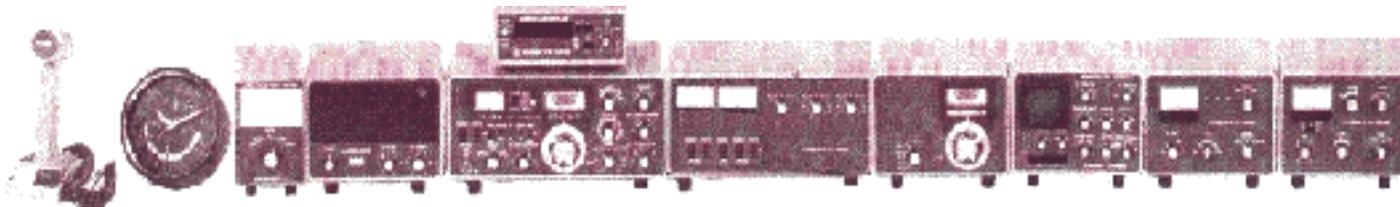


# NW2M Presents: The Yaesu FT-101 HF Transceiver Home Page



## Purpose

The purpose of this page is to capture and document the Yaesu FT-101 series radios during the 1970's. It has taken me 12 years to collect a transceiver and every accessory to make a "complete station". I encourage your feedback, corrections, and additions. I am not an Electrical Engineer, so I cannot help with specific repair or substitution problems. I simply don't have access to this type of material or equipment. My objective is to document the Yaesu FT-101 era and to provide a detailed understanding so that the value of this equipment can be realized.

Thanks, AI-NW2M

**FT-101 Web Page**

Advertised

<a href="#">FT-101 History</a>	<a href="#">FT-101 Model Numbers</a>	<a href="#">Physical Construction</a>	<a href="#">Advertised Features</a>
<a href="#">General Specifications</a>	<a href="#">A "Complete" Station</a>	<a href="#">Station Accessories</a>	<a href="#">Tune-up Procedures</a>
<a href="#">Known Modifications</a>	<a href="#">6JS6C Tubes</a>	<a href="#">Basic Alignment Points</a>	<a href="#">QST / 73 / CQ</a>
<a href="#">AM Operation</a>	<a href="#">Weights and Shipping</a>	<a href="#">Repair Facilities</a>	<a href="#">Original Prices</a>
<a href="#">Mobile Operations</a>	<a href="#">Fox-Tango Newsletters</a>	<a href="#">Comments/Corrections</a>	<a href="#">Credits</a>
<a href="#">About the Author - NW2M</a>			

## A Brief History of the FT-101 Transceiver

The FT-101 series of transceivers first appeared internationally in 1970 and then domestically inside the United States in January 1971. It gained overnight approval of amateur radio operators for its quality of signal, flexibility and for professional attention to workmanship and design. The modular design of 10 solid state circuit boards on a common chassis with a tube amplifier caught the eye of discriminating hams worldwide.

It was a strong performer. Although far from perfect, the first FT-101's suffered from intermod when strong signals were present during receive and generated spurs on transmit. Hams began to investigate these problems and offer improvements to existing circuit design. The factory responded with a major modification which significantly improved the receiver of the early FT-101's. The serial number revealed which transceiver was "early" and "late". So that the "early" FT-101 hams would not feel obsolete, Yaesu offered the entire modification which made an "early" into a "late" and sold it as a kit along with a 25 page instruction guide. Problems began as many hams lacked the proper test equipment and the know-how needed to make such an upgrade. After months of fighting with customers, Yaesu withdrew the kit (MIR-1 Modification Kit) and would only install it at their factory. Adding to the confusion was the fact that there were five (5) different sub-models within the "early" FT-101 series, the last being the FT-101 "late" model. The situation arose where identical FT-101 radios sat side by side with the only indication of the internal layout was by the serial number.

Additional improvements were made and with the addition of the 160 meter band, the FT-101B was released. Yet more improvements and the addition of a real "RF" speech processor led to the release of the FT-101E model. The "E" model was fully refined with all of the previous problems having been worked out. This was the most popular and the most produced model by Yaesu in the FT-101 series. Three models of the "E" were released. The "E" model with all options, an "EE" (economy) model lacking the speech processor, and the "EX" (extreme economy) model lacking speech processor, 160M crystal, DC options, and microphone. Last in the series was the "F" model which contained all of the modifications, improvements and options throughout the series. Only a few of the "F" models were made which also included an "FE" (economy) and "FX" (extreme economy) model. With fierce competition in the HF market, WARC bands on the horizon, IF shift, AF Notch/Peak, and digital readouts, the FT-101 series moved quickly to the analog "Z" model and then to the digital "ZD" models. The original FT-101 series lasted for 6 years, beginning in early 1971 and lasting through 1977. It was an exciting time for the FT-101 radios and their owners.

There were no "A", "C", or "D" models produced.

The FT-101 first appeared in the January 1971 issue of [QST](#) (page 147) sponsored by Spectronics. It would become a familiar full-page advertisement that would be used several times by Spectronics Inc as part of their global ad campaign. It set into motion a new wave of radios and ushered in an exciting time for amateurs worldwide! Each was hand-made by skilled workers with the utmost of pride. Each was unique.

A publication called the Fox-Tango Newsletter captured the "diary" of the FT-101s for all time. Ten publications per year offered thousands of FT-101 owners the opportunity to share problems, solutions, and performance data. The Fox-Tango Newsletters lasted for 14 years. It is the largest collection of user data and factory support information for any radio at any time. It has been preserved and full copies are still available today. Truly a testament to the era and popularity of these radios, even today. Here is a [link](#) to the Fox-Tango Newsletter page.

## !Safety!

Before we go any further, it is paramount that you understand that high voltages exist within these radios, cables, and accessories. Safety is first and foremost! The FT-101 radios and accessories have voltages which include: 100V,

117V, 240V, +150V, +300V, and +600V. These voltages exit the radio and appear on interface cables. There are no warnings! Within the high power FL2100 amplifier, there is a +2,600 Volt power supply! Within the YO-100 oscilloscope is a +1,300 Volt power supply and a cathode ray tube (CRT). Special tools are required when working on these radios, accessories, and interface cables. Professional repair and service are highly recommended. The following information is presented solely for informational purposes and historical reference.

## What's in the Name ?

There are many models which proudly display the FT-101 logo. Please be sure that you know which model you have, know its operating capabilities, and limitations. Normally, the longer the model number is, the less capabilities it has for that model. The last 5 digits represent the serial number. Any serial number prefix is for factory control and routing. Buyers and sellers of the original models needed to know the serial number to finalize any deal. Here is the complete list:

### FT-101 - "Early" model

1971, first offering in United States.

Serial numbers below 25,000.

Known for strong receiver overload, TX spurs, and audio problems.

80-10 meter transceiver.

### FT-101 - "Late" Model

Serial numbers above 25,000.

Major modifications to receiver, Regulator, IF and audio boards.

80-10 meter transceiver.

There were five FT-101 sub-models known: (based upon MK-160 160 Meter kit information)

- Mark 0: Serial numbers 06000 and below. First "Early" models during 1970.
- Mark 0A: Serial numbers 06001 to 07991. Transitional.
- Mark I: Serial numbers 08001 to 23999. Most common "Early" model.

- Mark II: Serial numbers 24000 to 24999. Transitional models with 160M tank circuit.
- Mark IIA: Serial numbers 25000 and up. First "Late" Models.

Beware: Early and Late model circuit boards may not be fully interchangeable!

#### FT-101B - "Early" Model

Serial numbers below 6,000.

Improved IF (PB1183B) and Audio (PB1315), and Blanker (PB1292) boards.  
160-10 meter transceiver.

#### FT-101B - "Late" Model

Serial numbers 6,001 and up.

