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The Yaesu FT-90R Dual-Band FM Mobile Transceiver

The Alinco DR-M03SX 10-Meter FM Mobile Transceiver

Mscan SSTV Software

The Yaesu FT-90R Dual-Band FM Mobile Transceiver

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I know you're becoming weary of hearing us drone on about the diminishing size of Amateur Radio transceivers. Tiny full-power handhelds and compact HF and multiband HF/VHF/UHF radios have become pretty common place.

One market segment that seems, at least 'til now, to have escaped this trend towards shrinking dimensions is the FM mobile transceiver. Looking back through product review data tables over the last decade or so reveals that, for the most part, the size of the typical example of this subspecies has remained essentially unchanged. With the majority of these units featuring removable/remote-mountable front panels, some may even question the necessity of further reducing the chassis size at all.

While the physical measurements of the FM mobiles haven't changed much, those of us who prefer direct mounting of the transceiver and faceplate assembly as a single unit are encountering ever-increasing challenges in finding suitable mounting locations in the typical modern vehicle. I like to have the flexibility of using a single mobile radio in a number of applications—at home, in the car or portable for example. Remote mounting can make this a bit of a chore.

The automobile industry—like Mother Nature herself—hates a vacuum. If there's any unutilized interior cabin space, rest assured some engineer will be assigned the task of designing a coin tray, storage compartment or cup-holder to fill the void.

It's a Small World After All

If you've been paying any attention to the advertising for this transceiver, you already know the FT-90R is small. Even still, it's difficult to appreciate just how small it is until you see one "in person."

Let's use the latest edition of the *ARRL Repeater Directory* for a reference. You'll find the FT-90R is about $3/4$-inch wider and $7/16$-inch thicker. The transceiver (not counting the knob projections) is about as deep as the directory is tall. *It's that small*—simply amazing.

For those who are still unable to find a convenient spot on their dashboard or console to bolt in a transceiver even *this* tiny, like its larger siblings, the FT-90R also al-lows remote mounting of the faceplate with an optional "Trunk Mounting" kit.

Under Pressure

Squeeze a radio this hard and something's got to give—*or does it?* Yaesu's done a commendable job of pulling off this size reduction without seriously compromising features, performance or operating convenience.

The FT-90R is a "one-band-at-a-time" VHF/UHF dualbander. It won't receive two signals simultaneously or operate full duplex (Yaesu's got another model in the lineup with these capabilities)—but that's about it for limitations. You get a full 50 W/VHF and 35 W/UHF RF output with four power settings down to 5 W, a total of 186 memories with alphanumeric tagging, direct frequency entry from the microphone keypad, CTCSS and DCS encode *and* decode built in, expanded receive, 1200/9600 bps packet capabilities, eight autodial memories and Yaesu's "*Smart Search*" and "*ARTS*" systems.

The front panel has a black textured finish and carries on the curvy stylized look that has been evident in all of Yaesu's Amateur Radio products since the release of the FT-1000MP. The face of the radio is surprisingly sparse—the entire complement of front panel controls consists of only three knobs and five buttons. Two small grooved knobs on the left edge of the panel provide

volume and squelch control and a third larger knob in the lower right corner serves as the encoder/channel selector. Just below the center-mounted display are three nearly rectangular keys: a ◀ key, a **SET** key and a ▶ key. Each of these had a unique shape and is separated from the others by a tiny ridge. The position, size and shape of these keys make them easy to locate by touch—a definite advantage for mobile operation.

The remaining keys are **DISP/SS** and **PWR**, located just above the encoder knob. A small ridge between these makes them simple to identify by feel as well.

In spite of the diminutive dimensions of the FT-90R, Yaesu's engineers managed to locate the controls on this radio's panel in an arrangement that makes it unlikely that you'll accidentally bump neighboring keys or knobs during normal operations. While the spacing between the volume and squelch knobs is a bit tight, a small amount of drag in their action makes them resistant to unintentional rotation.

