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Modifying the Kenwood TH-78a handheld transceiver

by Michael 'Mickey' Sattler

This document is dated Friday 17 November 1995. [Updated](#) 25 December 2002.

Note: This document predates the World Wide Web. With the exception of formatting for clarity I've chosen to leave it just as it was. Perhaps someday in the far-distant future I'll add photographs of the inside of my TH-78a, if I ever have to open it up again. ([Here are the pictures.](#))

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Introduction

Welcome to the "complete (and mostly accurate) guide to undocumented features and modifications of the Kenwood TH-78 handheld transceiver." The owner's manual for the TH-78 is satisfactory, but it omits documenting functionality and modifications that extend the functionality of the radio. This guide doesn't cover anything the manual does, although it does clarify some features.

Kenwood will not confirm nor deny anything you read here; researching was a long process of working with [amateur radio hams](#) who were both willing to sacrifice their radios to experimentation and enthusiastic with the business end of a soldering iron. To the best of my knowledge, everything in this guide is accurate. I pass this information along without warranty as to its use for any particular purpose; because Kenwood makes revisions to their production process without letting me know, any given mod may not work on your unit (but I have noted blackouts about which I know). I certainly don't guarantee that you can perform surgery on surface-mount diodes without mistakenly ruining the radio. If you find omissions or mistakes please let me [know](#). Be sure to include the document date, found [above](#).

This document supercedes every other attempt at documenting modifications to the TH-78 that I've found on public [mod servers](#), including `th78a-0.mod`, `th78a-1.mod`, `th78a-2.mod`, `th78a-complete.mod`, `th78a-new.mod`, and `th78a-warn.mod`. I've collaborated with the authors of those files, where I could track them down.

Scope of this document

Ever since this guide has been loosed on the net, every so often [someone] asks me: *Would you happen to know a similar list for the (insert model) radio?*

Sorry, no. I know only about the radio I own. If you want to send me a radio I may make the time to investigate the heck out of it. There are web pages and "mod servers" out there.

Early model, late model

Kenwood considers any TH-78 with a serial number greater than 405xxx to be a new-model TH-78. The ARTSCI 5A techmod book calls this the "Later Model (with green

jumpers)". As the modifications differ for the models, determining which one yours is becomes worthwhile. In this document I use the terms "early-model" and "late-model".

[William A Kirsanoff](#) explained that early-model TH-78s had a fault in the microprocessor that resulted in an inability to store a PL (Phase Lock) tone in the call channels. Those who complained had the new processor installed by Kenwood when it became available. (There are two microprocessors in the TH-78; we're referring to the one at IC 5. Replacement microprocessors may have a paper label pasted on the top surface.)

The appearance of jumpers on the SMC (surface-mount component) diodes happened around this time, probably to make modification easier; one no longer needs to go poking around in the radio's delicate innards with a fat soldering iron. (When William's early-model TH-78 was upgraded his mods (removed diodes) were left in place.)

I've received email suggesting that TH-78s made after April 1994 which have serial numbers in the form 410xxx will not receive 800-900 MHz (the cellular telephone range) even after being modified. This would be in keeping with the U.S. Electronic Communications Privacy Act, which resulted in similar changes to scanners.

December 2002 - Update: Reader Evan reports

I recently obtained a TH-78A, serial # 410019XX, and contrary to what you have on your website, it does receive full 800 MHz. As a matter of fact, I'm listening now to one of the agencies I work with on 867.5375, and reception is quite excellent!

I checked the web (now that it exists) and found Kenwood Service Bulletin no. 1038 (10 February 1994) which relates

Symptom:

Due to a recent rule change by the FCC it is no longer possible to supply transceivers, or provide replacement microprocessor that would allow a transceiver to receive in the 800 MHz band.

Corrective action:

The microprocessor program of IC5 has been modified to prevent 800 MHz band reception. Production has been changed beginning with serial number lot 510xxxx. Units produced after this point will not be capable of 800 MHz reception.

Old part no. 75517GF-170-3B9

New part no. 75517GF-257-3B9

So there you have it! Thanks, Evan.