Improved Regulator (PB1314A), IF (PB1180B), and Audio (PB1315A) boards.  
160-10 meter transceiver.

#### FT-101BS

Special FT-101B model for Japan Market.  
Single 6JS6C tube, 50 watt output.

#### FT-101E

160-10 meter transceiver.  
RF Speech Processor.  
Three sub-models:

"Early" - S/N 15,000 and lower. (PB1494) Processor

"Mid" - S/N 15,001-20,500. (PB1534) Processor

"Late" - S/N 20,501 and up. (PB1534A) Processor, (PB1547A) Regulator, (PB1183C) IF, (PB1315B) Audio, (PB1582) Blanker.

#### FT-101EE

Economy FT-101E model.

All FT-101E specifications except,  
No Speech processor (available as an option).

#### FT-101EX

Extreme Economy FT-101E model.  
All FT-101E specifications except,  
No Speech Processor (available as an option).  
No DC Converter for Mobile use (available as an option).  
No Microphone, DC cord, or 160M crystal, 10A crystal only.

#### FT-101ES

Special FT-101E model for Japan Market.  
Single 6JS6C tube, 50 watt output.

#### FT-101F

Latest in the FT-101 series. All updates applied.  
160-10 meter transceiver. 11 meters as AUX position.  
Improved (PB1582) Noise Blanker.  
Speech Processor and DC Converter.

#### FT-101FE

Economy FT-101F model.  
All FT-101F specifications except,  
No Speech Processor (available as an option).

#### FT-101FX

Extreme Economy FT-101F Model.  
All FT-101F specifications except,  
No Speech Processor (available as an option).  
No DC Converter for Mobile use (available as an option).

No Microphone, DC cord, or 160M crystal, 10A crystal only.

There were no "A", "C", or "D" models ever produced.

### FT-101 Board Complement by Model Number

FT-101 Version	VFO	REG	HF/IF	LO/IF	AUDIO	RF	MOD	RECT	BLANKER	PROCESS
FT-101 (Early) S/N 25,000&Down	PB1056	PB1079A	PB1084C	PB1080A	PB1081C	PB1077B	PB1078A	PB1076A	Part of PB1080A	None
FT-101 (Late) S/N 25,001&Up	PB1056	PB1185	PB1180	PB1183	PB1189	PB1181A	PB1184	PB1076B	PB1182	None
FT-101B (Early) S/N 6,000&Down	PB1056	PB1185	PB1180	PB1183B	PB1315	PB1181B	PB1184A	PB1076B	PB1292	None
FT-101B (Late) S/N 6,000&Up	PB1056	PB1314A	PB1180B	PB1183B	PB1315A	PB1181B	PB1184A	PB1076B	PB1292	None
FT-101E/EE/EX (Early) S/N 15,000&Down	PB1056	PB1314A	PB1180B	PB1183B	PB1315A	PB1181B	PB1184A	PB1076B	PB1292	PB1494
FT-101E/EE/EX (Mid) S/N 15,000- 20,000	PB1056	PB1314A	PB1180B	PB1183B	PB1315A	PB1181B	PB1184A	PB1076B	PB1292	PB1534

FT-101E/EE/EX (Late) S/N 20,001&Up	PB1056	PB1314A	PB1180B	PB1183C	PB1315A	PB1181B	PB1184A	PB1076B	PB1582	PB1534A
FT-101F/FE/FX (All) S/N All Numbers	PB1056	PB1547	PB1180B	PB1183	PB1315B	PB1181B	PB1184A	PB1076B	PB1582B	PB1534A

### Why so many sub-models?

FLASHBACK - In 1971, there were 250,000 licenses hams, First Class stamps were 8 cents; Minimum Wage was 1.60 per hour; 8-Track tapes were at their sales peak; Bill Gates was a junior in high school; the original IBM PC was still 10 years away; Linus Torvalds (Creator of Linux) was 2 years old; a new Chevy Corvette cost \$5,500 dollars; gas prices were 36 cents per gallon; and Atari was 10 months away from releasing "Pong". \$500-\$550 was a lot of money for a new ham radio. Numerically, the FT-101 was 1/10th the price of a 1971 Corvette! The Consumer Price Index (CPI) was 40, today it is 340. Today's equivalent value of a \$550 radio is \$4,700. Additionally, Novices only had CW privileges on certain bands- so a microphone, the Speech Processor, 160M crystal and the 10B/C/D crystals, etc were simply excess cost drivers on an expensive radio. As the Novice upgraded, these could be purchased to match the operating capabilities permitted by their license class. In 1972, the FCC allowed Novices to operate a transmitter controlled by a VFO. Ironically, a Novice could not operate a FT-101 with the VFO. Fixed crystals were needed! How times have changed!

## Construction

The FT-101 is a hybrid radio that employs a solid state transmitter, receiver, and a two-tube power amplifier. The solid state features of the radio offer high-performance, low-noise, and low-current characteristics, while the tube power amplifier provides a nearly "bullet-proof" transmitter and tuner stage.

The tube amplifier consists of a 12BY7A pre-driver stage that feeds a pair of 6JS6C tubes providing a nominal

output power of 130 watts PEP SSB, 90 watts CW, 30 watts AM. The 6JS6C tubes are matched to 50 Ohms through a conventional pi-output network. The pi-network transforms the 5500 ohm output impedance of the tubes to a 50 Ohm feed system, provides harmonic attenuation, and can actually match to a variety of output impedances from 25 to 100 Ohms with ease.

The transceivers were made with plug-in boards which could be sent to the factory for replacement or repair. This modular design was unprecedented in the amateur community, which explains why so many FT-101's are still in use today. In fact, board extenders could be purchased to extend any board above the main chassis for measurement, alignment, and repair. For any plug-in board, all voltages, grounds, and signal traces were routed through a single edge connector (facing down into the main chassis). This removed the need for wires and cables to these circuit boards. This yielded a clean and trim internal upper chassis. The bulk of the wiring harness is below the deck of the main chassis where all main circuit board edge connectors are fed. Yes, there are many wires!

[FT-101 Block Diagram 54k](#)

[FT-101 Top Chassis Photo 106k](#)

[FT-101 Bottom Chassis Photo 91k](#)

The most complicated device in this radio is the Band Selector Switch. This is a 12-position rotary switch that runs from the front of the radio to the back. It has 13 sections (wafers A thru M) which route everything from DC voltages, oscillator sections, crystals, tuning circuits, and RF Power in the high-voltage tank and output circuits. One band selector switch position is used for: 160M, 80M, 40M, 20M, 15M, 10A, 10B, 10C, 10D, 11M or AUX, and WWV receive-only. Each position allows the main VFO to cover 500kHz on any band.

The entire transceiver was made of metal. Covers, chassis, shields, shafts, etc., are all metal. Even the plastic RF/S-meter trim and knobs have brass metal inserts. At 35 pounds, there is a lot of metal in this radio! The 10 major circuit boards are mounted with threaded hardware to the main chassis. Very rugged indeed. A clear [plastic sheet](#) covers the entire painted surface of the faceplate. A well-cared-for FT-101 will still have this clear plastic front. Years later, vendors offered [plastic covers](#) to further protect your FT-101 radio and accessories.

Because critical circuit designs were kept to a manageable size, hams had no problem in offering circuit changes, isolating and repairing problems. This knowledge base was so active that in January 1972, Milton Lowens WA2AOQ, founded the International Fox Tango Club and the Fox Tango Newsletter. The Fox Tango Newsletters were published for 14 years covering the early FT-101's thru the latest Yaesu Transceivers in 1985. By then, surface mount technology and circuit complexity outpaced many ham's ability to maintain this level of equipment. In doing so, new chapters in circuit densities, solid state transmitters, and LSI chips were born, which closed the door (and the covers) to many radios forever.