The dot-matrix LCD displays black segments on a light blue background. Display backlighting can be set to four different levels or off—contrast can be adjusted to one of 13 settings. The display is readable even at fairly extreme angles. The upper two-thirds of the window can display the frequency, memory tags, channel numbers or menu titles. The bottom third of the window can show soft key labels for the three

BOTTOM LINE

With the FT-90R, Yaesu redefines the term "compact" as it applies to FM mobile transceivers. In spite of its small stature, it matches the big boys watt for watt, and still manages to squeeze in a formidable array of advanced features and capabilties.

Table 1
Yaesu FT-90R, serial number 9F050205

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 100-230, 400-530, 810-1000 MHz (cell blocked); transmit, 144-148, 430-450 MHz.	Receive, 100-230, 300-530, 810-991 MHz[1]; transmit, as specified.
Power requirement: Receive, 0.3 A; transmit, 9.5 A (high power).	Receive, 0.48 A; transmit, 8.0 A. Tested at 13.8 V.
Modes of operation: FM.	FM, AM (receive only).
Size (hwd): 1.2×3.9×5.4 inches; weight, 1.4 pounds.	
Receiver	*Receiver Dynamic Testing*
FM sensitivity, 12 dB SINAD: VHF and UHF, <0.18µV.	For 12 dB SINAD, VHF, 0.14 µV; UHF, 0.17 µV.
AM sensitivity: Not specified.	10 dB (S+N)/N, 1-kHz tone, 30% modulation, 120 MHz: 1.1 µV.
FM adjacent channel rejection: Not specified.	20 kHz channel spacing, 64 dB; UHF, 65 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing, VHF, 65 dB*; UHF, 65 dB*; 10 MHz channel spacing, VHF, 85 dB; UHF, 77 dB.
S-meter sensitivity: Not specified.	Maximum indication: VHF, 8.6 µV; UHF, 9.1 µV.
Squelch sensitivity: Not specified.	At threshold: VHF, 0.15 µV; UHF, 0.16 µV.
Receiver audio output: 2.0 W at 10% THD into 8 Ω.	2.0 W at 10% THD into 8 Ω.
Spurious and image rejection: Not specified.	First IF rejection, VHF, 66 dB; UHF, 99 dB; image rejection, VHF, 83 dB; UHF, 81 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output (H/M1/M2/L): VHF, 50 / 20 / 10 / 5 W; UHF, 35 / 20 / 10 / 5 W.	VHF, 55 / 21 / 9.8 / 4.2 W; UHF, 34 / 19 / 9.8 / 4.8 W.
Spurious-signal and harmonic suppression: ≥60 dB.	VHF, 72 dB; UHF, 66 dB. Meets FCC requirements for spectral purity.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, VHF, 160 ms; UHF, 130 ms.
Receive-transmit turn-around time (tx delay): Not specified.	VHF, 84 ms; UHF 58 ms.
Bit-error rate (BER), 9600-baud: Not specified.	146 MHz: Receiver: BER at 12-dB SINAD, 2.4×10⁻²; BER at 16 dB SINAD, 9.1×10⁻³; BER at −50 dBm, 2.4×10⁻³; transmitter: BER at 12-dB SINAD, 3.9×10⁻³; BER at 12-dB SINAD + 30 dB, 9.1×10⁻⁵. (See text.)
	440 MHz: Receiver: BER at 12-dB SINAD, 2.1×10⁻²; BER at 16 dB SINAD, 8.0×10⁻³; BER at −50 dBm, 2.3×10⁻³; transmitter: BER at 12-dB SINAD, 7.7×10⁻³; BER at 12-dBm SINAD + 30 dB, 7.5×10⁻⁴. (See text.)

> **Expanded Product Review Report Available**
> The ARRL Laboratory offers a detailed test result report on the Yaesu FT-90R that gives in-depth, technical data on the transceiver's performance. Request the *FT-90R Test Result Report* from the ARRL Technical Department, 860-594-0278; e-mail **mlevesque@arrl.org**. Members can see this on-line on our Members Only Web site.

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.
*Measurement was noise-limited at the value indicated.
[1]Limit of PLL lock range.

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lower rectangular keys, a seven-segment S/RF power output bargraph, the input voltage, or give specific information on the settings of a particular menu item. A "Demonstration Mode" can be programmed that scrolls two alphanumeric messages up to 50 characters long, one in the upper portion of the display the other in the lower portion, each time you apply power to the radio. The factory default message is about what you'd expect to see streaming across the side of the Goodyear Blimp if Yaesu leased it for advertising purposes.