Basics of modifying the Kenwood TH-78

Instructions herein presume that you're looking at the CPU board with the rotary encoders and TX/RX busy indicators at the top.

To open the radio, follow the instructions on page 64 of the manual. Unscrew four screws and break apart the radio halves. The two TX/RX busy indicator light-emitting diodes (LEDs) have **tiny** rubber seals placed over them. These have a tendency to fall off when opening or closing the radio.

If you have installed the Kenwood Memory Enhancement (ME-1) EEPROM temporarily remove it for easier access to the diodes.

Before you de-solder anything make sure that the instructions for the mod you've decided upon require it!

Covering the processor chip and the SMC diodes is a brass shield about one centimeter square. De-solder the shield's four corners with a pin-point soldering iron and lift it with right-angle surgical tweezers.

Uncovered are the processor (which we ignore) and six surface-mount diodes, numbered sequentially from one through six (D1 - D6), **top to bottom**. To an eye used to standard-sized electronic components these millimeter-wide specks seem too small for removal.

Late-model TH-78s have two large loops of green wire; the top one is W2, the bottom, W1.

Modifications are done by breaking the circuits created by the wire or the diodes. Removing diodes is done by using a pin-point-tip soldering iron and braid (to wick away the solder before you lift out the diode). The diode can also be lifted slightly but left in place. [Rich Garcia](#) said "I found if you **briefly** touch the iron to the right side lead while gently pulling up on the SMC diode it should completely come off without needing to apply heat to the other side and further risk board damage."

After performing a mod (or mods) replace the brass shield and re-assemble the radio. Then reset the processor (as documented in the manual) and re-enter any frequencies into memory.

Modifications for the Kenwood TH-78

There are several modifications that extend transmit and receive ranges. In order of increasing range, they are:

- The "[extended receive](#)" mod - Extends the receive range while providing no additional transmit capability. This mod is used by radio shops to pacify hams who demand more. (The few stores that know of the "MARS/CAP" mod won't tell you because they don't want to be fingered when you transmit out of band.
- The "[MARS/CAP](#)" mod - Extends the transmit and receive range to include the operation frequencies of the Military Assistance Radio Service (MARS) and the Civil Air Patrol (CAP). Since the U.S. Federal Communications Commission (FCC) prohibits the use of "non-type-accepted" (modified) radios, I'm not sure if MARS/CAP folks can use this mod, or only their overseas counterparts.
- The "[beyond MARS](#)" mod - Provides the greatest range extension.

I've been told that you must choose one of these mods, that they're mutually exclusive. I believe that's what I experienced during my early mods. One ham, DAP, said the "extended receive" and "MARS/CAP" mods can coexist in late-model TH-78s (that is, both green wires can be cut). This seems to be the case; a [table](#) of that performance profile is shown.

There is also a mod that increases radio functionality:

- The "cross-band repeat" mod - Converts your TH-78 into a repeater that weighs almost nothing
-

The "extended receive" mod

Early-model instructions: Remove diode 5 (D5).

Late-model instructions: Remove diode 5 (D5) or - without any de-soldering or plate removal - cut wire 2 (W2).

The "extended receive" mod		
Range	TX	RX
50.000 - 84.199		Y
85.200 - 109.995		Y
110.000 - 117.995		Y
118.000 - 135.995		Y
136.000 - 141.995		Y
142.000 - 151.995		Y
152.000 - 173.995		Y
174.000 - 179.995		Y
300.000 - 399.995		Y
400.000 - 424.995		Y
425.000 - 454.995		Y
455.000 - 511.995		Y
800.000 - 999.995		Y

To access the extended range, press 'F' for one second and then pressing the Band button, or F(1)+Band. This will switch the UHF VFO to an 800-999.995 MHz band and the VHF VFO to a 300-399.995 MHz band. The regular VHF VFO will now receive down to 50 Mhz.

The "CAP/MARS" mod

Early-model instructions: Remove D6 only.

Late-model instructions: Remove D6 only or cut wire 1 (W1).

