK 100Ω
R1015,1019,1028,1047, 1049,1061,1064,1067,1073	J02245101	〃 film	〃 SJ 100Ω

R1002	J02245121	Carbon film		1/4W	SJ	120Ω
R1091	J01215151	〃	〃	1/8W	TJ	150Ω
R1007,1055,1071, 1086	J02245221	〃	〃	1/4W	SJ	220Ω
R1077,1081	J02245331	〃	〃	〃	〃	330Ω
R1018	J02245561	〃	〃	〃	〃	560Ω
R1024	J02245681	〃	〃	〃	〃	680Ω
R1082	J02245821	〃	〃	〃	〃	820Ω
R1004,1005,1014 1022,1030,1038, 1048,1050,1078	J02245102	〃	〃	〃	〃	1kΩ
R1090	J01215102	〃	〃	1/8W	TJ	1kΩ
R1041,1063	J02245152	〃	〃	1/4W	SJ	1.5kΩ
R1074	J02245182	〃	〃	〃	〃	1.8kΩ
R1023,1026,1031, 1051,1083,1087	J02245222	〃	〃	〃	〃	2.2kΩ
R1058	J02245272	〃	〃	〃	〃	2.7kΩ
R1034,1079,1085	J02245472	〃	〃	〃	〃	4.7kΩ
R1006,1075	J02245562	〃	〃	〃	〃	5.6kΩ
R1011	J02245822	〃	〃	〃	〃	8.2kΩ
R1012,1016,1017, 1020,1037,1084	J02245103	〃	〃	〃	〃	10kΩ
R1040,1056	J02245153	〃	〃	〃	〃	15kΩ
R1042	J10246153	〃	Composition	〃	GK	15kΩ
R1046	J02245183	〃	film	〃	SJ	18kΩ
R1013,1021,1036, 1059	J02245223	〃	〃	〃	〃	22kΩ
R1043	J10246223	〃	Composition	〃	GK	22kΩ
R1009	J02245393	〃	film	〃	SJ	39kΩ
R1033,1044,1052	J02245473	〃	〃	〃	〃	47kΩ
R1032	J02245563	〃	〃	〃	SJ	56kΩ
R1060	J02245683	〃	〃	〃	〃	68kΩ
R1035,1045	J02245823	〃	〃	〃	〃	82kΩ
R1065,1066,1068— 1070,1072	J02245104	〃	〃	〃	〃	100kΩ
R1054	J02245124	〃	〃	〃	〃	120kΩ
R1053	J02245154	〃	〃	〃	〃	150kΩ
R1027,1029	J02245224	〃	〃	〃	〃	220kΩ
R1025,1039	J02245274	〃	〃	〃	〃	270kΩ
		POTENTIOMETER				
VR1005	J51745471	H0651A005-470B				470ΩB
VR1001	J51745332	H0651A010-3.3KB				3.3kΩB
VR1004,1006	J51745472	H0651A011-4.7KB				4.7kΩB
VR1002	J51745473	H0651A017-47KB				47kΩB
VR1003	J51745104	H0651A019-100KB				100kΩB

		CAPACITOR			
C1090	K00179001	Ceramic (DD104SL0R5C50V)	50WV	SL	0.5pF
C1071	K02179003	〃 (DD104CK020C50V)	〃	CH	2pF
C1129	K00172020	〃 (DD104SL020C50V)	〃	SL	2pF
C1004,1015,1083, 1097	K02179004	〃 (DD104CH030C50V)	〃	CH	3pF
C1007,1088,1091, 1106	K02172040	〃 (DD104CH040C50V)	〃	〃	4pF
C1068	K06172040	〃 (DD104UJ040C50V)	〃	UJ	4pF
C1089,1092,1098	K06172050	〃 (DD104UJ050C50V)	〃	〃	5pF
C1028	K00172050	〃 (DD104SL050C50V)	〃	SL	5pF
C1128	K00173080	〃 (DD104SL080D50V)	〃	〃	8pF
C1081,1082	K06173100	〃 (DD104UJ100D50V)	〃	UJ	10pF
C1012,1041,1087,1132	K00173100	〃 (DD104SL100D50V)	〃	SL	10pF
C1011	K00175180	〃 (DD104SL180J50V)	〃	〃	18pF
C1025,1094	K00175220	〃 (DD104SL220J50V)	〃	〃	22pF
C1107	K02179009	〃 (DD104CH220J50V)	〃	CH	22pF
C1077,1078	K00175270	〃 (DD104SL270J50V)	〃	SL	27pF
C1026	K00175390	〃 (DD104SL390J50V)	〃	〃	39pF
C1006	K02175470	〃 (DD106CH470J50V)	〃	CH	47pF
C1021,1031	K00175560	〃 (DD104SL560J50V)	〃	SL	56pF
C1067,1072,1073	K06179018	〃 (DD110UJ331J50V)	〃	UJ	330pF
C1074	K00175471	〃 (DD107SL471J50V)	〃	SL	470pF
C1002,1003,1013, 1014,1017,1020, 1024,1036,1038, 1043,1047,1048, 1062,1070,1075,	K12171102	〃 (DD104E102P50V)	〃	E	0.001μF

1085,1086,1093, 1095,1096,1099— 1105,1108,1109, 1111,1112,1114, 1115,1117,1118, 1120—1122,1125, 1126,1131			
C1005,1009,1016	K10186102	Ceramic (RD870-1B102K63V)	63WV 0.001μF
C1018,1027,1034	K14180103	〃 (RD871-1FZ103Z63V)	〃 0.01μF
C1032,1037,1079, 1080,1084	K13179008	〃 (DD106F103Z50V)	50WV 0.01μF
C1130	K19149013	Semiconductor Ceramic (UAT05×103K-L45AE)	25WV 0.01μF
C1050,1051	K19149017	〃 (UAT06×223K-L45AE)	〃 〃 0.022μF
C1019,1022,1023, 1029,1030,1033, 1042,1052,1058,	K19149021	〃 (UAT08×473K-L45AE)	〃 〃 0.047μF
C1055,1056	K19149023	〃 (UAT10×683K-L45AE)	〃 〃 0.068μF
C1065	K19149025	〃 (UAT10×104K-L46AE)	〃 〃 0.1μF
C1039,1040,1046	K70167104	Tantalum (CS15E1V0R1M)	35WV 0.1μF
C1057	K70167224	〃 (CS15E1VR22M)	〃 0.22μF
C1049,1059	K40179002	Electrolytic (ECE-A1HK0R1)	50WV 0.1μF
C1035,1053	K40179001	〃 (ECE-A1HK010)	〃 1μF
C1045,1060,1119	K40149011	〃 (ECE-A1K4R7)	25WV 4.7μF
C1124	K40149001	〃 (25RE4R7)	〃 4.7μF
C1044,1054,1069, 1076,1110,1113, 1116	K40129012	〃 (ECE-A1CK100)	16WV 10μF
C1061	K40129002	〃 (16RE47)	〃 47μF
C1063,1127	K40109001	〃 (10RE100)	10WV 100μF
C1164,1166	K40129034	〃 (ECEA1CS471SZ)	16WV 470μF