Setting the Stage

The FT-90R uses a 38-item menu system for activating and adjusting many of the operating parameters. You press and hold the **SET** key to enter the menu mode. Each item is identified by a sequential number followed by up to five alphanumeric characters. The menu titles are well thought out—"30Shift" for example. You won't find many cryptic abbreviations that will send you off in search of the *Operating Manual*.

Once you've used the main encoder to dial up the menu item, additional information and indications in the lower portion of the window above the ◀ and/or ▶ keys will appear. These let you know which of these keys you'll need to press to cycle through the available settings.

You use the menu to program and activate the CTCSS or DCS encoder and decoder, repeater shift, tuning step size, AM receive mode, alphanumeric tags, scan resume condition, time out and auto power off timers, display contrast and brightness, baud rate—and lots more. Nearly all of the FT-90R's various initial settings are controlled in the menu.

Operations Management

The transceiver uses a combination of controls on the front panel *and* on the microphone to operate the most-needed features. In addition to the 16-key DTMF pad, the **PTT** button and the top-mounted **UP** and **DOWN** buttons, the mike also sports four more keys—a dedicated **VFO/MR** button and three buttons labeled **ACC**, **P1** and **P2**. In their factory default settings, the **ACC** button activates priority channel monitoring,

the **P1** button allows you quick access to the CTCSS and DCS settings and the **P2** button lets you cycle through the four power output settings. Here's where things get interesting… Five menu items—three for these buttons and two additional ones for the ◀ and ▶ front panel mounted keys—allow you to reassign any of these controls to fit your personal operating preferences. You can choose from any of 10 alternative functions: tone menu access, priority monitoring, scan up, scan down, repeater shift, duplex reverse, power output, home channel, VFO/memory or tone burst.

Two slide switches are mounted on the right side of the microphone. A **LAMP** switch controls DTMF pad backlighting and a **LOCK** switch disables all microphone controls except **PTT** and **LAMP**.

The front panel **DISP/SS** button allows you to select the information you want shown in the lower part of the window. You can display the soft key labels, the input voltage or the S/RF meter. In any of these configurations, the three lower buttons are still available for their assigned applications.

Moving around in the VFO and entering

frequencies is easy. You can punch the digits in on the microphone's keypad or use the encoder knob to dial them up. A quick press of the encoder knob makes all digits to the left of the decimal point flash—turn the encoder and the frequency changes in 1 MHz steps. Press and hold the encoder knob for a second or two and the tens and hundreds of MHz digits flash; turn the encoder knob now and the frequency changes in 10 MHz steps. About five seconds after you stop turning the knob, the flashing will stop and the tuning steps will revert back to the step size you have set in the menu. In the memory mode you can dial through the memories with the encoder knob or the mike's **UP** and **DOWN** buttons or directly input the memory channel numbers on the DTMF pad.

Family Ties

The FT-90R includes a few of the exclusive features that have appeared in the latest generation of Yaesu's VHF/UHF Amateur Radio transceivers.

A "*Smart Search*" feature can be activated that will scan either an entire band or between set frequency limits and retain active frequencies in a 50 channel (per band) memory bank. These memories are temporary though—they are erased when you exit the Smart Search.

Yaesu's "*ARTS*" (Auto Range Transpond System) can automatically communicate with other ARTS equipped radios. The system will transmit DCS data with each press of the **PTT**, or every 30 seconds, and alert the user if he has moved out of communications range. Menu setting are included that let you program and transmit a CW ID at 9-minute intervals to insure that these automatic transmissions are properly identified.

DCS (*digital code squelch*) encode and decode is also included. DCS is an alternative to CTCSS that has been gaining popularity in the commercial communications industry. Very few ham repeaters are presently using DCS. It may eventually catch on if some of the other equipment manufacturers begin including it—but don't hold your breath—some of the operators in this area are still moaning about the increasing use of CTCSS! The scanner listeners among us will definitely find this an attractive feature.