The "CAP/MARS" mod		
Range	TX	RX
50.000 - 84.199		
85.200 - 109.995		
110.000 - 117.995		

118.000 - 135.995		Y
136.000 - 141.995		Y
142.000 - 151.995	Y	Y
152.000 - 173.995		Y
174.000 - 179.995		
300.000 - 399.995		
400.000 - 424.995		Y
425.000 - 454.995	Y	Y
455.000 - 511.995		Y
800.000 - 999.995		

If your radio allows both the "extended range" and "CAP/MARS" mods to be made simultaneously (see note [above](#)) then your post-mod performance will look like:

Both "extended range" and "CAP/MARS" mod		
Range	TX	RX
50.000 - 84.199		Y
85.200 - 109.995		Y
110.000 - 117.995		Y
118.000 - 135.995		Y
136.000 - 141.995		Y
142.000 - 151.995	Y	Y
152.000 - 173.995		Y
174.000 - 179.995		
300.000 - 399.995		Y
400.000 - 424.995		Y
425.000 - 454.995	Y	Y
455.000 - 511.995		Y
800.000 - 999.995		Y

The "beyond MARS" mod

Early-model instructions: Remove diode 5 (D5) only.

Late-model instructions: Remove diode 3 (D3) and cut wire 1 (W1). D5 has priority over D3, so if you've

already made the mods for the early model (which included the removal of D5) you must resolder D3 into D5.

The "beyond MARS" mod		
Range	TX	RX
50.000 - 84.199		Y
85.200 - 109.995		Y
110.000 - 117.995		Y
118.000 - 135.995		Y
136.000 - 141.995	Y	Y
142.000 - 151.995	Y	Y
152.000 - 179.995	Y	Y
300.000 - 399.995		Y
400.000 - 424.995	Y	Y
425.000 - 454.995	Y	Y
455.000 - 511.995	Y	Y
800.000 - 999.995		Y

To access the extended range, press 'F' for one second and then pressing the Band button, or F(1)+Band. This will switch the UHF VFO to an 800-999.995 MHz band and the VHF VFO to a 300-399.995 MHz band. The regular VHF VFO will now receive down to 50 Mhz.

I haven't been able to verify the actual operation of my radio on all these freqs.

Kenwood talks about the difference between the "dialable" range and the operating range, but I'm not sure what they mean (and they're not too keen on clarifying).

[Elendir](#), who owns the European version TH-78e, performed the "beyond MARS" mod and thereafter noticed "the combination POWER + DUAL displays something like "SAMPLE". Anybody knows what it is about?"

One person sent me the following data, but I'm not sure what to make of it.

Transmit		Transmit	
50.000 - 135.995	AM	VHF	NA
50.000 - 179.995	FM	SUB-VHF	136.000 - 179.995
136.000 - 179.995		SUB-VHF	136.000 - 179.995
300.000 - 399.995	AM/FM	SUB-VHF	NA
400.000 - 511.995		SUB-VHF	400.000 - 511.995
400.000 - 511.995		UHF	400.000 - 511.995
900.000 - 949.995		UHF	NA

The "cross-band repeat" mod

Early-model instructions: Remove diode 4 (D4).

Late-model instructions: Remove diode 4 (D4).

To toggle the repeater mode, press 'F' for one second, then '0', or F(1)+0. The MHz dot will flash when in repeater mode.

Mods: what we know we don't know

You'll notice that none of the mods use diodes D1 or D2, which brings to mind their purpose. It has been suggested that one of them toggles the American (TH-78a) or [European](#) (TH-78e) state.

[Brendan Hoar](#) said "I think removal of D1 causes "Forced Channelized Mode", at least on the late-model radios. If you put both VHF and UHF memories into a TH-78a without D1 and power on, you are stuck in channel mode until you do a full memory reset. Remember, you can't add frequencies or do any tuning in channel mode. (If you think about it, you'll want to be very careful not to let D1's circuit become an open circuit.)"

Observations on post-mod performance

[Rich Garcia](#) said:

All original functions have stayed the same, which is great. It seems that VHF-High band has improved a bit on sensivity where it was dead as a dog before the mod (above 155.000 MHz). The 162.000 MHz band - where weather radio is - remains a bit deaf at any distance greater than about 20 miles (taking into account terrain and transmitter output power).