C1123	K40129021	Electrolytic 16WV	1000μF
		(16RS102S 13×16)	
		TRIMMER CAPACITOR	
TC1001,1003,1004	K91000059	ECV-1ZW 04×53	4pF
TC1005	K91000029	ECV-1ZW 20×53	20pF
		INDUCTOR	
L1001	L0020900		
L1002,1008,1076	L0020767		
L1004	L0020903		
L1005	L0020342		
L1006,1017	L0021263		
L1011	L0020745B		
L1013	L0021276		
L1019	L0021262		
L1003,1007,1009 1015,1020	L1020673		
L1016	L1020672		
L1010	L1190008	FL4H-2R2	2.2μH
L1012	L1190115	S-154K	150mH
L1022	L1190024	FL5H-221K	220μH
L1021	L2030067A	FR14/7/5 2001F	
		HELICAL RESONATOR	
CV1001,1002,1004	Q9000114	CV-441B	
CV1003	Q9000223	CV-390	
		TRANSFORMER	
T1001−1004	L0020909		
T1005	L0020188		
T1006	L0021275		
T1007−1010	L0020907		
		RELAY	
RL1001	M1190002	FBR211A D012M	

		CONNECTOR
J1001,1003	P0090191	B2B-XH-A
J1002	P0090200	B11B-XH-A
J1004	P0090192	B3B-XH-A
J1005	P0090197	B8B-XH-A
J1006,1007	P0090193	B4B-XH-A
J1008—1011	P1090255	TMP-JA
		TP TERMINAL
	Q5000036	TP-G
	R0082970	Shield plate

CONTROL UNIT

Symbol No.	Part No.	Description	
PB-2436	F0002436	Printed Circuit Board	
	C024360A	P C B with component (w/o BAT2001)	Model A
	C024360B	〃	Model B,C
	C024360C	〃	Model F
	C024360D	〃	Model X
		IC	
Q2001	G1090417	HD44820A-62	
Q2002,2003	G1090126	MC14069UBCP	
Q2014	G1090237	μPD2819D	
Q2015	G1090072	μPC577H	
Q2019	G1090239	TC5082P	
Q2022	G1090084	μPC78L05	
		FET	
Q2008	G3090035	2SK19TM-GR	
Q	(G3801921G)	(2SK192A-GR)	
Q2010	G3801680D	2SK168D	
Q2009	G3802410G	2SK241GR	

		TRANSISTOR			
Q2006,2016,2017, 2020	G3309451P	2SC945AP			
Q2011—2013	G3305350B	2SC535B			
Q2018	G3105641Q	2SA564AQ			
Q2021	G3408920Q/R	2SD892Q/R			
		DIODE			
D2001	G2090118	Schottky	1SS97		
D2002—2008,2016—2018,2020—2026	G2090027	Si	1SS53		
D2019	G2001880F	Ge	1S188FM		
D2015	G2090107	Varactor	1T25		
		CRYSTAL			
X2001	H0102372	HC-18/T	4.2667MHz		
X2002 Model A	H0102486	HC-18/T	129.582MHz		
X2002 Model B.C.X	H0102485	HC-18/T	126.249MHz		
X2003 Model A.X	H0101983	HC-18/T	7.3728MHz	1800Hz	Tone
X2003 Model B.C	H0101982	HC-18/T	7.168MHz	1750Hz	Tone
		RESISTOR			
R2057	J02245560	Carbon film	¼W	SJ	56Ω
R2030,2032,2033, 2037,2045	J02245101	〃 〃	〃	〃	100Ω
R2021,2052	J02245151	〃 〃	〃	〃	150Ω
R2070	J00215221	〃 〃	⅛W	VJ	220Ω
R2029	J02245331	〃 〃	¼W	SJ	330Ω
R2044	J02245471	〃 〃	〃	〃	470Ω
R2082	J02245561	〃 〃	〃	〃	560Ω
R2038	J02245821	〃 〃	〃	〃	820Ω
R2049,2051,2061, 2074	J02245102	〃 〃	〃	〃	1kΩ
R2060	J02245122	〃 〃	〃	〃	1.2kΩ
R2048,2066	J02245152	〃 〃	〃	〃	1.5kΩ
R2034	J00215222	〃 〃	⅛W	VJ	2.2kΩ
R2035,2036,2039, 2041,2077,2078	J02245222	〃 〃	¼W	SJ	2.2kΩ
R2053,2065	J02245272	〃 〃	〃	〃	2.7kΩ
R2059	J02245392	〃 〃	〃	〃	3.9kΩ
R2004	J01245472	〃 〃	〃	TJ	4.7kΩ
R2040	J02245472	〃 〃	〃	SJ	4.7kΩ