## FT-101 Advertised Features

- Built-in AC and DC power supplies.
- True RF Speech Processor.
- Solid state VFO, 1kHz resolution.
- Modulation modes - USB, LSB, CW, AM.
- Built-in, adjustable, VOX.
- Adjustable CW Side tone.
- Selectable 25kHz and 100kHz calibrator/marker.
- RIT control +/- 5kHz range.
- WWV reception for time and fine frequency calibration.
- Built-in speaker.
- Eight pole SSB filter. AM or CW filter optional.
- Complete line of station accessories providing 160M thru 2M coverage.

## General FT-101 Specifications

Frequency Range: 3.5-30 MHz\* (80/40/20/15/10 meters)  
27.0-27.5 MHz (11/AUX)  
10.0-10.5 MHz (WWV receive only)  
\* 160 meters included with B/E/F Series

Modes: USB, LSB, CW, AM

Power Input: SSB 260 watts PEP DC Input (130 watts output)  
CW 180 watts PEP DC Input ( 90 watts output)  
AM 80 watts PEP DC Input ( 40 watts output)

TX Freq Response: 300 Hz - 2700 Hz  
RX Freq Response: 300 Hz - 2400 Hz Standard Yaesu SSB Filter  
500 Hz Optional Yaesu CW Filter

Optional Filters: 300 Hz - 1800 Hz SSB Narrow(Fox Tango Filter)  
250 Hz CW Narrow (Fox Tango Filter)

Audio Output: 3 watts  
AC Power: Rx 35 watts, Tx 300 watts  
DC Power: Rx 0.5 amps, Tx 20.0 amps  
Weight: 35 lbs  
Size: 6"h x 13-1/2"w x 11-1/2"d

## A "Complete" Station

Arguments arise when hams talk about a "complete" FT-101 station. Let's set the record straight. Based upon the [Yaesu Service Manual](#) "Accessories", a complete FT-101 station will have the following:

- FT-101 Transceiver or FL-101/FR-101 Twins
- FV-101 Remote VFO
- FL-2100 Linear Amplifier
- SP-101PB Phone Patch with Speaker or SP-101 Speaker-only
- YO-100 or YO-101 Monitor Scope
- YC-601 or YC-601B Digital Display Unit
- FTV-250 2 Meter Transverter
- FTV-650 6 Meter Transverter
- YP-150 Dummy Load / Watt Meter
- YD-844 Dynamic Desk Microphone
- QTR-24 World Clock

This rounds out the field, and is supported in the Yaesu Manuals and advertising in QST. There may be other items

made by Yaesu during this period, but no mention is made in any of the FT-101 service manuals or documentation. Yaesu Service Manual pages 1-31 thru 1-39 cover the above items as Accessories. Options included: CW Filter, Fan, Mobile Mounting Bracket, etc.

## Station Accessories

Yaesu made an entire suite of accessories to complement any FT-101 operator's station. Each accessory has been thoroughly crafted and integrated to extend any operating capability. Adding station accessories allows complete band coverage from 160 meters on HF through 2 meters (USB, LSB, CW, AM). Here is a list of each accessory, description, and specifications.

### FL-2100B/F/Z Linear Amplifier

| [FL-2100 Hook-up diagram](#) | [FL-2100 Schematic A](#) | [FL-2100 Schematic B](#) | [FL-2100 Transformer Wiring](#) |

The FL-2100B/F/Z is a conservatively rated matching amplifier for the FT-101 series. The amplifier features two rugged 572B carbon plate tubes in a Class B grounded-grid circuit with individually tuned input coils for each band. The FL-2100B/F/Z operates with dual cooling fans and a solid state power supply. Dual interlocks offer safety and shock protection. An automatic changeover circuit biases the tube to cut-off on receive to maximize tube life and minimize heat. A bifilar wound, ferrite chokes ensure minimum RF transfer to the power source. Conservatively rated at 1200 watts PEP input power on 80 through 10 meters. Dual illuminated front panel meters provide continuous monitoring of plate current, voltage, relative output, and SWR. A "standby" switch allows the amplifier to be bypassed with primary power enabled and tubes fully heated for operation. Connections to the FT-101 transceiver include TX/RX relay control and ALC control voltages. Such control lines are typical for all FT-101 accessories. There were three FL2100 models produced: FL2100B, FL2100F, and FL2100Z. The FL2100 B and F models cover 80-10 meters, the Z model includes 160 and WARC bands.

### FL-2000B/F/Z Specifications:

Frequency Range\*: 3.5-4 MHz, 7.0-7.5 MHz, 14.0-14.5 MHz, 21.0-21.5 MHz, 28.0-29.9 MHz.

\* The FL2100Z covers 160 Meter Band 1.8-2.0 MHz, 18 MHz, and 24 MHz WARC bands.

Plate Input Power: 1200 watts PEP on SSB, 800 watts on CW, and 600 watts AM.

Drive Requirements: 30 to 100 watts.

Input Impedance: 50 Ohms, unbalanced.

Output Impedance: 50 Ohms, unbalanced, SWR less than 2:1.

Distortion Products: -30dB at 1200 watts input.

Noise Level: 40 dB below single tone carrier.

Circuitry: A pair of 572B in grounded grid, class B.

Warm-up: Less than 10-seconds.

Power Requirements: 100/110/117 VAC at 18 amps. 200/220/234 VAC at 9 amps.

Size: 6"h x 13-1/2"w x 11-1/2"d

Weight: 41 lbs

### **FV-101B External VFO**

Adding the FV-101B External VFO to your station opens up a new world of operating flexibility. DX'ers will really appreciate this combination. The FV-101B features the same factory sealed, solid state, 1kHz resolution, VFO that is found inside the FT-101 transceiver. This flexibility allows for "split" operation for separate transmit and receive frequencies in any band. Regardless of VFO mode, the exact transmit and receive frequency are available for the Digital Display (YC-601 or DD-1) unit. Please note that any frequency split occurs within the same band. The Remote VFO does not offer cross-band operation. Four VFO modes are supported:

1. Transmit and Receive from Main VFO (normal mode)
2. Transmit from Main VFO, Receive from Remote VFO
3. Transmit from Remote VFO, Receive from Main VFO
4. Transmit and Receive from Remote VFO

### **FV-101B Specifications:**

Frequency Range: 8.7 to 9.2 MHz (500kHz tuning range)

Frequency Stability: Within 100 Hz in any 30 minute period after warm-up

Power Source: Remote VFO Connection on the rear of the FT-101 transceiver

Size: 6"h x 8-1/4"w x 11-1/4"d

Weight: 7-1/2 lbs

## **YO-100 / YO-101 Monitor Scope**

| [YO-100 Schematic A](#) | [YO-100 Schematic B](#) |

Adding the YO-100 Monitor Scope allows you to monitor and adjust your transmitter for the cleanest signal possible. Compatible with virtually any transmitter or transceiver, the Station Monitor features a wide range of inputs for all mode monitoring, even RTTY. A built-in 1500 Hz and 1900 Hz tone generators adds to the versatility of this accessory. The two-tone generator generates the proper audio signals to perform "trapezoidal" pattern testing for transmitter linearity. A full complement of front controls allows operator control of all key adjustments. The YO-101 is a solid state version of the YO-100.