On UHF all public safety frequencies up to about 500 MHz seem to come in well but sensivity greatly drops from there (we really can't ask for more). Frequencies can be programed in up to the 920 MHz ham band but I have no way of measuring sensivity. 800 MHz works but the signals are very weak, you must be near the transmitter for reception. Assuming you are in the town or city where the transmissions originate, it should work.

Transmit is enabled up to and including 500 MHz, but after testing this on a frequency counter I find that a signal is only generated to about 490 MHz, even though the transmit LED shows output in the higher frequencies.

Cross-band repeat seems to work fine, but the audio is unacceptable for use. **Be aware that the radio gets hot!** Prolonged use or use on a busy frequency would not be recommended. Also remember this is a dual band HT; please use a proper antenna while in cross-band mode to avoid a high SWR (We should all know better...right?)

[Blood](#) did the "beyond Mars" mod on his late-model TH-78. He noticed that he's lost the automatic repeater shift function.

Another person said ""I found that marine weather reports at 162.40 MHz in my area were received much better on the SUB-VHF band, than on the VHF band. If you are having problems with intermodulation try

switching bands (use the SUB-VHF band rather than the VHF band).

Undocumented functions of the TH-78

These are the functions that are undocumented in the TH-78 user's manual.

Toggle SHIFT button function

The TH-78 can operate in one of two modes:

- In Split mode non-standard offsets (i.e. split frequencies) are supported, but the default offset is not programmable.
- In Shift mode non-standard offsets are not allowed, but the default offset is programmable.

To toggle the mode press Shift during power-on. To select the default offset, press F for 1 second, then SHIFT, or F(1)+Shift. See page 30 of the manual for details on changing the default offset.

Toggle Call button function

The CALL button can operate in one of two modes:

- In the default mode (CALLSW), it switches between the call channel and the last memory channel (if in memory recall mode) or last frequency (if in VFO mode).
- In Call mode it will switch from the VFO to the last memory channel and then back to the Call channel.

To toggle the mode press Call during power-on.

Cloning

This is perhaps the most glaring omission from the user's manual. The TH-78's memory can be copied from one to another entirely over the air, without cables or other special equipment. Theoretically, this could be done via repeaters, although I've never heard it done. (It may be that this feature appears only through one of the mods; I'd already modified my radio when I came across. Perhaps it's time to spend a few minutes in a ham store. :-)

Cloning is a real boon to groups that want a bunch of radios to contain the same memories, such as amateur radio clubs, search and rescue units, and people too lazy to program their radios. Of course, given that the ME-1 memory expansion unit has 250 memories, laziness is understandable.

To clone:

1. Set both radios to the same frequency.
2. Activate both radios by pressing the '0' key while turning the power on. The radios will display the word "clone".
3. Now, click the PTT button of the "master" radio. The radio will transmit in the economy low power mode. This may take about 4 minutes for fifty channels, or 20 minutes for the 250-memory ME-1.

When the data has been transferred, both radios will revert back to their original frequency. (It is recommended that a dummy load be used to prevent unwanted interference.)

4. Turn both radios off and then on again.

The slave is now a mirror-image of the master radio.

Game Mode

The TH-78 has a game mode (presumably to use up spare ROM). Being careful not to accidentally reset the memory (which happens with M + Power), press M and PTT during power-on. Both reset and game mode display all screen items for a moment, giving one a good jolt of adrenaline. To exit the game mode at any time, press the Lamp key. Neither volume, lamp, nor frequency settings can be changed while in game mode.

The top part of the display will show "H.00", which represents the high score. The lower part shows a scrolling message, "PRESS ANY KEY". Pushing any key starts a "Follow Simon" type game. The display will briefly show one of the characters '1', '2', '3', or 'F'. Press the corresponding key. The game consists of repeating the displayed character sequence, which increases by one character each round.

After you "win" the Simon memory game by getting correctly entering a sequence of twenty characters you'll proceed to a draw poker game.