Curiously, although the FT-90R can scan for and identify DCS tones on a received signal, it is incapable of CTCSS tone scan. Provisions to use independent CTCSS or DCS encode and decode tones on a single frequency or duplex pair are also not available.

The FT-90R is capable of half-duplex crossband split operation. You can program an individual memory with a transmit frequency in the VHF band and a receive frequency in the UHF band—or vice-versa.

This transceiver includes widely expanded receive capabilities outside of the ham bands and offers an AM receive mode

for the aircraft band (see Table 1).

Up and Running

The *Operating Manual* included with the FT-90R is very good. It provides a well-organized table of contents, detailed information on installation, mike wiring diagrams, and even a section on antenna and coax considerations. The operating and programming instructions are easy to follow and a table and some additional text provide an excellent explanation of the menu arrangement.

It wasn't any problem finding several possible mounting locations in my vehicle, but when choosing *your* spot remember that it's important to take into consideration this unit's cooling arrangement. A small fan is mounted inside the top cover under a grill near the back of the radio. It pulls cooling air in and forces it through an internal heat sink area under the top cover. The air exits through vents on the sides of the enclosure. Don't be tempted to mount this radio in small compartments or in any manner that might obstruct the fan intake or exhaust vents.

The microphone connector is a 6-pin modular style jack located on the right side of the chassis. The 9600 bps packet connections are also provided in this jack. For 1200 bps packet operation, data to the TNC comes from the rear panel external speaker connection, data from the TNC is fed into the microphone jack. Information on wiring and programming the transceiver for packet operation is included in the manual.

The rear panel connections include a single chassis mounted SO-239 antenna connector, a 3.5 mm external speaker jack and a dc power pigtail with the conventional T-type connector.

If you still run into problems finding a place to mount the transceiver/faceplate as an assembly, you can always resort to the optional YSK-90 separation kit. This includes three 19.5-foot extension cables—one each for the front panel, the microphone and an external speaker—an adjustable front panel mounting bracket and a hardware pack. (A conventional mobile mounting bracket and an associated hardware pack is packed with the transceiver.) As with all of the Yaesu extension cable kits, a screw is used to fasten the radio end of the cable to the connector on the front of the chassis—removal and reconnection of the separated transceiver for short term alternative applications is inconvenient to say the least.

The Open Road

Operating the FT-90R while mobile was a pleasure. The small chassis size made it possible for me to find a place to install the radio where it was within easy reach and view. (I chose not to separate the head.) I mounted the microphone hanger so that the mike keypad was also convenient. The vari-

ous control buttons on the microphone and the ability to directly enter frequencies on the keypad make using the radio while underway reasonably simple.

Transmit audio reports ranged from "crisp" to "sharp." One minor annoyance is the **PTT** button. The return spring tension is extremely light. I found myself accidentally hitting transmit on a number of occassions.

I can only describe the receive audio with the built-in speaker as marginal at best. Even with the vehicle parked and the engine off, the level of audio available from the top-mounted speaker is insufficient. The tiny speaker itself is nested into a cutout in the internal heat sink. I can imagine there was quite an interaction between the design engineers as they fought for space inside this small chassis. It looks like the heat sink group won this battle. Rightly so perhaps—but don't despair—the audio is more than adequate when using an external speaker.

Speaking of acoustics, the two-speed cooling fan does generate quite a bit of noise at the higher speed. Whenever power is applied to the radio the fan will run at the lower setting, but the fan is nearly silent at this speed.

Yaesu includes a menu item that allows you to choose between four fan control options. An "auto" setting uses temperature sensing to switch the fan to high when the chassis temperature exceeds a certain level. A "TX" setting switches the fan to high speed on transmit and keeps it on for 30 seconds afterward. An "auto/TX" setting combines these configurations, and an "off" setting holds the fan on low at all times. While I was tempted to select "off," I finally decided on "auto." While there are no particular guidelines in the manual on which setting to use, I recommend you consider your transmit duty cycle when you select your setting. I imagine a little extra cooling is better than not quite enough.

Shack tests with the fan set to "auto" as I served as net manager for a local information net confirmed that this setting kept the unit cool even on high power during relatively high duty cycle operation.