### YO-100 / YO-101 Monitor Scope Specifications:

#### Vertical Trace Performance

Sensitivity: 200 mV P-P/cm

Frequency Response: Direct 10Hz to 60MHz

#### Horizontal Trace Performance

Sensitivity: 300 mV/cm

Frequency Response: 10Hz to 16kHz

Sweep Frequency: 10 Hz to 10 kHz

#### Two-Tone Generator Performance

Frequency: 1500 Hz and 1900 Hz, Independently selectable

Output Level: 50 mV

Power Requirements: 100/110/117/200/220/234 VAC 50/60 Hz

Size: 6"h x 8-1/4"w x 11"d

Weight: 13 lbs

## **YD-844 Dynamic Base Microphone**

## | [YD-844 Hookup](#) |

The YD-844 is an attractive and functional necessity for serious base-station operation. The unit is made of heavy cast metal which rests solidly at your operating position. The microphone element is dynamic (voice-coil) and is balanced (output levels and impedances) for use with the FT-101 transceiver. Two PPT (push to talk) buttons are available on the YD-844 microphone. One button is a momentary-switch which must be depressed to activate the PTT relay, the second button has a lock feature which allows hands-free operating (while still transmitting via PTT). The microphone element is always connected to the FT-101 so that VOX operations are available without depressing any microphone PTT buttons. The FT-101 transceiver has three transmit options: 1-MOX (Manually Operated transmitter), 2-PPT (Push To Talk), and 3-VOX (Voice Operated Transmitter). These three options are available on the front panel of the FT-101 Transceiver via toggle switch. The YD-844 is available in both high and low impedances. The microphone cord is a 3' coiled, 4 conductor (one shielded) cable terminating into a 4-pin female connector.

### YD-844 Specifications:

Impedance: 500 Ohms at 1kHz, or 50k Ohms at 1kHz

Output: 50mV nominal

Frequency Response: 50Hz-10kHz nominal

Directivity: Uni-directional

Size: 9"h x 3"w x 6"d

Weight: 1-3/4 lbs

## **QTR-24 World Clock**

### [QTR-24](#)

The QTR-24 World Clock is a 12 and 24 hour format clock. The standard clock movement (hours, minutes, seconds) is represented in a classical 12-hour format. An outer ring depicts time in a 24-hour format. The first 12 hours are shown in white to depict daylight and the other 12 hours in black depict night. The outer-most perimeter of the clock face has the names of 70 major cities throughout the world in each of the 24 global time zones. As the 24-hour ring passes a group of cities, you can easily see their UTC and a day/night indication. The QTR-24 has three adjustments on the rear. One for time (basic movement adjustments), one for the 24-hour ring, and one for fine-time

adjustment. The QTR-24 can be adjusted to be accurate within  $\pm 10$  seconds per month.

The current name and format for world time is called Universal Time Coordinate (UTC). It has also been known over the past years as Greenwich Mean Time (GMT), and the military term ZULU (Z). World time is represented in a 24-hour format based upon the global starting point in Greenwich, England (UK). The UTC time standard does not adjust for Daylight Savings Time.

Accurate time reception can be found by tuning to WWV/WWVH (10.000MHz) or CHU (7.335) on the FT-101 transceiver. Alternate HF/shortwave frequencies for WWV/WWVH are 2.500, 5.000, 10.000, 15.000, and 20.000 MHz. All time formats are AM broadcasts. The WWV (male voice) originates from Ft. Collins, Colorado (USA). The WWVH (female voice) originates from Kauai, Hawaii (USA). The ultra-high accuracy of the WWV 10.000MHz signal is also used to calibrate the FT-101 internal marker located on the Regulator Board (TC<sub>1</sub>). Radio station CHU in Ottawa, Ontario (Canada) can be found on 3.330, 7.335, and 14.670 MHz.

**Setting up your QTR-24 Clock.** Using the internet, go to [time.is](http://time.is), set your QTR-24 clock to your local time (rear knob adjustment), and rotate the white 24-hour bezel ring (rear knob adjustment) so that the top agrees with the 24-hour value for London/Greenwich Time. See the [image](#) of the QTR-24 which depicts a local time of 08:38:45am local, and a GMT time between 13 and 14 hours. Additionally, my time zone is the same as New York. The 24-hour bezel depicts between 8am and 9am (in white) UTC. The QTR-24 is properly set.

Allow the QTR-24 to run for a few days. The speed of the clock may be adjusted via flat blade screwdriver. Clockwise one tick mark to advance the device 5-seconds per day, Counter-Clockwise to retard the clock 5-seconds per day.

QTR-24 Specifications:

Time Format: 12 and 24 hour formats

Accuracy: Continuously adjustable,  $\pm 10$  sec/month, nominal

Power: 1.5V, single C-cell battery, replace yearly

Internal Movement: Oscillating spring wheel

External Movement: Hours, minutes, seconds, 24 hour ring day/night indication

Construction: Black plastic frame, glass face with chrome trim

Mounting: Wall mount or desktop with tilt-bail

Size: 6" diameter, 2-1/2" deep

Weight: 1 lb

## **YP-150 Dummy Load / Watt Meter**

| [YP-150 Schematic](#) |

The YP-150 is a 50 Ohm dummy load with a built-in RF watt meter. This unit provides a 50 Ohm resistive load to any transmitter operating from 1.8MHz thru 200MHz. A single PL-259 plug on the rear panel provides the unbalanced input to this unit. The YP-150 is powered by a 117V AC source to run an internal cooling fan to remove heat from the 50 Ohm non-inductive load. Although YP-150 is powered, the front panel meter is not illuminated. A four-position switch allows accurate RF power measurements from 0-6 watts, 0-30 watts, and 0-150 watts. The fourth position is the OFF position which removes power to the fan and disconnects the power measuring unit. The YP-601 can be operated without AC power, but this practice is not recommended, as excessive heat can damage the resistive load. There is no provision for an RF "bypass", therefore this unit is best suited for bench testing and alignment procedures.

### YP-150 Specifications:

Frequency Range: 1.8MHz to 200MHz

Power Scales: 0-6 watts, 0-30 watts, 0-150 watts

SWR: Less than 1.2:1 at 145MHz

Accuracy: Better than 10% of maximum scale

Meter: Logarithmic scale, non-illuminated

Connection: Single PL-259, unbalanced

Power: 117V AC for internal cooling fan

Size: 6"h x 4-1/2"w x 11"d

Weight: 7.0 lbs

## **SP-101 External Speaker and SP-101PB External Speaker and Phone Patch**

| [SP-101PB Hook-up diagram](#) | [SP-101SP Schematic](#) |

The Yaesu SP-101 and SP-101PB provide audio fidelity that is unmatched by the internal speakers found in most conventional HF transceivers. Although all of the FT-101 series of transceivers have internal speakers (some early radios did NOT have speakers!), the SP-101 External Speaker provides an audio fidelity and presence which cannot be matched with a small 3" internal speaker. The SP-101 internal speaker uses the entire speaker enclosure to produce pleasing tonal qualities needed for the reception of rich AM, sharp SSB, and narrow CW. There are no audio filters in the SP-101 to change the audio properties originating from the FT-101. Connection to the SP-101 is with shielded RCA connectors. It is strongly suggested that small diameter coax or highly shielded audio be used to ensure shielding from the transceiver to the remote speaker. The SP (speaker output) jack on the FT-101 has some RF suppression, and is one of the first places to look for feedback and hum especially at kW levels during transmit.

The SP-101PB contains all of the excellent audio properties and characteristics as the SP-101 speaker-only model with the addition of a hybrid telephone-patch circuit. This circuit allows the FT-101 transceiver to be interconnected to your telephone circuit to allow telephone calls to be placed with over-the-air stations. The SP-101PB has two level controls to ensure proper audio levels are presented to the telephone lines. A built-in VU-meter is used monitor the phone-input levels. Connection to the telephone line is via (two-wire) twisted pair (normally red and green wires).

**NOTE:** When using the phone patch, you are engaging in third-party traffic in which you are the control operator. The US does not have 100% third-party traffic agreements with all countries. Example: I was unable to make a phone patch for a ham on a small sailboat on vacation in the Bahamas/C6 to their parents living 3 miles from my house! The US does not have third-party traffic agreements with the Bahamas. Beware!