The poker game begins by placing a bet from 1 to 10 by pressing '2' to increment the bet and '5' to decrement. Then press 'F' to deal five cards. The face value of the cards are displayed; the suits may be seen at any time by holding down the PTT key. Any number of cards may be discarded, and to select (or deselect) a card for discarding, press the keys '1', '2', '3', '4', or '5'. If a card is selected for discard, it is displayed "face-down".

Press 'F' again to draw new cards. Your new cards will be displayed. If your hand is 2 pair or better, the screen will show the rank of your hand on the left (2P for 2 pair, 4K for four of a kind, etc.). The pay-off for that hand will be displayed on the right. Your bet is multiplied by the pay-off factor and the resulting pile of cash is displayed in the right hand side of the upper screen. The left-hand side of the upper screen contains your table stakes, which are initially 100 coins from winning the Simon game.

If you win the poker hand, pressing any key steps into the next stage. If you lose the poker hand, your bet is deducted from your stakes and you are asked to start another poker hand. In the next stage, you are asked "TRYB/S" which means, "Do you want to try double-or-nothing in a guessing game for Big or Small cards?" Press 'F' for yes, press TONE for no. If you say no, your winnings are credited into your stakes and you are asked to start another poker hand. If you say yes, then a single shuffling/incrementing card is displayed on the left, and three stars are displayed on the right. You have to choose to go for either BIG or SMALL, by pressing '2' or '5'. You can keep pressing '2' and '5' to change your mind. When you are ready, you must try to hit the 'F' key to stop the rotating card display, and the card will show, and you will either win, lose, or draw. If you draw, you have to play big/small again, I think. If you lose, your winnings are gone and you can play poker again. If you win, your winnings double and you are asked whether you want to play big/small again.

The payoff odds on poker are set against you; the double-or-nothing game includes a draw, so the odds are against the player unless you can time hitting the 'F' key to win more than half the rounds. I haven't managed to do this, so I don't know if there is anything beyond this. When the table stakes are exhausted, you go back to playing Simon again.

(james@brokaw.lcs.mit.edu is credited for "much of this".)

Hardware problems with the TH-78

Several hams (including myself) have noticed inherent design flaws with the TH-78. While there's little that can be done (and what can is noted), being aware of the problem is most of the battle.

Antenna mount design flaw

This is the one that'll get you first. During normal use the antenna gets jiggled, especially if you've bought a half-meter high-performance whip antenna to replace the "rubber ducky" dummy load stub antenna that comes with the TH-78. The antenna is mounted on a mail BNC plug, which is in turn connected to the radio innards with a rigid solder joint instead of a flexible wire. When this solder joint breaks (and it will) you'll neither be able to transmit nor receive because the antenna is no longer connected to the radio proper.

Remember what the manual says about transmitting without the antenna! You can burn out your radio while you're trying to figure out what's wrong. If you're electrically minded I suggest a prophylactic first strike with a soldering iron and a centimeter of wire.

Potential case design flaw

Some time after performing mods on his TH-78 wble@klrqq.me.usa.na (which no longer exists) saw the display blank; the radio would not turn back on. With the radio opened he could turn on radio. The contents of memory had been lost. The cause turned out to be some component pins on the front face coming in contact with the square bodies of the two volume/channel/squelch switches when the case is closed.

Placing small insulating strips of electrical tape on the sides of the switches takes care of the problem.

[Mark Olson](#) confirmed this. "There is a warning on some of the rig mod bulletin boards about this. The problem is that pins on the back side of the PCB that is mounted on the front half of the TH-78 can come into contact with the volume control housings mounted on the PCB on the other half of the unit. My radio had this problem until I put electrical tape across these housings. Symptoms were display blanking momentarily and the radio power cycling, sometimes causing memory erase when pressure was applied to the front of the unit or to the volume controls. I originally thought that it was a loose battery connection."