R2003,2020	J02245562	Carbon film		1/4W	SJ	5.6kΩ
R2008,2046,2072, 2073,2075,2076, 2079,2080	J02245103	〃	〃	〃	〃	10kΩ
R2071	J00215103	〃	〃	1/8W	VJ	10kΩ
R2002	J01215183	〃	〃	〃	TJ	18kΩ
R2042,2047,2062	J02245223	〃	〃	1/4W	SJ	22kΩ
R2025,2055	J02245333	〃	〃	〃	〃	33kΩ
R2023,2027,2043, 2063	J02245473	〃	〃	〃	〃	47kΩ
R2028,2081	J00215473	〃	〃	1/8W	VJ	47kΩ
R2001,2006,2024, 2031,2056,2057, 2058	J02245104	〃	〃	1/4W	SJ	100kΩ
R2069	J00215104	〃	〃	1/8W	VJ	100kΩ
R2050	J02245154	〃	〃	1/4W	SJ	150kΩ
R2009—2011,2015	J02245334	〃	〃	〃	〃	330kΩ
R2068	J00215474	〃	〃	1/8W	VJ	470kΩ
R2012,2016	J02245684	〃	〃	1/4W	SJ	680kΩ
R2026	J02245824	〃	〃	〃	〃	820kΩ
R2005,2007,2054	J02245105	〃	〃	〃	〃	1MΩ
		THERMISTOR				
TH2001	G9090016	33D28				
TH2002	G9090008	31D26				
		POTENTIOMETER				
VR2003	J51745152	H0651A008-1.5KB				1.5kΩB
VR2002	J51745103	H0651A013-10KB				10kΩB
VR2001	J51745473	H0651A017-47KB				47kΩB
		CAPACITOR				
C2046	K00179001	Ceramic (DD104SL0R5C50V)		50WV	SL	0.5pF
C2027,2037,2048	K00172020	〃 (DD104SL020C50V)		〃	〃	2pF
C2023	K02179004	〃 (DD104CH030C50V)		〃	CH	3pF
C2035	K00172030	〃 (DD104SL030C50V)		〃	SL	3pF
C2021	K06172050	〃 (DD104UJ050C50V)		〃	UJ	5pF

C2019	K02173070	Ceramic (DD104CH070D50V)	50WV	CH	7pF
C2029	K00173080	〃 (DD104SL080D50V)	〃	SL	8pF
C2022	K06173090	〃 (DD104UJ090D50V)	〃	UJ	9pF
C2043	K00173100	〃 (DD104SL100D50V)	〃	SL	10pF
C2024	K02175120	〃 (DD104CH120J50V)	〃	CH	12pF
C2047	K00175120	〃 (DD104SL120J50V)	〃	SL	12pF
C2084	K00175150	〃 (DD104SL150J50V)	〃	〃	15pF
C2032	K00175180	〃 (DD104SL180J50V)	〃	〃	18pF
C2038	K06175180	〃 (DD104UJ180J50V)	〃	UJ	18pF
C2040,2042	K02175330	〃 (DD104CH330J50V)	〃	CH	33pF
C2058,2059,2085, 2086	K00175330	〃 (DD104SL330J50V)	〃	SL	33pF
C2050,2051	K00175560	〃 (DD104SL560J50V)	〃	〃	56pF
C2009,2011,2016	K10186471	〃 (RD870-1B471K63V)	63WV		470pF
C2002−2005,2013 2017,2018,2025, 2028,2030,2031, 2033,2034,2036, 2044,2045,2054, 2056,2061,2062, 2064−2066,2070, 2072,2081,2088, 2089−2091	K12171102	〃 (DD104E102P50V)	50WV		0.001μF
C2039	K13179008	〃 (DD106F103Z50V)	〃		0.01μF
C2041,2049,2052, 2053,2055,2082,	K14180103	〃 (RD871-1FZ103Z63V)	63WV		0.01μF
C2008	K19149009	Semiconductor Ceramic (UAT05×472K-L05AE)	25WV		0.0047μF
C2007	K19149013	〃 (UAT05×103K-L05AE)	〃	〃	0.01μF

C2078,2079	K19149019	Semiconductor Ceramic (UAT08×333K-L45AE)	25WV	0.033μF
C2014,2069,2071, 2093	K19149021	〃 〃 (UAT08×473K-L45AE)	〃	0.047μF
C2060	K70167474	Tantalum (CS15E1VR47M)	35WV	0.47μF
C2067,2068,2074	K70120002	〃 (489D106×0016C1)	16WV	10μF
C2092	K40179005	Electrolytic (ECE-A1HKR47)	50WV	0.47μF
C2083,2087	K40179001	〃 (ECE-A1HK010)	〃	1μF
C2080	K40149011	〃 (ECE-A1E4R7)	25WV	4.7μF
C2001,2006,2026, 2057,2063,2073, 2075,—2077 2015(B.C)	K40129012	〃 (ECE-A1CK100)	16WV	10μF
		TRIMMER CAPACITOR		
TC2001	K91000029	ECV-1ZW20×53		
		INDUCTOR		
L2002	L0021278	S6-B		
L2006	L0021020			
L2007	L0020745B			
L2001,2004,2008	L1190005	FL4H-1R0M		1μH
L2003	L1190004	FL4H-R68M		0.68μH
L2009	L1190014	FL4H-100K		10μH
L2010	L1190115	S-154K		150mH
		TRANSFORMER		
T2001—2003	L0020907			
		SWITCH		
S2001	N6090037	SSS-312		
		CONNECTOR		
J2001	P0090200	B11B-XH-A		
J2002,2004,2005	P0090195	B6B-XH-A		
J2003	P0090194	B5B-XH-A		
J2006	P1090292	FJ-20-001		

		LITHIUM BATTERY
BAT2001	Q9000106	CR-2025
		TP TERMINAL
	Q5000036	TP-G
	R0082940A	Shield Case
	R0082950A	Shield Cover
	R0082960A	Shield Plate
	R7082980	Insulating Pad A
	R7082990	〃 〃 B
		PA UNIT
PB-2435	F0002435	Printed Circuit Board
	C024350A	P C B with components
		TRANSISTOR
Q3001	G3309451P	2SC945AP
		DIODE
D3001	G2090211	Si V06C
D3002,3003	G2090118	Schottky 1SS97
D3004	G2015550	Si 1S1555
		RESISTOR
R3001	J02245821	Carbon film ¼W SJ 820Ω
		POTENTIOMETER
VR3001	J50714503	V8K-1-1 50KB 50kΩB
VR3002	J50714103	V8K-1-1 10KB 10kΩB
		CAPACITOR
C3015,3018,3021	K02179001	Ceramic 50WV CH 1pF (DD104CK010C50V)
C3017	K02172040	〃 〃 〃 4pF (DD104CH040C50V)