Doing the Numbers

Lab testing of the FT-90R revealed respectable two-tone third-order IMD dynamic range performance during the important 10-MHz channel spacing testing. This is usually a good indicator of a receiver's ability to reject interference from nearby paging and commercial radio services. As with many of the transceivers that offer expanded receive range, while the FM sensitivity is very good within the amateur bands where the unit transceives, sensitivity outside of these ranges varies widely—anywhere from decent to nearly nonexistent. Measurements taken at 223 MHz were a disappointing 88 µV. Spot checks of FM sensitivity at 162 MHz came in at 0.29 µV;

810 MHz, 5.3 µV and 991 MHz, 1.6 µV.

9600 bps bit error rate testing turned up a problem with our product review transceiver. While the unit worked fine in receive, data transmitted by the unit could not be decoded. A second FT-90R, borrowed from a local distributor, worked properly. All transmitter BER data presented in Table 1 was generated by the second unit.

Wrapping It Up

The FT-90R sets an entirely new definition for the phrase "compact mobile transceiver." It's difficult to imagine how the dimensions of radios for this type of application could be further reduced without giving up ease of use or display legibility—but I'm confident that there are groups of radio designers working diligently at this very moment, eager to make me eat my words.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; tel 562-404-2700, **http://www.yaesu.com**. Manufacturer's suggested retail price: FT-90R, $500. Typical current street price, $390. YSK-90 Trunk Mounting Kit, $64.

The Alinco DR-M03SX 10-Meter FM Mobile Transceiver

Reviewed by Wayne K. Irwin, W1KI
Assistant to the ARRL VEC Manager

My first contact as a ham was on the 10-meter band. That was over 26 years ago. Since then, no matter where I wander in RF land, I always seem to return there. I've enjoyed many hours on 10 using all of the common modes—AM, CW, SSB, data and FM—so when I was asked to have a look at Alinco's new 10-meter offering, I was happy to oblige.

Initial Observations

The DR-M03SX is very similar to the DR-M06, Alinco's 6-meter FM-only mobile transceiver (see *QST* Product Review, August 1996). They even share the same instruction manual.

Being FM only, this unit is fairly restricted in its applications for the American amateur. For the 6-meter model this might not be considered a major limitation. The 6-meter band is 4 MHz wide and FM activity is common on a significant portion of it. All US amateurs, except the Novice class licensee, have access to the entire 6-meter band.

For the 10-meter enthusiast the story is a bit different. Although the radio covers the entire 10-meter band—from 28.0 MHz to 29.7 MHz—FM is generally only found between 29.200 and 29.300 and above 29.510 MHz. The FM signal is too wide to meet the FCC's maximum bandwidth regulations for operation below 29 MHz. The ARRL band plan for 10 meters reserves 29.000 to 29.200 for AM. Both the ARRL and IARU band plans set aside 29.300 to 29.510 MHz for satellite downlinks (some of the RS-10/11, RS-12/13 and RS-15 satellite downlinks are found there). Additionally, Novice and Technician Plus licensees do not have any 10-meter phone privileges above 28.500 MHz. Under the current FCC rules the DR-M03SX is a radio for General class and higher licensees. Even then—a significant portion of its frequency coverage is outside of the spectrum set aside for FM operation.

Front Panel Layout and Control Functions

The 'M03 is a very compact mobile radio, small enough to easily find a home in almost any vehicle or shack. In spite of its small size, this rig is functionally very easy to use. The 28-page bilingual (English and Japanese) instruction manual is brief but well written. The new user should have little difficulty in understanding and following the programming information.

Six keys along the lower edge of the front panel are dual-function keys. Their primary operations, labeled in white letters, are selected with a simple press. Secondary operations, titled in blue, are accessed when any of the keys are activated within 5 seconds of pressing the **F/MONI** key. The other front panel controls are a rubber-ringed main tuning knob, two small volume and squelch knobs and two additional keys for **POWER** and **MHz/H/L**. All controls are spaced far enough apart and adequately identified for easy operation.

The supplied Alinco EMS-11 DTMF microphone includes **UP** and **DOWN** buttons and a sliding lock switch that disables all mike functions except for PTT. A conventional 8-pin mike connector is employed. Direct frequency entry from the microphone keypad is not supported. No keypad backlighting is provided.

