Product Review Column from *QST* Magazine

April 1981

Gargler, Inc. Microphones

Kenwood TR-2400 2-Meter FM Transceiver

Yaesu FT-107M HF Transceiver

Product Review

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Yaesu FT-107M HF Transceiver

The FT-107M is a full-featured, completely solid-state transceiver offering the radio amateur a high degree of versatility which is further enhanced by a variety of available options. Standard equipment includes all the features we have become accustomed to in an advanced transceiver: smooth VOX operation, an effective noise blanker, semi-break-in cw and a good rf speech processor, to name a few. Band coverage is complete, 160 through 10 meters, including the three new WARC bands.[1]

The all-solid-state PA is rated at 240 watts input on cw and ssb, and 80 watts input on a-m and fsk. Being solid-state, the PA is somewhat more sensitive to SWR than rigs using vacuum tube finals. Built-in protection circuitry automatically reduces input power in the event of high SWR, thus preventing damage to the output transistors. The power reduction is gradual, rather than the abrupt shut-off found on some rigs. Operating into a 2:1 SWR will result in approximately a 25% reduction in output power. The heat sink for the finals is fitted with a thermostatically controlled fan to cool the unit during long transmissions.

Other features of the FT-107M include a 20-dB attenuator, offset tuning on receive and/or transmit, and digital and analog frequency readout. Some of the more unusual features found on the '107 are an af peak/notch filter, SWR meter, 170-Hz fsk circuitry and variable i-f bandwidth. The af filter can be tuned from 300 Hz to 1.4 kHz in either the peak or the notch mode. Tuning in both modes is very sharp, and some care is required in adjusting the frequency for maximum effectiveness. The peak mode is useful on cw, even when the optional 600-Hz i-f filter is used. The variable bandwidth control is like that found on the FT-101ZD.[2] It allows the i-f bandwidth to be adjusted from 2.4 kHz to 300 Hz. This can be very helpful when operating ssb under crowded band conditions.

Power requirements for the FT-107M are 13.6 V at 20 A dc. For operation from the 117 V ac line, two power supply options are available. The FP-107E is an external supply with built-in speaker, while the FP-107 supply can be installed in the transceiver cabinet for compactness.

Digital Memory and DMS

Perhaps the most unusual option available for the '107M is its digital memory system. The DMS system provides a synthesized VFO (the main VFO is a conventional LC tuned oscillator) and 12 memories, each of which can be used to control transmit or receive frequency, or both. In addition, memory fine tuning and the normal offset tuning can be applied to the memory frequency. This allows considerable flexibility in frequency control. But wait — there's more! The DMS (Digital memory Shift) control enables the operator to shift a memory channel, in 100-Hz steps, to either the upper or lower band limit. This is done by means of an optically encoded, detented control. When combined with the optional YM-35 hand-held scanning microphone, the operator can tune to any frequency in the band with just one hand. Three buttons, on top of the mike, control the direction and speed of scanning. As pointed out in the owners manual, a slight chirp may be heard when using the DMS. The chirp is very brief and not objectionable. It is caused by the relatively long

Fig. 1 — Yaesu's FT-107M and matching external ac-operated supply. The optional YM-35 microphone shown may be used for frequency control of the transceiver.

Yaesu FT-107M Serial No. 9N030626

Manufacturer's Claimed Specifications	*ARRL Lab Measurements*
Frequency coverage, (MHz)	As specified plus 40 kHz beyond each band edge.
1.8 - 2.0	
3.5 - 4.0	
7.0 - 7.5	
10.0 - 10.5	
14.0 - 14.5	
18.0 - 18.5	
21.0 - 21.5	
24.5 - 25.0	
28.0 - 29.9	
Power input (dc): 240 watts (ssb, cw), 80 watts (a-m, fsk).	
Output power: Not specified.	Greater than 125 watts on 160, 80, 40 and 20. Greater than 110 watts on 15 and 10 meters.
Carrier suppression: Better than 40 dB, (at 14 MHz).	51 dB (at 14 MHz)
Unwanted sideband suppression: Better than 50 dB, (at 14 MHz, 1 kHz tone).	Better than 60 dB (at 14 MHz, 1 kHz tone).
Spurious output: Better than 50 dB down.	47 dB down from carrier (1.8 MHz)
Transmitter third-order IMD: Better than 31 dB down.	32 dB down from PEP.
Receiver sensitivity: 0.25 μV for 10 dB S/N.	0.16 μV for 10 dB S/N (at 14 MHz).
Rf attenuator: 20 dB ±3 dB.	21 dB.
APF, notch frequency range: 300 Hz to 1.4 kHz.	260 Hz to 1.7 kHz.
Notch filter depth: Not specified.	35 dB.
Audio output power: 3 watts at 10% THD (into 4 ohm load).	Greater than 3 watts at less than 10% THD.
Receiver MDS: Not specified.	– 133 dBm on 80 meters, – 133 dBm on 20 meters.
Receiver two-tone, third-order IMD dynamic range: Not specified.	82 dB on 80 meters, 90 dB on 20 meters.
Receiver blocking dynamic range: Not specified.	Could not be measured because of receiver noise.