C3014,3025	K02172050	Ceramic (DD104CH050C50V)	50WV	CH	5pF
C3003,3004	K02173060	〃 (DD104CH060C50V)	〃	〃	6pF
C3016	K02173070	〃 (DD104CH070D50V)	〃	〃	7pF
C3006	K02173090	〃 (DD104CH090D50V)	〃	〃	9pF
C3019,3022	K02173100	〃 (DD104CH100D50V)	〃	〃	10pF
C3001,3002,3005, 3007,3009,3011, 3013,3020,3023, 3024	K10186102	〃 (RD870-1B102K63V)	63WV	B	0.001μF
C3026—3032	K21170002	Feed Thru (ECK-Y1H102WE)	50WV		0.001μF
C3008,3012	K40129012	Electrolytic (ECE-A1CK100)	16WV		10μF
		INDUCTOR			
L3001,3006	L0020767				
L3002	L0020342				
L3005	L0020903				
L3003,3004	L1020672				
		RELAY			
RL3001	M1590002	CX-1015			
		TP TERMINAL			
	Q5000049	TP-J			
		CONNECTOR			
P3001(with wire)	T9204491				
P3002(〃)	T9204492				
	R0083000	Shield Case			
	R0083010	Shield Cover			

SW UNIT		
PB-2433	F0002433	Printed Circuit Board
	C024330A	P C B with components
		DIODE
D4001,4002	G2090027	Si 1SS53
		SWITCH
S4001—4006	N4090051	KHH10902
S4007,4008	N4090042	SUJ111
		CONNECTOR
J4001	P0090210	S9B-XH
	T9204483	FLAT CABLE

DISPLAY UNIT		
PB-2434	F0002434	Printed Circuit Board
	C024340A	P C B with components
		IC
Q5001	G1090346	TP0401
	(G1090472)	(MN1252A)
		LCD
DS5001	G6090025	H1313A
	S2000018	Rubber conductor
	S6000047	Diffusor
	R0083030	LCD Flame
	R4083040	LCD Mount
	R7083050	LCD Cushion
		LAMP
PL5001	Q1000050	BQ034-30657A
		CONNECTOR
P5001(with wire)	T9204435	XHP-9

ACCESSORIES

	M3090033	Microphone YM-47(Supplied w/out Hanger)
	M3090035	Spkr/Mic. YM-49(Optional)
	M3090037	DTMF Mic. YM-50(Optional, Supplied w/US model, Incl. Microphone Hanger)
	R0071360	Microphone Hanger(for YM-47,YM-49)
	P1090253	(Microphone plug FM-147P)
	T9002805	Power Cord
	P1090019	Power Plug FM-142P
	Q2000001	Fuse Holder SN-1101
	Q0000005	Fuse 5A
	P0090067	Cigarette Lighter Plug CP103
	P0090034	External Speaker Plug P2240
	D6000026	Mobile Bracket Assy
	R0085570	Bracket
	U50520001	Screw M5×10
	U60500101	Nut M5
	U70005001	Flat washer 5φ
	U71005001	Lock washer 5φ
	R0062300A	Wire Stand
☆☆☆☆☆☆☆☆☆☆☆		KNOB ☆☆☆☆☆☆☆☆☆☆☆
	R3073810A	FT-11UK VOL
	R3073820A	FT-15UDS SQL
	R3073830A	FT-13UTK RPT
	R3073850	FT-26T TUNING
	R3073900	Push Knob HI/LOW(T.SQ)
	R3073901	〃 〃 VFO A/B
	R3073910B	〃 〃 STEP, DIAL/S, MR/PRI, F, M
	R3074190C	〃 〃 T.CALL

E3810182(8208-H)