SP-101 and SP-101PB Specifications:

Speaker Impedance: 4 Ohms

Speaker Size: 4" x 6"

Audio Power: 3 Watts RMS

Patch Input: 4 Ohms, 600 Ohms (RCA, Shielded)

Patch Output: 600 Ohms, 50K Ohms (RCA, Shielded)

Telephone Connection: Unshielded Twisted-Pair (UTP), Red-Green or Black-Yellow pairs

Patch Performance: 300-4000Hz, 600 Ohms balanced, complies with FCC Part 68.

Size: 6"h x 8-1/4"w x 11-1/4"d

Weight: 13-1/4 lbs

## YC-601 Digital Display

| [YC-601 Hookup Diagram](#) |

The YC-601 is a 6-digit frequency display- not a frequency counter. It was not until the later release of the YC-601B that the unit actually performed real frequency counting thru 35 MHz. The YC-601 base unit would simply measure the 500kHz sweep of the internal VFO (8700kHz - 9200kHz) and display the 100kHz, 10kHz, 1kHz, and 100Hz of the tuned VFO frequency. The MHz portion of the display was simply a diode matrix that the user had to select via front panel. This is why you see a band selector on the front. There was also a 4kHz shift between USB and LSB as the FT-101 had this amount of oscillator offset within the unit between modes. The YC-601 had green display tubes. The YC-601B had red display tubes, and the tell-tale front BNC input connector. A popular equivalent for the Yaesu YC-601 was the DD-1 made by Spectronics Inc. Both were functionally equivalent and shared a similar paint scheme and look and feel.

### YC-601 Specifications:

Display: 1.5MHz - 30.0 MHz

YC-601 Input Frequency: 8700 kHz - 9200 kHz

YC-601B Input Frequency: 8700 kHz - 9200 kHz & 35MHz Counter

Digits: Six (6)

Bands: 160M,80M,40M,30M/10MHz,20M,15M,11M,10M

Power: 110VAC - 240VAC, internally set

Size: 3-1/4"h x 8-3/4"w x 9-1/4"d

Weight: 5 lbs

## FTV-250 2 Meter Transverter

| [FTV-250 Hookup Diagram](#) |

The FTV-250 is a 100% solid state 2M transverter designed to be used with any of the FT-101 HF transceivers to

extend its operating capability to include the 2M amateur band. The FTV-250 "transverts" signals to/from the 144-146 MHz or 146-148 MHz frequency segments to the FT-101's 10M band (A, B, C, D positions). This amount of translation is required as the 2M band is 4 MHz wide, and any band on the FT-101 is only 500 kHz (0.5 MHz) wide.

The four (4) 10M band positions on the FT-101 (A,B,C,D) and the two (2) 2M band positions on the FTV-250 yield eight (8) segments of 500 kHz, equaling 4 MHz total spectrum (144 Mhz - 148 MHz). Both units have to be tuned simultaneously for maximum performance. The FTV-250 achieves this broad 4MHz tuning by employing varactor tuning diodes. These diodes change capacitance by varying the voltage across them. This is the purpose of the TUNE knob on the FTV-250. This voltage-tuned RF circuitry was unprecedented in the Amateur market and is an example of Yaesu's commitment to performance and reliability.

The FTV-250 has a self-contained power supply providing all of the internal voltages required for high performance operation. There is a 2-stage RF Power Amplifier which provides approximately 12 watts PEP RF output (20W DC input) in linear service. Users found this power level attractive as many external amplifiers were available (10W in, 160W out), with and without low-noise pre-amps.

Interconnection to the FTV-250 transverter is done thru a series of cables. These cables provide signaling and control between the units. Please note that the voltages which appear on the interface cable include: 12.6V, 100V, +150V, +300V, and +600V! Always ensure that the FTV-250 interface cable is in perfect condition due to the high voltages present. Shielded coax provides low-level 10M RF (28MHz - 30Mhz) signals required for the 2M/10M translation. When the FTV-250 2M transverter is turned ON, it cuts the filament voltage to the FT-101's 100W Power Amplifier so that it cannot be energized. The FTV-250 transverter has the extra connectors on the back to add the FTV-650 6M transverter. The 2M and 6M transverters can be daisy-chained together. Therefore, the FTV-250 can serve as the middle-unit, while the FTV-650 is an end-unit only. Do not lose or misplace the FT-101 ACC Plug!

The 10M-2M frequency translation is as follows: Supposed you want to QSO on the 144.200 USB National Calling frequency in the USA. This frequency is in the bottom 500 kHz segment of the 2M band. The FT-101 is set to 10A and the main VFO is tuned to 28.200 MHz. The FTV-250 is set to 144-146. The resulting 28.200 USB signal is linearly translated to 144.200 MHz. Upon receive, the 144.200 MHz is linearly translated back to 28.200 MHz. Metering on both units allow alignment within 10 seconds. Once aligned, e.g. 144.200 USB, you can easily move  $\pm$

50kHz (100kHz total) without re-adjustment. Perfect for calling CQ, rag-chewing, or contesting.

FM and Repeater operation: The FT-101 does not have FM as an operating mode. The modes available are: AM, USB, LSB, and CW. Therefore, it cannot transceive FM signals, so FM operation is moot. Additionally, repeater operation uses a 600 kHz frequency offset, while the FT-101 only has a 500 kHz per band segment. Therefore, repeater operation is not possible even with the Yaesu Remote VFO (FV-101B).

#### FTV-250 Specifications:

Frequency Range: 144.0-146.0 MHz, 146.0-148.0 MHz

Intermediate Frequency: 28.0 MHz - 30.0 MHz

Sensitivity: Better than 0.5uV for 20 dB SNR SSB

Modes: USB, LSB, CW, AM

RF Power Output: 12W PEP , 20W DC Input

Connection: Single PL-259, unbalanced

Power: 100-240VAC 50/60Hz, 12VDC@3amps

Size: 6"h x 4-1/2"w x 11"d

Weight: 7.0 lbs

#### FTV-650 6 Meter Transverter

| [FTV-650 Hook-up diagram](#) | [FTV-650 Schematic A](#) | [FTV-650 Schematic B](#) |

The FTV-650 is a hybrid 6M transverter designed to be used with any of the FT-101 HF transceivers to extend its operating capability to include the 6M amateur band. The FTV-650 "transverts" signals to/from the 50-52 MHz or 52-54 MHz frequency segments to the FT-101's 10M band (A, B, C, D positions). This amount of translation is required as the 6M band is 4 MHz wide, and any band on the FT-101 is only 500 kHz (0.5 MHz) wide.

The four (4) 10M band positions on the FT-101 (A,B,C,D) and the two (2) 6M band positions on the FTV-650 yield eight (8) segments of 500 kHz, equaling 4 MHz total spectrum (50 Mhz - 54 MHz). Both units have to be tuned simultaneously for maximum performance.

The FTV-650 has no internal power supply. All required voltages come from the attached FT-101 host. Please note

that the voltages which appear on the interface cable include: 12.6V, 100V, +150V, +300V, and +600V! Always ensure that the FTV-650 interface cable is in perfect condition due to the high voltages present. If the FT-101 is powered on, these voltages are present!

The FTV-650 employs a single tube RF Power Amplifier (6146B/S2001) which provides approximately 25 watts PEP RF output in linear service. Users have found this power level attractive for barefoot operation as well as with an external amplifier.

Interconnection to the FTV-650 transverter is done thru a series of cables. These cables provide voltages and control between the units. Shielded coax provides low-level 10M RF (28MHz - 30MHz) signals required for the 6M/10M translation. When the FTV-650 6M transverter is turned ON, it cuts the 12.6 filament voltage to the FT-101's 100W Power Amplifier so that it cannot be energized. The FTV-250 2M and FTV-650 6M transverters can be daisy-chained together. The FTV-250 can serve as a middle-unit, while the FTV-650 is an end-unit only. Do not lose or misplace the FT-101 ACC Plug!