*Assistant Technical Editor

[1]The 10-, 18-, and 24-MHz bands are not yet open to U.S. amateur occupancy. See Baldwin and Sumner, "The Geneva Story," *QST*, February 1980, p. 53.

[2]Product Review, *QST*, December 1979, p. 52.

lock-up time of the synthesizer, which also ensures that the LO signal is clean, thus not compromising the receiver performance. ARRL laboratory tests confirm this; receiver measurements made using both the synthesized and the conventional VFO produced the same results.

Circuit Highlights

Each major functional unit of the transceiver is contained on a separate, plug-in circuit board. Extensive use of diode switching permits band and mode changes to be made by switching only dc control voltages to the various boards. The only point at which diodes are not used for rf switching is at the output of the PA; each of the output low-pass filters has a relay at each end.

During receive, the incoming signal is preselected by a single-tuned circuit and applied to a dual-gate MOSFET (a 3SK51-03) amplifier. The amplified signal passes through a two-pole band-pass filter before being fed to the doubly balanced diode ring mixer. Following the first mixer, the signal is band-pass filtered, buffered and then applied to the crystal filter. The i-f amplifier uses two dual-gate MOSFETs, while a doubly balanced diode ring is used as the product detector. The overall performance of the receiver is very satisfactory with the exception of poor cw filter performance. The skirt selectivity of the 600-Hz filter, while adequate for most operating, was far from outstanding. Also, the two-tone, third-order IMD dynamic range measured on 80 meters was less than expected, 82 dB compared to 90 dB measured on 20 meters. To determine if the unit received for review had a problem, a second FT-107M was solicited and the measurements were repeated. Nearly the same results were obtained with the second unit.

The transmitter section of the '107M is of conventional design. The local oscillator is a premix type using a 5-MHz VFO frequency which is mixed with the output of a crystal oscillator. A separate crystal oscillator is used for each band, and the crystal frequencies are such that the LO signal is always above the signal frequency.

Low-power a-m operation is provided by modulating the 8988.3 kHz carrier signal. Fsk is generated in a similar manner: the carrier oscillator frequency is shifted the required 170 Hz. During a-m and fsk operation, the rated input power of 80 watts produces an output power of 10 watts.

Figs. 2 through 4 show cw keying waveforms obtained when operating the FT-107M under differing conditions. Fig. 2 shows the waveform when the DRIVE control is adjusted for maximum input power. It was noted during testing that the first dot transmitted has a different waveform, as shown in Fig. 3. This photo was taken by closing the manual transmit switch and then keying a single dot. This waveform variation is likely caused by the time constant of the alc circuit. The waveform shown in Fig. 4 was produced by adjusting the DRIVE control to the point at which the alc meter just begins to show an indication; the output power at this point was 100 watts. While the keying waveforms shown in Figs. 3 and 4 depart from the ideal 5 ms rise and fall times, on the air tests showed only the slightest "click" to the signal.

The spectral photograph in Fig. 5 shows the transmitter two-tone, third-order IMD performance to be reasonably good. Suppression of spurious emissions easily meets current FCC requirements (see Fig. 6). The maximum output power obtainable from the '107M tested was typically 126 watts, dropping to 112 watts on some bands. Other pertinent specifications and test results are listed in the table.

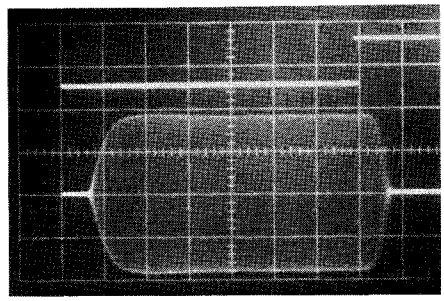

Fig. 2 — Cw keying waveform of the FT-107M with DRIVE control adjusted for maximum input power. Upper trace is the actual key closure; lower trace is the rf envelope. Each horizontal division is 5 ms.