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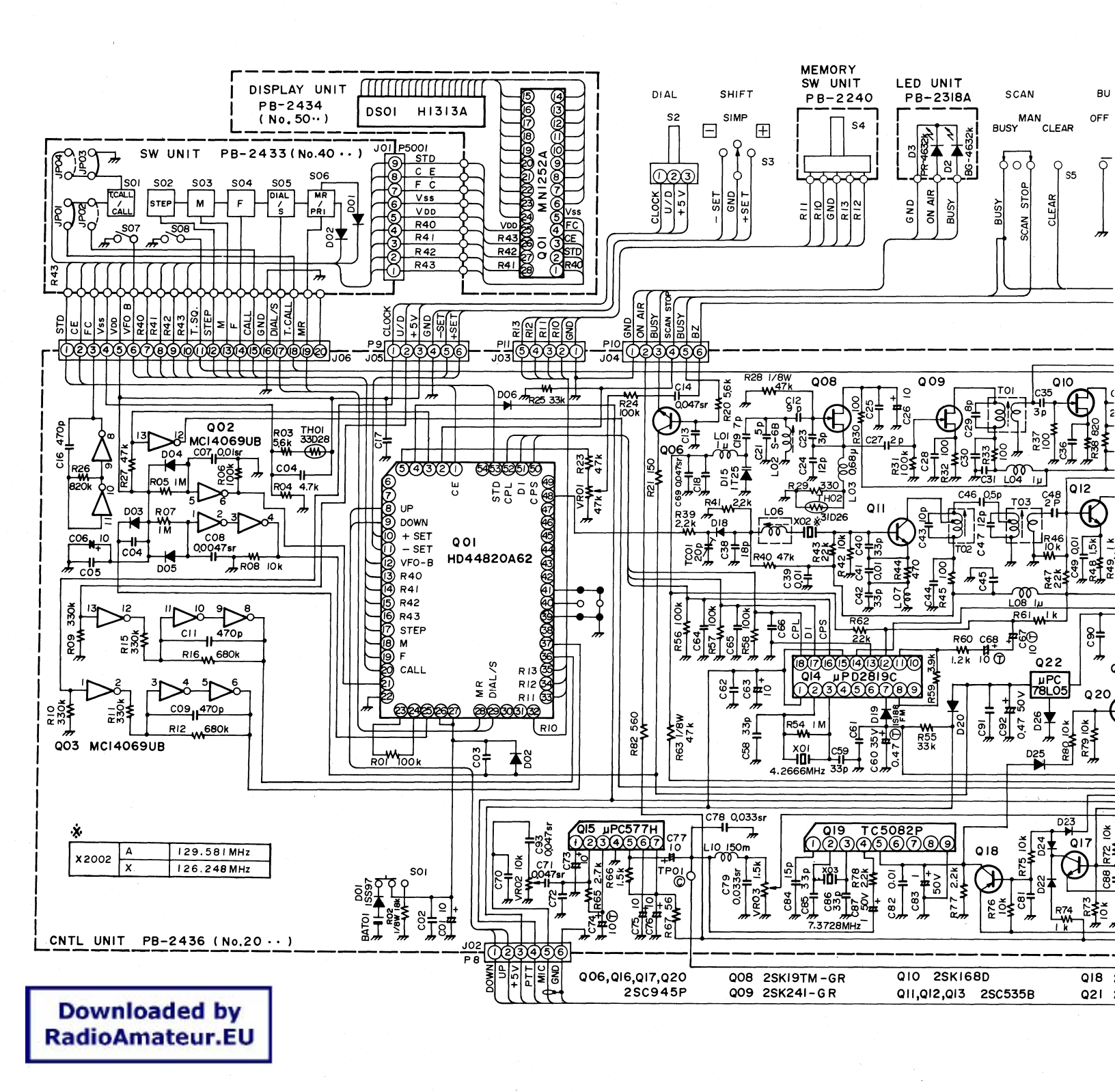
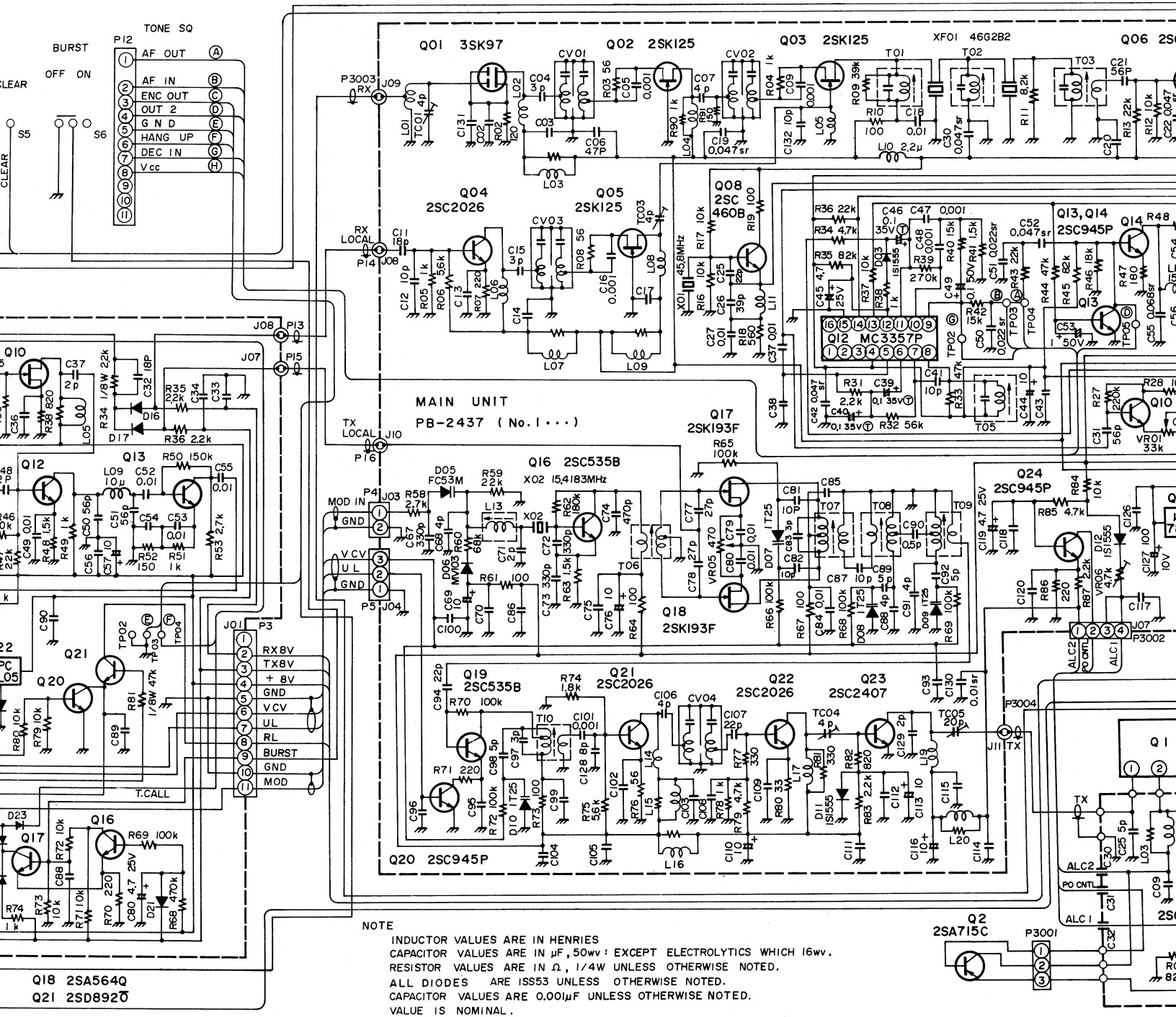
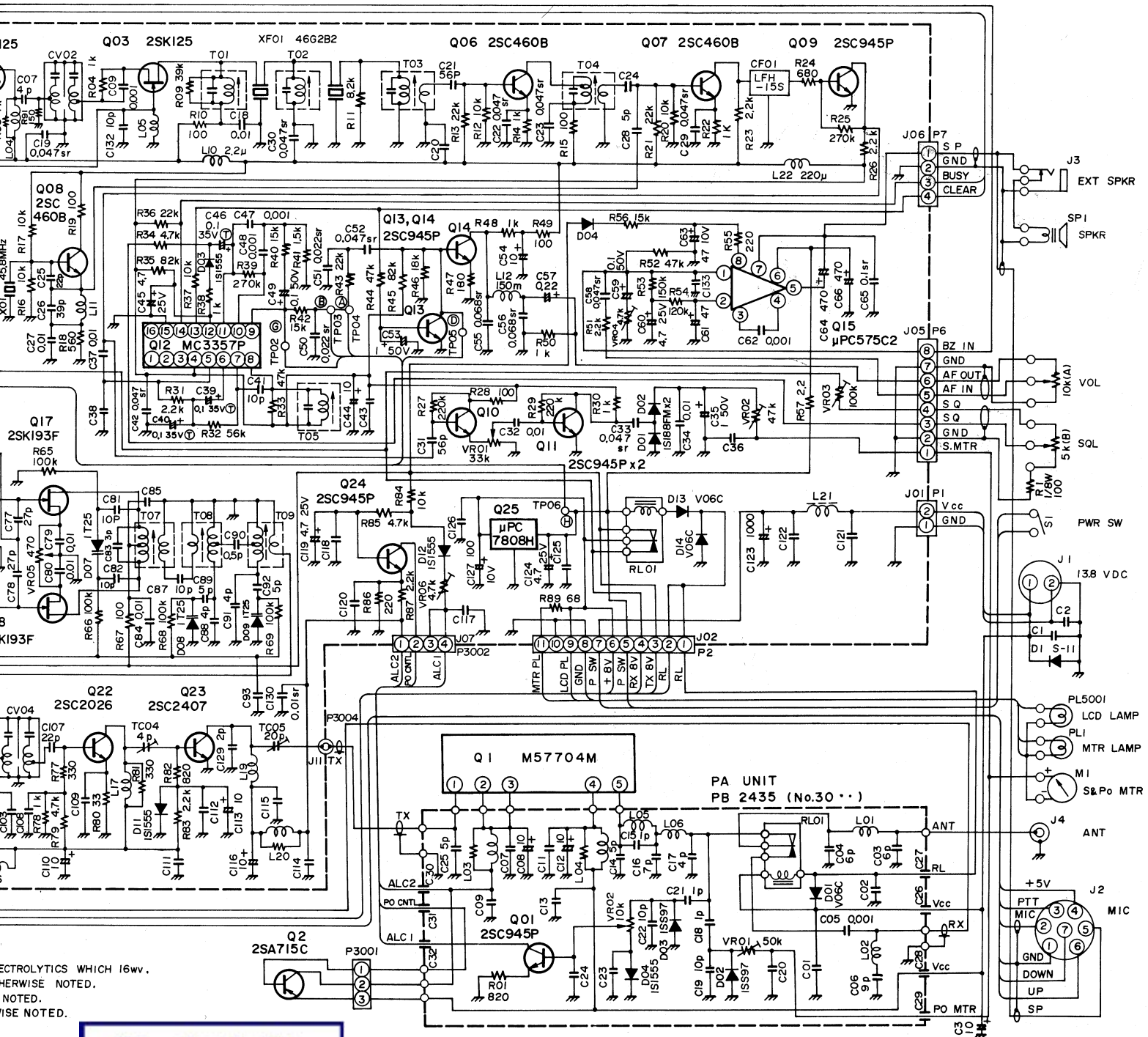