The 10M-6M frequency translation is as follows: Supposed you want to QSO on the 50.125 USB National Calling frequency in the USA. This frequency is in the bottom 500 kHz segment of the 6M band. The FT-101 is set to 10A and the main VFO is tuned to 28.125 MHz. The FTV-650 is set to 50-52 MHz. The resulting 28.125 USB signal is linearly translated to 50.125 MHz. Upon receive, the 50.125 MHz is linearly translated back to 28.125 MHz. Metering on both units allow alignment within 10 seconds. Once aligned, e.g. 50.125 USB, you can easily move  $\pm 50$ kHz (100kHz total) without re-adjustment. Perfect for calling CQ, rag-chewing, or contesting.

FM and Repeater operation: The FT-101 does not have FM as an operating mode. The modes available are: AM, USB, LSB, and CW. Therefore, it cannot transceive FM signals, so FM operation is moot. Additionally, 6M repeater operation typically use a 1MHz frequency offset, while the FT-101 only has a 500 kHz per band segment. Therefore, repeater operation is not possible even with the Yaesu Remote VFO (FV-101B).

#### FTV-650 Specifications:

Frequency Range: 50.0-52.0 MHz, 52.0-54.0 MHz

Intermediate Frequency: 28.0 MHz - 30.0 MHz

Sensitivity: Better than 0.5uV for 10 dB SNR SSB

Modes: USB, LSB, CW, AM

RF Power Output: 25W PEP, 50W DC Input

Tubes: Single 12BY7A (pre-driver), Single 6146B/S2001 (PA)

Connection: Single PL-259, unbalanced

Power: Provided by FT-101 (12.6V, 100V, +150V, +300V, and +600V)

Size: 6"h x 4-1/2"w x 11"d

Weight: 7.0 lbs

## MMB-1 Mobile Mounting Bracket

| [Image](#) | [Assembly Instructions](#) |

The MMB-1 Mobile Mounting Bracket was a factory accessory for the FT-101 series radios. It was a sturdy steel tray designed to hold a FT-101 securely for mobile operation. The MMB-1 straddled the transmission "hump" found in cars during the period. The tray has four detents to accept the four feet found on the bottom of the FT-101 transceiver. A strap secured the transceiver to the tray. The only change required to the FT-101 during mobile operation using DC electrical power was the adjustment of the tube bias to 60ma idle current.

Yaesu advertisements in [QST](#) hinted at mobile and portable operation, but never a clear photo of how to do it or show one in actual operation. The vehicle in the advertisement appears to be a 1972 Land Rover Series-3. There is no front seat room in this vehicle to mount a FT-101 on the "hump". The practicality of mounting a 30+ lbs radio in a vehicle is nil. Therefore, the idea of mobile operation was short lived. Here is an [example](#) from 1967 in a 1967 Dodge Dart. Five years later, hump-mount mobile operation was almost impossible to do. Center consoles, heat ducts, and vehicle accessories consumed this space forever. The MMB-1 may be the rarest of all FT-101 parts/accessories in the FT-101 lineup. So few were ever made, the practicality was zero, and 40 years have passed. The assembly instructions above are the only known copy to exist- including the typographical error.

## MMB-1 Specifications:

Size: 3/4"h x 13-1/2"w x 11-1/2"d

Weight: 3 lbs

Surface: 18 gauge, unpainted steel

## FT-101 Original Prices

So how much did it cost? Here are some prices from QST during the 1970's for each of the FT-101 transceivers and associated accessories. It is difficult to accurately depict prices for each and every month spanning 9+ years. Even with this data, there are dealers offering close-out prices which can be \$100-\$125 under other dealers who wish to continue selling the product line. In some cases the "list" prices are advertised with the note to "call for best price", making it extremely difficult to accurately gauge exact prices. Prices marked with an asterisk (\*) denote a close out price or inventory reducing price. Normally prices will vary only a few dollars between dealers in the same issue. More sources and lists will follow- as I find the QST issues for the 1970's.

Model	Item Description	Price Q3/71	Price Q3/72	Price Q3/73	Price Q3/74	Price Q3/75	Price Q3/76	Price Q3/77	Price Q3/78	Price Q3/79	Price Q3/80
FRdx400	80M-10M All Tube Receiver	\$359			\$339						
FRdx400SD	80M-10M+6M+2M All Tube Receiver				\$399						
FLdx400	80M-10M All Tube Transmitter	\$299									
FRdx401	80M-10M All Tube Receiver										
FLdx401	80M-10M All Tube Transmitter										
FTdx401B	80M-10M All Tube Transceiver				\$599						
FTdx560	80M-10M All Tube Transceiver	\$450									
FTdx570	80M-10M All Tube Transceiver		\$550								
FL2000	80M-10M Linear for dx Series	\$299			\$339						
FT-101	80M-10M Transceiver	\$499	\$560								
FT-101B	160M-10M Transceiver										
FT-101E	160M-10M Transceiver				\$649			\$729	\$799	\$695*	
FT-101EE	160M-10M Transceiver							\$649	\$759		
FT-101EX	160M-10M Transceiver							\$589	\$699		
FT-101ES	160M-10M Transceiver(50 watt version for Japan market)										
FT-101F	160M-10M Transceiver								\$799		
FT-101FE	160M-10M Transceiver								\$759		
FT-101FX	160M-10M Transceiver								\$699		
FT-101Z	160M-10M Transceiver								\$749		\$599*

FT-101ZD	160M-10M Digital Transceiver				\$895	\$749
FT-101ZD	160M-10M Digital Transceiver (WARC)					\$799
FT-901D	160M-10M Digital Transceiver (WARC)			\$1299		
FT-901DE	160M-10M Digital Transceiver (WARC)			\$1149		
FT-901DM	160M-10M Digital Transceiver (WARC)			\$1299	\$1459	
FL-2100B	Linear Amplifier 80M-10M	\$339	\$399	\$479		
FL-2100F	Linear Amplifier 80M-10M				\$399*	
FL-2100Z	Linear Amplifier 160M-10M			\$399*		
FV-101B	Remote VFO	\$99	\$109	\$135	\$116	
SP-101	Speaker-Only	\$19	\$22	\$25		\$22*
SP-101PB	Speaker with Telephone Patch	\$59	\$59	\$67	\$57	
FTV-650	6 Meter Transverter	\$149	\$199	\$235		
FTV-250	2 Meter Transverter		\$199	\$275		\$225*
YC-601	Digital Display (Yaesu)		\$169	\$199	\$205	
YO-100	Station Monitor Scope (Tube Model)		\$199	\$233	\$240	
YO-101	Station Monitor Scope (Solid State)			\$320		\$199*
FR-101	Analog Receiver 160M-2M		\$489			
FR-101	Digital Receiver 160M-2M		\$599	\$599	\$549	
FR-101S	Analog Receiver 160M-2M			\$599	\$449	\$349*
FR-101SD	Digital Receiver 160M-2M			\$749		
FL-101	160M-10M Transmitter		\$525	\$575	\$499	\$399*
YP-150	Dummy Load - Watt Meter			\$86	\$78	\$79*
RFP-101	Speech Processor		\$79	\$79		
YD-844	Base Station Microphone	\$29	\$29	\$29		
YD-846	Hand Microphone		\$16	\$16		
QTR-24	World Clock		\$30	\$35		\$29*
FA-9	Fan	\$19	\$15	\$20		
MMB-1	Mobile Mount for FT Series	\$19	\$19	\$23		
XF-30C	CW Filter 500 Hz	\$45	\$40	\$40		
XF-30B	AM Filter 6kHz			\$40		
DC-1	DC Converter for EX Models		\$45	\$50		
Crystals	Any FT-101 Crystal 160M-10M	\$5	\$5	\$5		
DD-1	Digital Display (Spectronics Model)	\$169	\$169			

\* - Indicates Advertisers offering "close-out" prices to reduce stock.