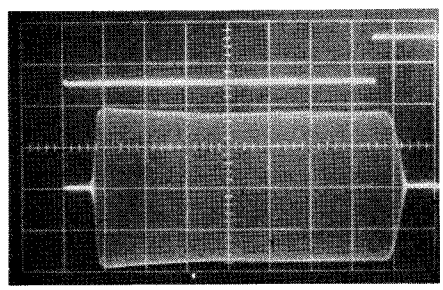

Fig. 3 — Cw keying waveform of the first dot in string. All operating conditions are the same as those used for Fig. 2.

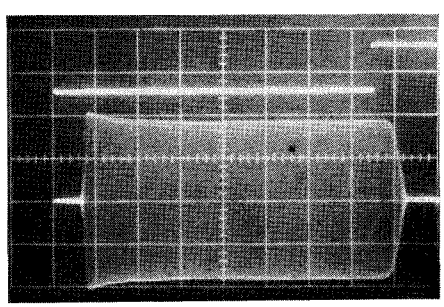

Fig. 4 — Cw keying waveform with the DRIVE control adjusted to the point at which the alc indication just begins. All other operating conditions are the same as those used for Fig. 2. Note that under these conditions the rise time is reduced to about 1 ms and fall time to about 2 ms.

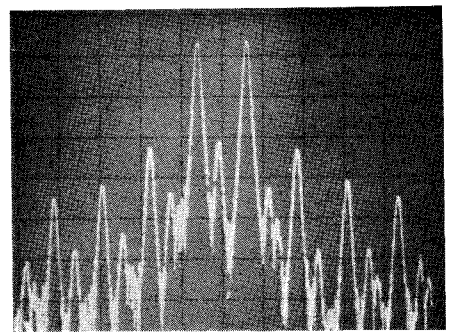

Fig. 5 — Spectral display of the FT-107M output during two-tone IMD test. Third-order products are 32 dB below PEP and fifth-order products are 41 dB down. Vertical divisions are 10 dB; horizontal divisions are 1 kHz. Transceiver was being operated at rated input power on the 20-meter band.

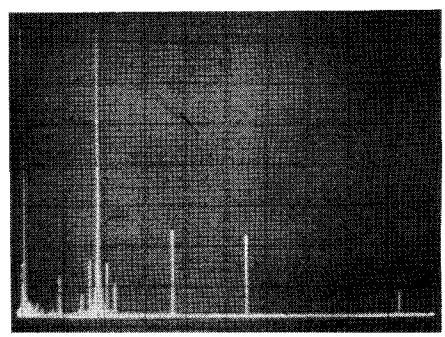

Fig. 6 — Spectral display of the FT-107M output operated at rated input power on the 160-meter band. Output power is approximately 125 watts. All spurious emissions are better than 40 dB below the carrier. Vertical divisions are 10 dB; horizontal divisions are 1 MHz. The FT-107M complies with current FCC specifications for spectral purity.

On-the-Air Operation

Using the FT-107M on the air was, for the most part, a pleasure. The broadband design allows quick, no-tune-up band changes — provided the antenna system used shows a reasonably low SWR on all bands. Both received and transmitted audio quality is excellent and the cw keying drew no unfavorable comments. Receiver sensitivity was more than adequate even when using small antennas.

A minor problem with the S-meter calibration was noted during on-the-air tests: The S-meter readings seemed rather high compared to those obtained with the station receiver normally used. Tests with a calibated signal generator showed that an S-9 meter reading required only a 1.5 μV signal! Following the S-meter calibration procedure given in the owner's manual resulted in a 52 μV signal producing an S-9 reading. The number of decibels per S unit averaged 3.5 across the meter scale, which is somewhat less than the 5 or 6 dB per unit normally found.

Station accessories available include the FC-107 antenna tuner, FTV-107R vhf/uhf transverter, FV-107 external VFO and the SP-107P speaker/phone patch. All of the above accessories match the FT-107M in color and styling. Price class: FT-107M with DMS, $1170; FP-107E, $145. Manufacturer: Yaesu Electronics Corp., 6851 Walthall Way, Paramount, CA 90723. — *George Collins, AD0W*

KENWOOD TR-2400 2-METER FM TRANSCEIVER

☐ Need a durable, convenient-to-use rig that should handle just about any 2-meter fm situation you're likely to encounter? Kenwood's Model TR-2400 synthesized hand-held is that kind of rig.