MAIN UNIT
PB-2437 (No.1・・・)
Q01 3SK97
Q02 2SK125
Q03 2SK125
Q04 2SC2026
Q05 2SK125
Q08 2SC 460B
Q13,Q14 2SC945P
Q12 MC3357P
Q17 2SK193F
Q16 2SC535B
Q18 2SK193F
Q19 2SC535B
Q21 2SC2026
Q22 2SC2026
Q23 2SC2407
Q20 2SC945P
Q24 2SC945P
Q10
Q12
Q13
Q21
Q20
Q17
Q16
Q18 2SA564Q
Q21 2SD892O
Q2 2SA715C
XF01 46G2B2
TONE SQ
BURST
OFF ON
CLEAR
P12
AF OUT
AF IN
ENC OUT
OUT 2
G N D
HANG UP
DEC IN
Vcc
P3003 RX
RX LOCAL P14
TX LOCAL P16
MOD IN P4
GND
VCV
UL
GND P5
J01 P3
RX 8V
TX 8V
+ 8V
GND
VCV
UL
RL
BURST
GND
MOD
T.CALL
P3001
P3002
P3004
J11 TX
ALC2
PO CNTL
ALC1
TX
NOTE
INDUCTOR VALUES ARE IN HENRIES
CAPACITOR VALUES ARE IN μF, 50wv : EXCEPT ELECTROLYTICS WHICH 16wv.
RESISTOR VALUES ARE IN Ω, 1/4W UNLESS OTHERWISE NOTED.
ALL DIODES ARE ISS53 UNLESS OTHERWISE NOTED.
CAPACITOR VALUES ARE 0.001μF UNLESS OTHERWISE NOTED.
VALUE IS NOMINAL.