# 6JS6C Tubes

The 6JS6C tube is a TV Deflection Tube, or "Sweep Tube". Although not meant for transmitting, it exhibits sufficient performance for RF operation through 30 MHz. Each tube can dissipate 30 watts of plate power. The base is a 12-pin socket.

[6JS6C Diagram](#)

[Full 6JS6C Specification Sheet](#)

There will come a time when the finals in your FT101E will need replacing. The FT-101 transceivers were originally equipped with 6JS6C tubes manufactured by NEC and Toshiba. Other manufacturers tube properties are slightly different from the original 6JS6C tubes. Therefore, a simple modification to the neutralization circuit must be made to the final section of the transceiver. The modification consists of replacing the fixed value 100 pf 1000 VDC mica capacitor with a 10 pf 1000 VDC mica capacitor. This capacitor, C125, is in series with the 10 pf variable neutralizing capacitor off of the plate circuit.

[Schematic of FT-101 Power Amplifier Circuit](#)

If this modification has not already been completed on your rig, be sure to use a mica or silver mica of at least 1000 VDC. Do not substitute a different type because the heat in the final compartment will change the value, and your tubes will fail prematurely. Also, be very careful to keep all leads short and in exactly the same orientation as the original capacitor.

Before re-neutralizing, open the variable neutralizing capacitor all the way to minimum engagement and follow the neutralizing instructions in the manual. While dipping the PLATE, remember to adjust the neutralizing capacitor for equal value meter reading "dips" (Ic meter position) on both sides of the peak when tuning the PLATE control. **WARNING!** You are tuning a capacitor in the High Voltage compartment, +600 Volts are present! Always use non-metallic tuning tools. After neutralization, reset the bias to [60ma](#) with CARRIER and MIC settings at minimum.

# QST / 73 / CQ Magazine Articles

**QST-** The following performance data is provided by the American Radio Relay League (ARRL) and their publication QST. A full copy of this table was found on the Technical Information Service section on the ARRL web page. The table depicted over 60 radios and their performance data. I have shown only the Yaesu radios from the 1970's that apply to this web page.

Rig	QST Review Issue	QST Reviews of Amateur HF Transceivers									
		Harm. dBpep	Xmtr Spurs dBpep	IMD dBpep	Min Sig dBm	Rcvr BlkRng dB	IMD dB	DR	3rd0 dBm	Icpt	
-----											
Yaesu:											
FT-101B	02/74										
FT-101E	09/76			-34	-141	108	81				
FT-101Z	12/79	-45		-38	-139	112	78		-22		
FT-301	10/77	-55	-68	-40	-133	100	75				
FT-901	11/78	-46	-57	-38	-137	114	85				

Introduction of the original FT-101, QST Jan 1971: [Page 147](#). This is the very first time we see the FT-101!  
 QST Review: FT-101B, Sep 1974: [Page 46](#), [Page 47](#), [Page 48](#). A complete 3-page QST review of the B-model.  
 QST Review: FT-101E, Feb 1976: [Page 38](#). A 1-page QST update on the E-model.

Misc Station Photos: [Nice Station Photo #1](#), [Nice Station Photo #2](#), [Nice Station Photo #3](#), [Nice Station Photo #4](#), [Nice Station Photo #5](#)

## Quick Tune-up Procedures

If you have ever purchased a FT-101 transceiver without the Instruction Manual, you know it can be very intimidating to operate until you perform the tune-up process a time or two. Without 'tuning up' your transmitted and received signals really suffer AND could actually damage the tubes in the power amplifier. I always suggest that you download

the Instruction Manual for any FT-101 radio or accessory you own. Even older radios have web pages that can provide you copies at very reasonable rates. An Instruction Manual was made for each and every FT-101 radio and accessory. These are free across the Internet. Even the FT-101 Service Manual is available (32MB PDF). See the FT-101 Repair Facilities section on this page for the link. No excuses!

The FT-101 series is a very mechanical radio. The size, selection, and operation of this rig allow for very high-Q circuit tuning. It is a very strong point with the FT-101 series. As with any high-Q circuit, it must be continuously tuned for maximum efficiency. Once learned, it takes only a few seconds to perform. You should re-tune anytime you change bands, change antennas, or move a significant distance (in frequency) from where you last tuned up. This may be as large as 200 kHz on the 10 meter band (10-15 turns of the VFO dial) or as little as 15 kHz on the 160 meter band (one turn of the VFO dial).

Before you begin, you should allow the rig to warm up (with the heaters on) for at least 15 minutes. This allows the rig to become frequency and temperature stable. Put the Meter switch into the 'IC' position with the CARRIER and MIC control fully counter-clockwise. Throw the MOX switch to engage the transmitter and read the meter that is now displaying the idling current. The current should read 60ma on the scale. If it does not, adjust the BIAS control until 60ma is obtained. Move the Meter switch to ALC and ensure a full meter deflection to the right. Adjust the ALC control as needed. Return the MOX switch to normal PTT.

Please remember to tune-up into a well-matched antenna system or dummy load representing a 50 Ohm load. Keep all tune-up steps to under 10 seconds of transmitting to prevent damage to the Power Amplifier tubes! After each 10 second transmission, allow the tubes to cool for 10 seconds. Then repeat. Do not exceed this 50% duty cycle. The tubes can only dissipate 30 watts each! You can put heat into the tubes faster than they can dissipate that heat!

The earlier FT-101 manuals used a tune-up procedure which 'peaked' the output (PO) while 'dipping' the grid (Ic) current. By the FT-101F series, the procedure was simply a 'peaking' (PO) process as depicted in the Instruction Manual. With a little practice, you will be able to perform these procedures within 10 seconds. Really!

Tune-Up Procedure for SSB, CW, and AM:

- After a 15 minute warm-up, and Idle Current confirmed at 60 ma:
  - Select the band and general operating frequency to be used.
  - Place the Meter switch in the Power Out (PO) position.
  - Rotate the PRESELECTOR for maximum receiver noise/signal output.
  - Place the CARRIER control to position 4 and MIC control to minimum.
  - Momentarily engage the MOX or PTT transmitter control for a maximum of 10 seconds.
  - Adjust the PRESELECTOR, TUNE, and PLATE controls for maximum meter deflection.
  - Disengage the MOX or PTT transmitter control and allow the rig cool for 10 seconds.
  - Increase the CARRIER control two units and repeat.
- NOTE: If using AM, peak the CARRIER for 30 watts maximum, then increase the LOAD control one unit. The PO meter will deflect slightly on voice peaks.

Adjust CARRIER, MIC, and PROCESS controls for the proper output as desired. Monitor the Meter for grid current (Ic) and ALC levels (ALC) to ensure that you are not over-driving the transmitter. Both will greatly shorten tube life, cause distorted transmitted audio, and is the prime source of television interference (TVI).

## AM Operation

One of the most misunderstood and mistuned modes available on the FT-101 transceivers is the AM (Amplitude Modulation) transmitter. (Second only to the RF Speech Processor!) The FT-101 has one of the best on-air signals for AM that you may ever find in a stock radio. It is also one of the easiest to make a mistake. The most common mistake is measuring AM power the same way that you measure SSB or CW signals using a watt meter. AM is very different.

The most common mistake is running too much carrier power in AM mode. The FT-101 can only deliver 30-40 watts of AM carrier in linear service. The reason for this is that an AM signal contains a steady carrier and two sidebands that contain your audio. The amount of RF power in this modulated AM "envelope" is actually 4-times the carrier. This means that a modulated AM signal with a 30-watt carrier is actually transmitting 120 watts of power. This is the amount of power needed from the power supply to transmit this signal. It is also approaching its absolute power limit.