The TR-2400 is built around a sturdy aluminum frame, partially encased front and back with dark-gray high-impact plastic covers. The physical layout is well planned,

with the VOLUME, SQUELCH, TRANSMIT OFFSET, special purpose (OPEN/BUSY, SUBTONE, REVERSE/NORMAL) switches and a quick-disconnect BNC antenna jack on the top surface. The LCD readout, multifunction 16-key pad and special (FREQUENCY LOCK, TRANSMIT LOCKOUT, LAMP) switches are located on the lower front panel, with jacks for the earphone, battery charger and microphone on the right-hand side. The PTT thumb switch is well placed on the left-hand side and the 8-ohm internal speaker and condenser microphone are located at the top of the front panel.

Power is supplied by a 9.6-volt NiCad battery pack which drops into a bottom rear compartment accessible through a slide-out panel removable with a coin. Accessories supplied with the standard unit include the rubber stub antenna, NiCad battery pack, ac wall charger, earphone, plugs for microphone and standby inputs and instruction manual. (The manual contains thorough operating instructions, a block diagram and schematic, but no maintenance information.)

Fig. 7 — The Kenwood TR-2400 2-meter fm transceiver. The BNC antenna connector is a thoughtful feature.

Frequency Synthesis

Synthesized hand-helds are becoming more the rule than the exception today, thanks to comparatively recent developments in electronic technology. The convenience and versatility of the "800 channel" rigs are hard to dispute. The Kenwood approach was "digital control of a phase-locked voltage controlled oscillator," or placing the frequency output of a VCO under microprocessor control. At its simplest, you tell the microprocessor by means of the keypad and function switches what you want, and it controls the electronics within. Thus, when you want to operate a 146.28 MHz/146.88 MHz repeater, for example, you enter the exact receive frequency using the keypad: punch the four digits 6,8,8 and Ø (the 1 and 4 are assumed and the decimal point automatically "set" by definition). Assuming all the other controls are set properly (−600 kHz offset, etc.), you'll be operating right where you want!

Operating frequency range is controlled by the microprocessor according to the "operational rulebook" preprogrammed at manufacture. Under microprocessor control, the TR-2400 covers the entire 2-meter amateur band plus those frequencies down to 143.900 MHz and up to 148.495 MHz. You cannot *directly* enter any frequencies above 147.995 MHz or below 144.000 MHz, but you can scan manually beyond these limits. By pressing continuously the up or down "arrow" keys, corresponding to the keypad's "#" and "*" respectively, you'll reach the upper and lower extreme limits mentioned above. When you reach 148.495 MHz scanning up in frequency, the synthesizer "jumps down" to 143.900 MHz and continues scanning up from there in 5-kHz steps. The reverse is true when scanning down beyond 143.900 MHz. To change frequency by 5 kHz only, depress the appropriate arrow only momentarily. To change from one frequency (within the 2-meter band) to another, enter the last four digits of the desired new frequency as described above: the last digit to the left of the decimal point (MHz units-place) and the three digits to the right of the decimal point. The last digit will always be a Ø or a 5, as the synthesizer generates frequencies in minimum 5-kHz increments. If you enter a 5, 6, 7, 8 or 9, the last digit will be a 5; if you enter a Ø, 1, 2, 3 or 4, the last digit will be Ø. The last four digits of the frequency currently being generated may be viewed in the LCD readout.

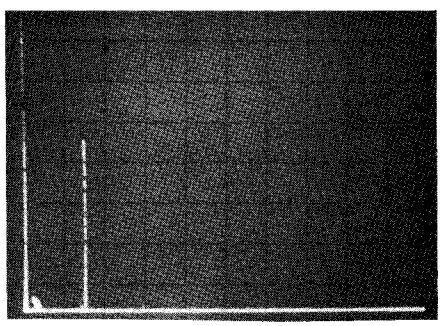

Fig. 8 — Spectral display of the TR-2400. Vertical divisions are 10 dB; horizontal divisions 100 MHz. The fundamental has been reduced in amplitude approximately 34 dB by means of notch cavities; this prevents analyzer overload. Power output is 2 watts at a frequency of 147.88 MHz. The second harmonic is just barely visible approximately 74 dB below peak fundamental output. Tests were performed in the ARRL lab. The TR-2400 complies with current FCC specifications for spectral purity.

Memory

The TR-2400 incorporates 10 memory channels to program with your most-used local frequencies. With several of the channels programmed, changing frequency becomes a simple matter. Pressing the key labeled MR (memory recall), followed by the number of the memory channel holding the frequency you want, will do it.

With your local repeaters' frequencies programmed into the memory channels, you'll also be able to scan all ten of them automatically. Pressing the MS (memory scan) key will return the rig to the frequency stored in M1 where it will pause for one second, change to the frequency stored in M2, pause, and so on. From MØ it recycles back to M1 and continues scanning. Though this scan rate seems fairly slow, if you care to monitor only two repeaters, for example, you can speed up the apparent scanning rate (see "Hints and Kinks," December 1980, p. 53). The same can be done with three repeaters or more, or you can set up a "priority channel" by programming a priority frequency in every odd-numbered memory channel with five other frequencies entered in the even-numbered memories.