ECTROLYTICS WHICH 16wv.
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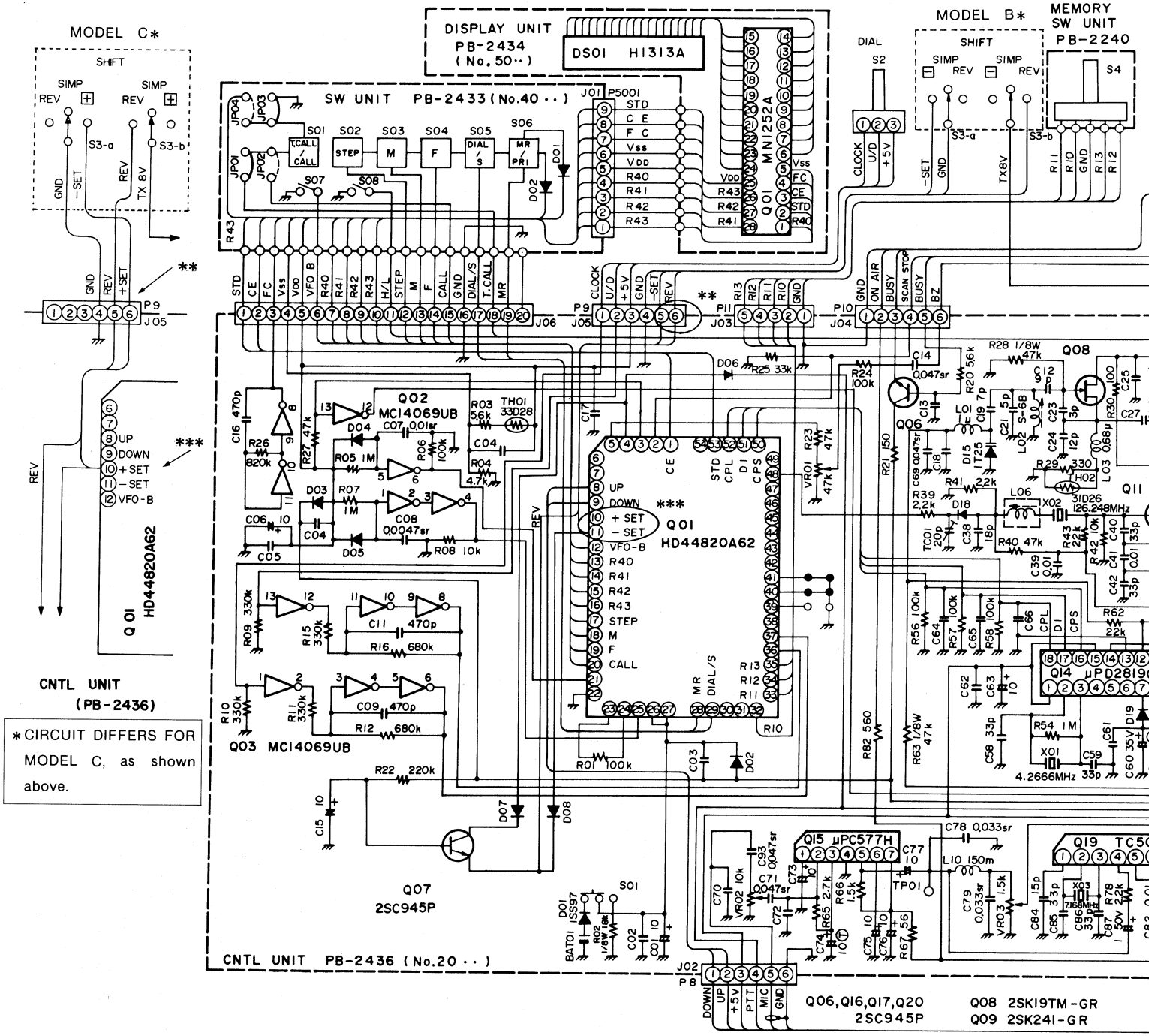
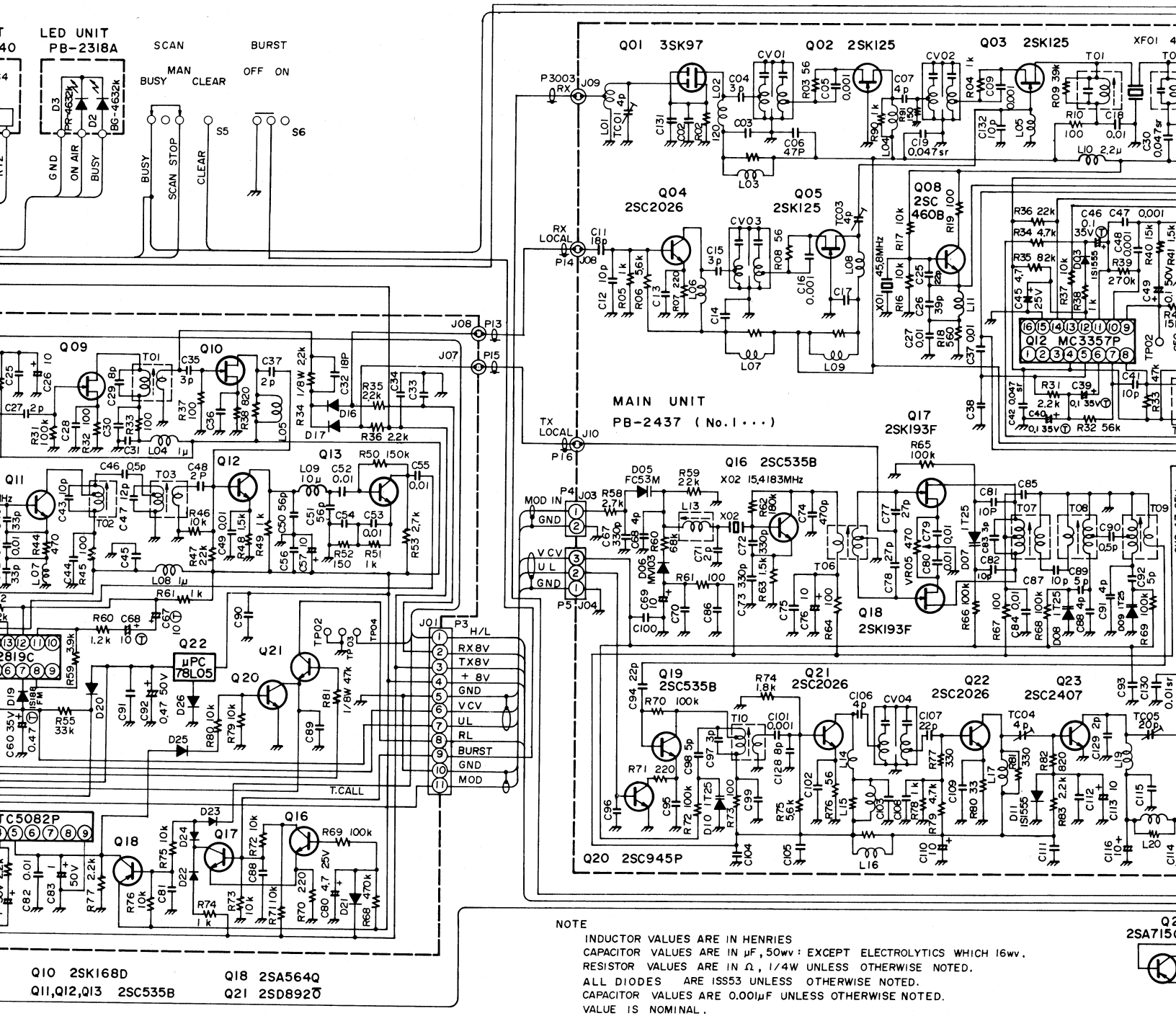
FT-730R CIRCUIT DIAGRAM MODEL A, X