The transceiver's LCD display is easy to see even in fairly bright sunlight, the segments are black on a light amber background. The frequency and memory channel digits and the various function icons are large. A 10-segment S/RF output meter appears along the bottom edge of the display window. The display backlighting level is fixed.

The rear panel includes the PA heat sink, an SO-239 antenna jack on a coax pigtail, a power input cable with the typical T-type dc power connector and a 3.5 mm remote speaker jack.

Features and Operation

The radio has two primary modes of operation, VFO and Memory. Like most VHF FM radios, tuning in the VFO mode can be incremented in fixed steps; it is not infinitely variable. The steps can be set to 5, 10, 12.5, 15, 20 or 25 kHz. FM communications tends to be carried out on fixed channels, so there is really no need for finer tuning increments. A call channel memory is also included—allowing instant access to your favorite repeater or simplex frequency at the push of a button.

The transceiver offers 100 memory channels that can store independent fre-

Table 2
Alinco DR-M03SX, serial number T001626

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency coverage: receive and transmit, 28-29.7 MHz.	Receive and transmit, as specified.
Power requirements: 12.4-15.2 V dc; receive 0.8 A (squelched); transmit, 3 A (max, high power).	Receive, 0.52 A; transmit, 1.8 A, tested at 13.8 V.
Size (hwd): 1.6x5.5x4.5 inches; weight, 1.5 lb.	
Receiver	*Receiver Dynamic Testing*
Sensitivity, 12 dB SINAD: 0.25 µV.	12 dB SINAD: 0.12 µV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 29 MHz, 70 dB. 10 MHz offset from 29 MHz, 115 dB.
Adjacent channel rejection: Not specified.	20 kHz offset from 29 MHz, 70 dB.
Spurious response: Not specified.	IF rejection: 86 dB; image rejection, 113 dB.
Squelch sensitivity: Not specified.	0.06 µV at threshold.
Audio power output: >2.5 W at 10% THD into 8Ω.	3.1 W at 10% THD into 8Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output (H / L): 10 / 1 W.	10 W / 0.94 W.
Spurious signal and harmonic supression: ≥40 dB.	55 dB. Meets FCC requirements for spectral purity.
Transmit-receive turn-around time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 160 ms.
Receive-transmit turn-around time ("tx delay"): Not specified.	90 ms.

quency, repeater offset and CTCSS data. Fifty CTCSS tones are available.

The recommended band plan outlined in the *ARRL Repeater Directory* shows only four suggested repeater frequency pairs plus the 10-meter National FM Simplex Frequency—29.600 MHz. With just these four pair plus a handful of commonly used simplex frequencies, 100 memories may seem excessive. Actually there is a good reason to have such a large number of memories. Since each memory can store pertinent data for any frequency or repeater pair, duplicate frequencies or repeater pairs can be programmed, each with independent CTCSS information. If you've had any experience with the utility of CTCSS on the higher FM bands, its value becomes even more apparent on 10—especially when the band opens. It is better to access one desired repeater than five or six simultaneously! Alinco also offers a CTCSS *decode* option, the EJ-20U (not installed in the review unit), that the serious 10-meter FM enthusiast will probably want to consider purchasing.

Two types of scanning modes are included. You can scan either the programmed memories or the entire range of the VFO—28 to 29.7 MHz. Active frequencies encountered during a scan will cause the scan to pause. Scanning will automatically resume after 5 seconds or when the signal disappears. Provisions for locking specific frequencies out of a memory or VFO scan, or to scan between two set frequency limits, are not included.

The DR-M03SX also has priority watch. Once activated, the receiver will check for activity on a VFO frequency, a selected memory channel or the call channel at 5-second intervals. This effectively allows you to monitor two frequencies simultaneously.

Another interesting feature is a "Time Out Timer." It can be set anywhere from 15

to 450 seconds in 15-second increments. At the "0" setting the timer is disabled. At other settings, transmit is inhibited after the programmed time period. This can prevent you from "timing out" a repeater or becoming the victim of the dreaded "open mike."