When scanning, you have the option to pause on either open channels or busy channels using the OPEN/BUSY push-button switch on the top panel. Scanning will resume when the status again changes. To stop the rig manually from scanning, press the keypad button labeled STOP. This button serves double duty as the C or CLEAR key when you've made entry errors using the keypad. As the keys are exposed and susceptible to unintentional entries during everyday use, provision has been made to prevent errors by locking in the displayed frequency. When you slide the F.LOCK switch on, you will not be able to change the frequency manually. If the radio is scanning *before* this switch is activated, it will continue to scan the 10 memories and will not stop until you've turned the F.LOCK off and hit STOP.

Receiver/Transmitter

The receiver performs well and exhibits no overloading problems unless operated immediately next to another 2-meter rig. The internal speaker provides surprisingly good audio, though in a noisy environment, such as the inside of an automobile, you'll need to turn the volume up near its limit. The transmitter yields a minimum of 1.5 watts with the batteries charged. At full charge, you'll typically get over 2 watts out from the rig. A spectral display of the output is shown in Fig. 8.

One quirk that we noticed is the way the transmitter "sweeps hot" from the receive frequency to the transmit frequency. Whatever the split, whether the standard ±600 kHz or the broadest possible split (143.900 MHz to 148.495 MHz using the nonstandard split capability), when you key the PTT switch the TR-2400 begins transmitting instantaneously at the receive frequency; very quickly (less than a second) the transmitted carrier sweeps up or down to the appropriate transmit frequency. As the thought of an rf pulse traversing the entire band raised a few questions in our minds (hmmm . . . wonder if we'd key up all the repeaters for miles around?), we took a long, hard look. The fact is that at any given frequency, the transmitted pulse "looks" like a very low power transient that does not break squelch. It certainly did not key up any of the local repeaters, many of which are near ARRL Hq., and the pulse could barely be detected above the noise as a very low audio "bip" in a second receiver a few feet away. Though quick, it *was* present as a full-powered pip racing up the display of the spectrum analyzer.

Early models of the TR-2400 (those characterized by a spring-return (no-click) REV/NORM push button on the top panel — later models have a locked-detent button that remains halfway "down" when in REV position) were electronically gated to prevent transmitting. Though the synthesizer did sweep from the receive to the transmit frequency, the transmitter was disabled for a few hundred milliseconds and nothing was transmitted until after the transmit frequency was reached. Several owners of earlier models have com-

mented about the delay on transmit, wondering why their first syllable was often "chopped" off. This is the answer. Later models, those with a detent or "cocked" position in REV operation are not gated: When you key the transmitter, you are transmitting immediately, but the listener may still miss the first syllable.

Within the amateur allocations, this really poses little problem, as we demonstrated with our test. When considering MARS or CAP operation, however, where reception is often below 144 MHz and transmission above 148 MHz, the newer TR-2400s *do* transmit while sweeping across frequencies that are not authorized for use. The operator should be aware of this feature.

Transmitted audio quality is excellent. The tiny internal condenser microphone seems to do the job quite well, as reports were good whether through repeaters or operating simplex. Though most listeners could tell that the rig was a hand-held, the tonal qualities of the operator's voice were reproduced well enough that he was easily recognized.

Power Consumption

The 9.6-volt battery pack consists of eight standard 1.2-volt AA NiCad cells wired in series and held together in a shrink-wrap sleeve. With the wall charger, Kenwood states that full recharge (from complete discharge) should take about 15 hours; this seemed to be a pretty fair estimate under a variety of operating conditions over the test period of several months. The normal claimed operating time of the TR-2400 is 2-1/2 hours at a 1:3 transmit/receive ratio. I found this estimate to be a good rule of thumb, though I did not sit down for a 2-1/2 hour stint with a stopwatch! Good 2-meter fm operators normally do much more listening than talking (the proverbial elephants — all ears and little mouth), and will find their operating time greatly extended beyond the 2-1/2 hours claimed. On the other hand, our alligator friends (all mouth and no ears) should carry an extra battery pack, as their operating time will be less per charge (poetic justice!). An informative chart of battery voltage versus operating time is included in the operating manual.