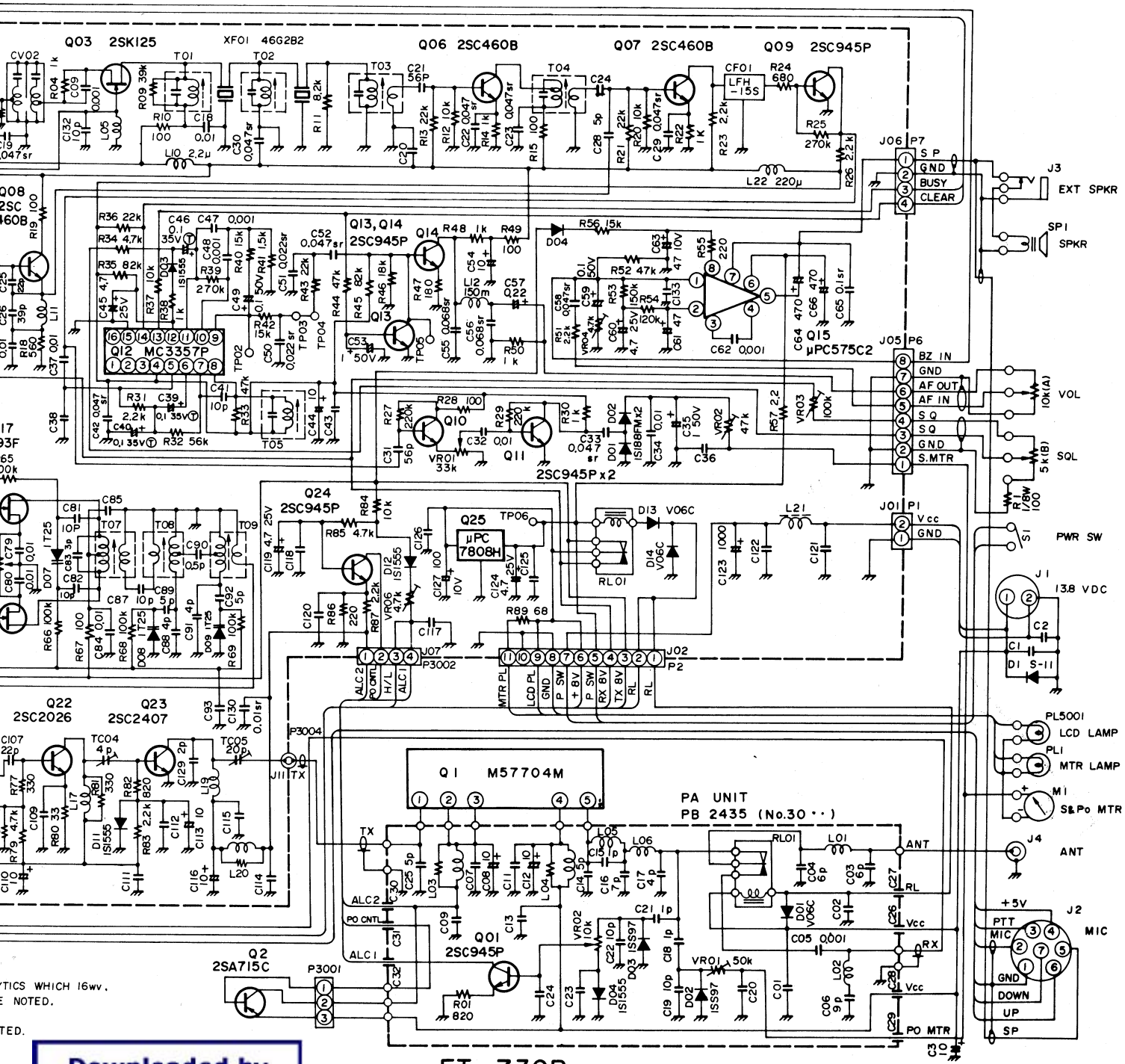

MODEL C*
SHIFT
SIMP
REV
SIMP
REV
S3-a
S3-b
GND
-SET
REV
TX 8V
**
P9
J05
***
UP
DOWN
+SET
-SET
VFO-B
Q01
HD44820A62
CNTL UNIT
(PB-2436)
*CIRCUIT DIFFERS FOR MODEL C, as shown above.
DISPLAY UNIT
PB-2434
(No.50··)
DS01 H1313A
SW UNIT PB-2433 (No.40··)
MODEL B*
MEMORY
SW UNIT
PB-2240
DIAL
S2
S4
CLOCK
U/D
+5V
TX8V
Q02
MC14069UB
Q03 MC14069UB
Q07
2SC945P
Q08 2SK19TM-GR
Q09 2SK241-GR
Q06,Q16,Q17,Q20
2SC945P
Q15 μPC577H
Q19 TC5
Q14 μPD2819
CNTL UNIT PB-2436 (No.20··)
P8
J02
DOWN
UP
+5V
PTT
MIC
GND



Q10 2SK168D
Q11,Q12,Q13 2SC535B
Q18 2SA564Q
Q21 2SD892O

NOTE

INDUCTOR VALUES ARE IN HENRIES
CAPACITOR VALUES ARE IN μF, 50wv : EXCEPT ELECTROLYTICS WHICH 16wv.
RESISTOR VALUES ARE IN Ω, 1/4W UNLESS OTHERWISE NOTED.
ALL DIODES ARE 1SS53 UNLESS OTHERWISE NOTED.
CAPACITOR VALUES ARE 0.001μF UNLESS OTHERWISE NOTED.
VALUE IS NOMINAL.



FT-730R CIRCUIT DIAGRAM MODEL B, C

YTICS WHICH 16wv.
E NOTED.
TED.