The same is true with the matching FL-2100B amplifier. A 300-watt carrier contains 1200 watts of RF power when fully modulated. There is nothing worse than "cooking" a FT-101 by running AM with a 100 watt carrier. The power supply, tubes, and amplifier components cannot deliver 400 watts of power, are run continuously beyond their maximum rating, and for long periods of time. Beware when purchasing one of these 11 meter 'cooked' radios!

## Alignment Points and Procedures

As you know by now, the FT-101 series of radios are very mechanical. From time to time, they will require basic alignment and calibration. The Yaesu factory knew this and made many of the adjustment points directly accessible under the top cover. Personally, I let the FT-101 warm-up for 2-hours with the heaters on and covers on so that the unit becomes temperature and frequency stable. Never try to align or calibrate a cold rig.

The [FT-101 Service Manual](#) has the most complete description of alignment and calibration information for the FT-101 series. The Service Manual covers all of the models from the original FT-101 thru the FT-101E. Chapter 7 depicts the entire process. There are a few things to remember about the FT-101 radios: 1) They are 40 years old. 2) They are analog radios. 3) They do require alignment from time to time. 4) Parts may be hard or impossible to find. 5) It is a radio without equal!

Be very cautious of cleaners and solvents on this rig. Tuner Cleaner can be used on mechanical switches. Potentiometer Cleaner on all variable resistors. Use Compressed Air on coils and variable capacitors. Whetting these parts and moving them back and forth may actually dissolve that material which provide the resistive function. Residual oils may actually attract more dirt and dust over time. Solvents should NEVER be used!

There are a few terms you need to know about, how to correctly use, and apply them. Please note that there are many WRONG descriptions on the internet including videos on YouTube. Follow them (with respect to the FT-101) and you are going down the path to mistakes and frustration. Let's get started:

**Zero Beat (#1)** This is the term used when the absolute value of a single tone is adjusted to zero. This occurs when you hear the high-pitched FT-101's internal MARKER tone and you adjust the VFO so that the tone goes lower and lower in frequency until it is no longer heard thru the speaker. Since the frequency you hear rolls off at 100Hz (you can

no longer hear the tone), you go just a fraction more to account for the last 100Hz that you cannot hear. The goal is truly zero-Hz. This is how you adjust the VFO to the MARKER when you: Change Bands or Change Modes (eg: USB to LSB, or from CW to USB, etc.). After you Zero Beat the VFO with the MARKER, you rotate the silver frequency wheel to align with the 25kHz or 100kHz multiple. This puts the FT-101's VFO on-frequency. The MARKER is calibrated with WWV. It is your master frequency standard on all bands.

**Zero Beat (#2)** This is a term used when you adjust two tones to be equal with each other. It is like tuning a guitar. It is not finding the average between two single tones as you flip some switch back and forth. When you Zero Beat two simultaneous tones being emitted from the FT-101, you will eventually hear the famous "wow wow wow" as the two tones "beat" against each other. As the tones get closer together in frequency, they become indistinguishable to the human ear- and the wow-wow ceases. You have achieved the Zero Beat process. Here is an audio [example](#) of the process. At the end of the audio clip (25-28 second mark), the tone is steady. These are the tones you will hear when setting the 10 MHz MARKER used to provide the 100 kHz and 25 kHz Markers. You will Zero Beat the WWV radio signal with the FT-101's MARKER. This will provide an accurate internal frequency reference. The goal is to mimic the highly accurate over-the-air 10MHz radio frequency emission from WWV in Colorado. Adjust the MARKER trimmer capacitor with a non-metallic tuning tool. This trimmer capacitor is labeled "MARKER TC1" on the [FT-101 Top Chassis Photo](#).

**WWV** The radio station WWV plays a vital role with the FT-101 series radios. WWV transmits a highly accurate frequency carrier at exactly 10 Mhz. This signal is received by the FT-101 radio tuned to the WWV Band segment and is ultimately used to zero-beat with the internal MARKER frequency to derive accurate frequency calibration. Since WWV transmits like any other radio station, it will not be heard all the time. It may take several attempts to get a strong S7 on the FT-101's meter to perform accurate MARKER calibration. Be patient. This is typical of radio signals in the 30 Meter band, your distance from Ft Collins Colorado, time of day, solar activity, and the effectiveness of your antenna.

## Shipping your Yaesu Radio and Components

**Background:** As a buyer or seller, you need to know the fair market value of shipping so that you can finalize the

exact cost of any deal. There should be no surprises as you hand over the box to be shipped, and no surprises when the box gets opened. The following information will allow for accurate shipping costs, assuming you have weighed the package carefully, for delivery anywhere in the United States or overseas.

**Sizes and Weights:** The sizes and weights for each piece of Yaesu equipment is listed above. None of the Yaesu transceivers or accessories exceed the size and weight limits imposed by any of the major common carriers such as: UPS/FedEX/USPS. Shipping should be a very straightforward process, and with a little planning, your package should arrive in the same condition as it was shipped.

**Estimating Final Weight:** Accept the fact that shipping will add 20%-25% to the actual weight of any unit. Yes, a 30 pound FT-101E transceiver with manual and power cords will actually weigh 38 pounds ready to ship. A two pound YD-844 microphone will weigh 3-4 pounds if packed properly. The heaviest in the series, the FL-2100 amplifier (41 lb.) will tip the scales at 52 pounds at the counter! Don't underestimate the weight of shipping!

**Packing Considerations:** Remember that you are responsible for ensuring that the equipment is packed properly and safely for its journey. The longer the trip the better it must be packed, especially overseas. NEVER use newspaper for any of packing material. It is not resilient to compression, it holds moisture, and will leave ink on painted and plastic surfaces. When possible, use the original Yaesu packing box and materials. Prior to shipping any unit, remove all AC cords, microphones, accessory plugs, and the brass spinner on the main VFO dial. Do not use tape on any plastic or painted surface. Ensure that all covers are on tight. Put the unit in a plastic bag (as a moisture and dust barrier), and then wrap in bubble wrap. Select a box which allows at least 2" on each side to survive a hard "knock" while in transit. Place enough fill to cover 2" in the bottom of the box. Insert the unit and fill completely with packing to the top.

Compute the Shipping Costs



## FT-101 Repair Facilities

Since FT-101 parts are very hard to find, please ask ANY repair facility how they obtain parts. If they simply call the Yaesu factory, you may be sending your FT-101 to the wrong place or waiting a very long time. I prefer to deal with repair facilities that specializes in FT-101 parts, which means in some cases, they must use 'parts rigs' to find that hard to get part. Basic capacitors, resistors, and transistors are not a problem. But, there are times where a substitute is not available. You will be glad that your rig is being repaired by a "FT-101 ready" facility.

### [The Complete FT-101 Service Manual](#)

List of FT-101 repair facilities:

<http://www.certifiedelectronics.org/certifiedelectronics.htm>

#### **FT-101 Transceiver**

More info to follow.....

| [FT-101 AC Power Transformer Connection Diagram](#) | [AC and DC Power Connection and Pin-out Diagram](#) |

## **Credits and Source References**

This web page was created back in late 1997 and posted in January 1998. Back then, web access was thru a 14.4k or 28.8k dial-up modem. The goal was to create a web page that was bandwidth friendly and basic in layout- even for a 14.4k modem. At that time, there were web pages that would scan your web page and offer reduced image resolution and a reduced color pallet (Website Garage). It was a very effective way to reduce bandwidth demands and still get your message out. As a point of reference, the image below is larger in size than all of the text and formatting of this page combined!

Special thanks to the MIT Radio Club W1MX for the use of their extensive technical library. They had every radio publication ever produced for the past 60+ years. Looking back 40+ years is never easy!

73, for now.



AI, NW2M

Or send email to: [NW2M at QSL dot NET](mailto:NW2M@QSL.NET)

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