The 'M03 puts out 10 W in the high power setting, 1 W on low. Because of the capture effect of the FM mode the 1 W option did not get much use by this reviewer. I found it was too easy to get buried under stronger signals—especially when the band was wide open. Even when participating in extended rag-chewing sessions at the 10 W level the heat sink never seemed to get uncomfortably warm.

Since propagation on 10 meters can be a great equalizer, the low power operator can enjoy worldwide communication with just a few watts of RF flowing to a simple antenna. FM operation on 10 meters is really quite unique. Ten meters provides decent band openings on a considerably more regular basis than 6 meters. Add the ease of tuning and the interference fighting capabilities of this mode and FM on 10 can offer some real operating pleasure! If your current HF transceiver includes 10-meter FM capabilities (nearly all the recent models do) give 10 FM a try, you may be pleasantly surprised.

On a recent vacation trip to Cape Cod, this little rig provided several domestic QSOs and even a couple of mobile-to-mobile contacts with European hams. Accessing a nice selection of the domestic repeaters was a snap. Transmit audio reports were always good. The receive audio from the unit's top mounted speaker was sufficiently robust for even windows-down mobile operation.

Final Comments

Alinco should be commended on the simple but effective design of their mobile mounting bracket. After the mounting

bracket has been installed, attachment and removal of the radio from the bracket requires only slight loosening of the four mounting bolts (Alinco even includes a tiny wrench in the hardware pack). Cut out paths in the bracket allow you to pull and lift the unit slightly, guiding the bolt shafts through the cutouts. No more fishing loose mounting bolts and washers out of your vehicle's carpeting!

One minor annoyance is the supplied power cord. Like many of the radios on the market today, it's made of two separate conductors that tend to get tangled when the radio is moved from one place to another. Zip-cord type construction would eliminate this tendency to tangle.

If you have—or develop—a serious interest in 10-meter FM operation, this little transceiver may be just what you are looking for. It can find a home in even the smallest of today's automobiles, or it can be tucked in a corner in the main station and used as a monitor for your favorite 10-meter repeater or simplex frequency.

During the last sunspot cycle, several manufacturers marketed 10-meter single band radios aimed primarily at the Novice and Technician Plus licensees. These became popular because they offered a relatively low cost way for the newcomer to get in on the worldwide HF fun. Most of these fell short as FM transceivers—either they left off the mode altogether or they didn't provide the split frequency and CTCSS capabilities required for repeater operation. Now—if Alinco could only find a way to pack some additional modes into *this* little rig…

Manufacturer: USA Alinco Branch, 438 Amapola Ave, Suite 130, Torrance, CA, 90501; 310-618-8616; fax 310-618-8758; **http://www.alinco.com**. Manufacturer's suggested retail price: $250. Typical current street price: $200. EJ-20U CTCSS tone squelch unit: $41.

Mscan SSTV Software

Reviewed by Larry Wolfgang, WR1B
Senior Assistant Technical Editor

Slow-scan TV has become very popular on both HF *and* VHF. Inexpensive scan converters and computer interface circuits have made it relatively easy to explore this mode. It is also becoming much easier to obtain pictures for transmission. For a small additional fee, most photo processors will now supply copies of your photographs on computer disk or CD-ROM when they develop your film. Image scanners, digital cameras and video cameras also offer methods of collecting pictures in a format that can be stored as a digital computer file.

If you haven't experienced the fun of receiving the slow-scan pictures that hams are exchanging, nor the thrill of sending some of your own images, you owe it to yourself to give SSTV a try!

Mike Versteeg of CombiTech, Middleburg, The Netherlands developed the *Mscan* SSTV program for IBM-PC or compatible computers. Two *DOS*-based versions and a third version for *Windows 95/98* are available.

Mscan v1.3 will run on an 80286 with 640 kB of RAM and VGA video at 16 or 256 colors. *Mscan v2.3* requires an 80386 with 640 kB of RAM, SVGA video at 16.7 million colors (also referred to as "true color") and a mouse. The *Windows 95/98* version—*Mscan v3.1*—needs at least a 100 MHz Pentium machine, 16 MB of RAM, a mouse and requires using a *MultiScan*, *HariFax*, *EasyDSP* or *PTC-II* modem. For this review I installed CombiTech's evaluation version for *DOS*—*Mscan v2.11*.