With the power switch turned off, the memory backup circuitry that keeps the 10 memories "loaded" draws about 0.8 mA. Though this is normally insignificant during active periods, Kenwood has included the option of eliminating even this drain over long periods of non-use: Turn the TX OFFSET to BU.OFF (back up off). I found that putting the TR-2400 aside for over a week with the memories saved would reduce later operating time before a charge was needed; reprogramming the memories is so simple a task that turning this off for extended "down times" should be standard procedure!

Another way Kenwood chose to prolong the usefulness of a full charge was to use a liquid crystal display (LCD). The TR-2400 display is non-defeatable and must be left on whenever the power is turned on; but the power consumed is truly insignificant. One complaint often heard about LCDs is that they are difficult to read. Though the TR-2400's LCD digits don't "jump out" at you like their bright-red LED counterparts, they posed no problem whatsoever even in dim lighting conditions. And, for viewing the display in total darkness, you need only throw the LAMP switch and a small bulb illuminates the entire display. As the bulb does consume a good deal of power, it should not be left on indiscriminately — but there are a few instances where you'd need more than several seconds to check your frequency.

While we're looking at the display, it would be a good time to note four LCD "pointers" that convey additional information to the operator. One, the MR indicator, tells you that the operating frequency in the display has been "called" from one of the 10 memories. The LAMP indicator lets you know that the lamp has been left on; in bright light the lamp is not noticeable and this warns you to turn it off before the batteries have unnecessarily been drawn down. A third indicator, labeled BATT, warns that your batteries are close to full discharge. When this comes on you have only enough power left for one or two *short* transmissions. The fourth indicator, ON AIR, tells you that the radio is presently transmitting; that is, it is keyed. These latter three indicators proved indispensable in saving the battery charge on several occasions.

Kenwood recommends recharging the battery pack for about 10 hours after unpacking the rig, even though the batteries are fully charged at the factory. We did this but still experienced a bit of a problem for the first few weeks of operating as the batteries would not hold a full charge for very long. Leaving the rig off for as little as two days after a full charge would leave the battery pack on the verge of "going south." After a few weeks, however, the problem seemed to cure itself, though I suspect several cycles of deep discharge and complete recharge — "exercising" the batteries — may have helped. Kenwood cautions against operating while recharging the batteries with the wall charger and recommends not leaving the rig plugged into the charger after the 15 hours required for full charge. When both cautions were inadvertently violated, the rig suffered no apparent damage, though I suspect that the potential for doing harm does exist.

Other Features

Several other features are worth mentioning. With the TX OFFSET switch you can select ±600 kHz offsets or simplex operation as with most new rigs, but one can also program so-called "oddball" splits directly. Enter the last four digits of the repeater input frequency into memory Ø (MO), enter the repeater output frequency into the display and turn the TX OFFSET switch to the M position. With this setup, you will listen on the displayed frequency and transmit on the frequency stored in MO, regardless of the size of the split. The receive frequency is displayed during receive and the transmit frequency displayed during transmit.

The remaining two push-button switches on the top of the radio control two equally useful functions. The button marked S.TONE enables a subaudible tone generator (not supplied with radio and not available from Kenwood). The instruction manual describes clearly how to install one of these generators, which are readily available from several sources for those needing tone-access capability. The NORM/REV switch allows you to "flip" your transmit and receive frequencies and "play repeater." With the button depressed, you'll receive on the repeater input and transmit on the repeater output: a quick way to check if you're close enough to someone to work them simplex, freeing the repeater for others, or for working others should the repeater be down unexpectedly for a short time.

The BNC "quick disconnect" antenna jack is one of the more useful features of the TR-2400, though few people think of it in those terms. It readily accommodates the supplied stub antenna and most any other 2-meter antenna that can be adapted to BNC. Many TR-2400 users use magnetically mounted 5/8 λ whip antennas on their cars, inserting an easy-to-find SO-239 to male BNC adaptor between the commercial antenna's PL-259 plug and the rig. A quick twist and the radio is ready to go.

The TX-PTT/STOP or transmit lockout prevents transmission when in the STOP position. This is handy when swapping between antennas or when the radio is sitting on the car seat beside you, situations where transmitting accidentally could cause you or others problems.

And for the autopatch user, the multifunction keypad does more than just "talk to the microprocessor." Twelve of the 16 keys function as a Touch-Tone generator during transmit (digits 0-9, * and #). Operation is standard, though the radio must be keyed with the PTT switch; because of the other keypad functions, the rig cannot be automatically keyed when a button is depressed.

Its multiple features, versatility and ease of operation make Kenwood's newest entry in 2-meter fm hand-helds a joy to operate.

Kenwood TR-2400 2-Meter FM Transceiver Serial No. 0121277

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 144.000 to 147.999 MHz with direct programming	143.900 to 148.495 MHz manual scan
Rf output power (50 Ω load): 1.5 W	2 W
Spurious emissions: 60 dB below fundamental	>60 dB below fundamental
Power requirements: 9.6-volt dc battery pack.	
Dc current drain:	
Approx. 28 mA receive/no input signal.	
Approx. 500 mA transmit.	
Approx. 0.8 mA memory backup.	
Receiver type: Double conversion; first i-f — 10.7 MHz; second i-f — 455 kHz.	
Sensitivity: <1 μV for 30 dB S/N.	0.31 μV for 20 dB quieting.
Audio power output, 8-ohm load: >200 mW (10% distortion).	180 mW (undistorted).
Size (HWD): 7-9/16 × 2-13/16 × 1-7/8 in. (192 × 71 × 47 mm).	
Weight: 1.62 lbs (0.74 kg)	
Color: Brushed aluminum, charcoal gray and black.	
Price class: $400.	
Manufacturer: Trio-Kenwood Communications, Inc., 1111 West Walnut, Compton, CA 90220.	

Whatever the application, autopatching, monitoring a number of local 2-meter repeaters, searching for accessible machines in unfamiliar territory or joining in a friendly roundtable, the TR-2400 will find a place in many active 2-meter fm shacks. — *Steve Place, WB1EYI*

GARGLER, INC. MICROPHONES

☐ At last! A phone operator's microphone that has all the features required by the amateur or CBer! Gargler, Inc. has developed a group of space-age microphones that will satisfy the needs of contesters, DXers and ragchewers. The manufacturer offers vanity accessories for those who wish to be "big frogs in little ponds," plus some assorted functional accessories.

The problem with past and present microphones has been a lack of variation in design. That is, most mikes have not been designed for the application, at least with respect to hams and CB operators. Furthermore, existing microphones dictate the voice reproduction quality by virtue of the bandpass constrictions of the microphone element. It dates back to the days of "burnt-lip" modulation (loop modulation), wherein one was inclined to shout into a megaphone to avoid rf burns that could result from coming into physical contact with the mike. We've progressed well beyond that primitive stage of voice operation, graduating to carbon mikes, condenser mikes, ribbon mikes, dynamic mikes, crystal mikes, electret mikes and — finally — ceramic mikes. But, all suffer the same shortcomings: no significant "bells and whistles," to use the vernacular. Transceivers have become endowed with countless unnecessary frills and goodies. Why not the same for microphones? After all, the cw operator's needs have been addressed nicely with electronic keyers, keyboard keyers, CMOS keyers and memory keyers. Why has the phone operator been ignored? We may never know the answer, but we can rejoice in the knowledge that *finally* the shy or "leather-lunged" voice enthusiast can stand proudly with his or her cw counterparts. Gargler, Inc. has answered the ssb/a-m/fm person's need!

Microphone Features

The basic microphone mainframe is their model Profundo 10X, illustrated in Fig. 9. It becomes apparent that panoramic speech was a fundamental design objective when we observe the width of the microphone head (1 ft./305 mm). The height of the head is 3 in. (76 mm). This portion of the mike is available in a plane format or with a 180-degree curvature. The latter is for those operators who move their heads and wave their arms during the heat of phone-contest operating. The curved format permits a uniform dyne level on the mike element over a 180-degree range. This prevents "voice QSB" within a 1-dB level range, which can be vital during weak-signal work.

Perhaps of equal value is the luster-chrome back shield (splatter plate). It serves three important functions: (1) It prevents saliva droplets from reaching the station equipment beyond the mike, thereby eliminating the need to periodically clean and polish the panels of the transceiver and linear amplifier. (2) It provides 30 to 35 dB of background noise (blower fans, etc.) suppression. (3) It allows the operator to see his or her own image clearly during operating periods (important to some on-the-air personalities). The reviewer wants to caution the buyer that this part of the 10X must be cleaned and polished frequently, especially if the operator is in the habit of snacking while operating.

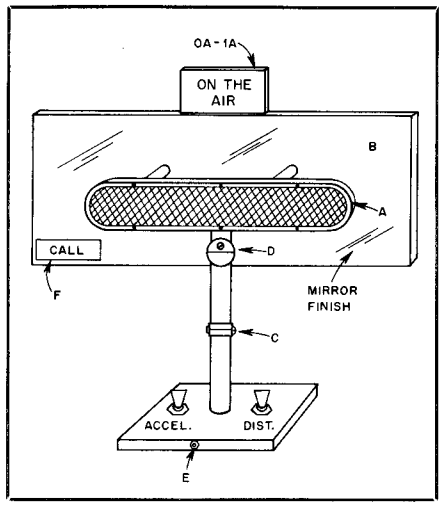

Fig. 9 — Line drawing of the Profundo 10X Magnum with connection points indicated for accessories. The mike element is 12 in. (305 mm) long and 3 in. (76 mm) high. A splatter shield is situated behind the microphone (see text).