If you have a *Hamcomm* or *JV-Fax* interface, you can use that with the *DOS* versions of *Mscan* to operate SSTV. Other simple op-amp interface circuits based on these designs should also work. I used a *RadioWare SSTV Explorer* receive-only converter and was receiving SSTV pictures just minutes after installing the *Mscan* software. Even with a receive-only converter you still have several options for transmitting pictures. You can take transmit audio from the PC speaker or use the TxD line (pin 2 on a DB-25 serial connector). If you have an *Ad Lib* compatible sound card (such as a *Creative Labs SoundBlaster*) you can employ the sound card for the output signal. You can also use your *EasyFax* or *ViewPort* VGA interface with *Mscan*.

CombiTech also offers several of their own converters. The *Microscan RX* is a receive-only op-amp interface. *Miniscan* includes a sinewave generator to create a distortion-free audio signal and will also emulate the *Hamcomm* interface for use with other programs. For a more sophisticated converter, CombiTech offers their *Multiscan* unit. This device includes sepa-rate circuit boards for the receive and transmit sections. You can purchase the *Multiscan* unit as PC-boards, the boards and parts as a kit, or assembled units.

The *Mscan* display divides the top $^3/_4$ of the screen into two windows for display of received pictures or pictures to be transmitted. Below that is a double row of images stored in 14 "memory" positions. These files are stored on disk for rapid recall. The very bottom portion of the screen is the "console," which includes a spectrum display, program status indicators and command buttons.

The bottom left corner of the screen displays a spectrum image that helps you tune to a signal and indicates when the software is synchronized to the received signal. Once you are properly tuned to the SSTV frequency, *Mscan* will read the VIS code as a new picture is started, and automatically select the proper mode to receive the picture. All of the popular SSTV and fax modes are supported.

The operating commands are displayed as buttons along the bottom of the screen. You can load and save pictures to disk or the memory area, use the text editor to add a label or other text to an image and even use your mouse to draw in the image area. There is a set of commands to mirror an image left to right or to change the aspect ratio. Clicking the mouse cursor on certain boxes will call up alternate command screens. This gives you access to a wide range of commands, but lets the control panel use a relatively small portion of the screen.

Mscan will load pictures that are stored in either the GIF or JPEG formats. When you save a picture to disk, however, it will always be saved in JPEG format to help minimize the size of the files. The files stored in the 14 "memories" are in a special format (no information is given) that allows the program to save and recall those particular images very quickly. This gives you rapid access to your favorite images whenever it's your turn to send a picture.

You can insert specific elements of one image on top of another image by using the "TRANSBOX" command. With this feature any pixels that appear in the overlay image that have an intensity below 1.2% (black) will become transparent. One application for this is to generate a message image—such as your call sign or a CQ message for example—that you can readily superimpose on top of any image in your picture collection.

The text editor also provides a convenient way to add text to any image. You can select tiny, small, medium and large characters and choose from a nearly infinite range of text colors. In addition, you can set the characters to show transparent over the background or to obscure the background. (The shareware version of the software that I tested did not include all these options, however.)

One nice feature of the *Mscan* software is its multitasking ability—multitasking, that is, within the SSTV program. The intention for this feature is that while receiving one picture you can be preparing another one for transmission. Screen 1 (on the left) might be receiving, so you can load a picture from disk into screen 2 (on the right). Then you can insert another image, mirror it from right to left, add text or process it in any of the ways built into the *Mscan* software. This way, when it's your turn to transmit a picture you'll be ready to go without hesitation.

I don't have a video digitizer, so I wasn't able to test that capability of the program. According to the documentation, though, grabbing an image from an *Iris*, *Video Blaster* or *ComputerEyes/RT* digitizer is as simple as clicking the "DIGITIZE" button on the command line.

I haven't covered every feature of the software here. Each interface requires some different calibration or adjustment, and some features only work with the more sophisticated interfaces. The program offers good utility and is not difficult to use. If you are looking for a way to sample the excitement of SSTV, *Mscan* is a good way to get started.