Areas C and D in Fig. 9 are jointed. Section C permits forward and reverse tilting, while point D contains a ball joint. This makes the mike adaptable to persons of assorted heights. It also accommodates operating tables of various heights. Those with large paunches may find it convenient to lean back and place the Profundo 10X directly on the flat part of the stomach. This technique has been proved desirable for ragchewing sessions.

Other Features

Let's now discuss those space-age features of the 10X. This brings us to the Contester Model 4X Magnum. It contains battery-operated CMOS circuitry in the base of the mainframe. One circuit is called a "speech accelerator." It contains a memory and word processor that permits transmitting the human voice at four times the spoken rate. This can be equated generally to the function of a keyboard keyer with a buffer circuit. We may ask, "Of what value is this feature?" Well, if you've ever listened to the phone bands during a contest, you've no doubt heard many operators trying to talk so fast that they nearly choked! This is because some humans lack the necessary speech articulation to talk clearly while speaking rapidly. Slow talkers, and those with regional accents, will be able to match operating advantages with the best of them when using the model 4X! This circuit is invaluable in DX pile-ups for "tailending" on voice. You can almost always beat the other guy when dropping in your call at accelerated rate. *Caution:* The reviewer has learned that this feature is unacceptable for certain operators who normally are regarded as "fast talkers." The transmitted voice energy may be too fast for intelligibility, especially when QSOing with foreign amateurs who aren't adept at the English language.

For those who do not own speech processors or can't afford to buy one, take heart! The Contester 4X has a built-in circuit that can introduce just enough distortion to make one's voice sound like it has been routed through a speech processor. By actuating the DISTORTION switch on the mike base you can sound like most of those who use processing regularly, but Gargler's circuit has a "distortion limiter" that prevents excessive signal bandwidth. This enables the operator to identify with his or her peers, while not causing splatter on the phone bands, such as is commonly heard with misused conventional processors. The manufacturer plans to introduce a model Contester 10^8X in a few months. It will have "limitless distortion," which will be controlled by means of a 10-turn Helipot.

Fig. 9 shows a jack at point E. This is for use with the Gargler TI-10A outboard 10-minute automatic timer. If the operator forgets to identify his or her station each 10 minutes, the TI-10A disables the output from the mike element and inserts a voice-simulator i-d, such as, "This is KN1FE." Then the mike is reinstated for continued communications. The operator is never aware that the i-d is being sent, so the function does not interfere with the flow of speech or thought. The i-d is inserted in the buffered speech so no information is lost. Neat, we say!

Some operators insist on having an on-the-air indicator in the shack. Well, Gargler has thought of that feature too. The OA-1A plug-in display attaches to the top of the splatter shield of the Profundo, as shown in Fig. 9. This display is voice-actuated, and has an audio age circuit that prevents the light from flashing on and off in sync with the spoken words. The original model (LQ-1) used a liquid-crystal readout. Owners complained because visitors to the shack were unable to see the on-the-air sign light up. So, Gargler now uses bright red 1/2-in. (13 mm) LED blocks.

Finally, owners can have the microphone personalized at no extra cost. The call letters are embossed at the lower left of the splatter plate in 1-in. (25 mm) high gothic letters. Some of the newer U.S. calls are too long to fit on the left. In this situation half of the call is embossed on the left, and the remainder (suffix) is impressed at the lower right of the splatter shield.

We feel that this line of microphones is ideal for today's dedicated voice operator. Those seeking Ragchewers Certificates will be delighted with this apparatus. You may want to try one of the Gargler products during the phone Sweepstakes contest, or just for bursting DX pile-ups on 20 meters. Whatever your operating preference, Gargler offers you the modern approach to voice communications. Dealer inquiries are invited. — *Lypp Survis, YØWL*

Gargler Profundo 10X Microphone

Manufacturer's Specifications

Height: 2 ft (610 mm).
Weight: 5 lb (2.2 kg).
Color: Gold or chrome (buyer's choice).
Power requirements: 9-volt transistor-radio battery.
Frequency response: dc to 50 kHz.
Output voltage: 10 volts (50,000 ohms).
Price class: $495 (Contester 4X).
Manufacturer: Gargler, Inc., 70 Braeburn Rd., Bristol, CT 06010.