C-17 design flaw

[William A Kirsanoff](#) said "the TH-78 will lose C-17 on the control board if dropped, period. This causes loss on receive audio on the left-hand side of the radio. The solder pads for that cap are not big enough. If you find the need to replace C-17, use a gap-fill cyanoacrylate glue like Zap-A-Gap (tm) to increase the device footprint. I have learned the hard way. Otherwise, I have found it to be a fine radio. My only problems have been related to the C-17 issue and attempts to rectify it. Had I been given the above advice, it would have been a one-time only issue. As it is, I took out one of the microprocessors yesterday looking for a bad solder joint that was induced by my attempt to solve the C-17 problem (sigh). This radio gets a lot of use and a lot of travel. C-17 is the only thing that I have broken with the case closed. :-)"

Losing the call channel CTCSS tone

I'd heard that some TH-78s lost the call channel CTCSS tone and posted a general query: "Can you come up

with an easy procedure for the readers of the guide to check whether their particular TH-78 loses the call channel tone?"

[George Lin](#) answered: "Sure. Go to the oscillator on the right (UHF oscillator). Select a UHF frequency on the VFO. Set the CTCSS tone frequency to some arbitrary number, say, 94.8 Hz. Turn on the CTCSS. Save the whole thing under the call channel for UHF. Select another UHF frequency. Select another CTCSS tone. Turn the sub-audible tone on and save it under a spare memory channel. Go back to the call channel and check the tone frequency."

TH-78 miscellany

The following are nowhere as important as are the preceeding, but they may prove useful to you.

Cellular telephones and the TH-78

Cellular telephones (in the USA) transmit at 824.040 - 848.970 MHz and receive at 869.040 - 893.970 MHz. These frequencies are well within reach of your modified TH-78. Cell phones frequencies have 30 KHz increments, your TH-78 will increment in 25 KHz steps at this frequency range, meaning that the exact cellular frequency cannot be tuned in (most of the time).

Legal hand-waving notice: in the USA the Electronic Communications Privacy Act forbids you from monitoring cell phones.

TH-78 in-band full-duplex operation?

Early on I'd mentioned that I've had one report that the TH-78 is capable of in-band full-duplex operation. As I'd been unable to get my TH-78 with the CAP/MARS mod to do it. I asked for confirmation of this feature.

[Neal, KD6HPG](#) said "My friend (N6RNF) has a early-model TH-78 which was capable of doing in-band full-duplex. I have a late-model and can't get it to work. My friend's radio has the beyond MARS mod."

Battery life on the TH-78

[Eric Williams](#) investigated battery life issues after hearing complaints. Checking the power consumption under various configurations, Will came up with the following suggestions:

- The rig draws close to 2ma even with the power turned off, so don't leave the rig off with the battery installed for several days and expect full capacity to be maintained.
- If you're only using one of the bands, shut down the other to extend your battery's life. Battery consumption with the squelch closed is cut by almost a third.
- If you're monitoring two frequencies on the same band, use the f2 button to receive both simultaneously rather than scanning between them. The battery saver with two simultaneously inputs uses about half the current of one scanning input.
- You can construct a battery pack by putting nickel metal hydride (NiMH) AA cells in a Kenwood BT-8

battery holder. A small strip of aluminum from the positive battery terminal to the depression in the top of the case will allow you to recharge the pack inside the rig. This will give you 1000 mAh capacity without enlarging the size of the radio and with no memory effect. (But they **are** expensive.)

In the case of power-saver mode, figuring out the average current with my DVM was impossible, so I ran the radio on a large capacitor and timed how long it took to die.

TH-78a (American) vs. TH-78e (European/Japanese)

Kenwood makes one stock TH-78 radio, and then uses diodes to customize for the marketplace (USA, Europe/Japanese, ham users, public service users, etc.). Here are some of the observed differences between the American and European/Japanese modes.

CTCSS differences

[Eric Williams](#) reminds us that the manual says that the CTCSS module is an option on the European model, but standard on the American one.

[Vince](#) explained that's because [the French] repeaters are activated by a 1750 Hz tone. If I intend to go to US this summer, must I buy the CTCSS module?

[Alan K Biocca, WB6ZQZ](#) related that while it varies geographically, where I am (Lawrence Berkeley Laboratory, California) very few 2-meter repeaters require CTCSS tones; most 440 MHz repeaters do. Many of those that do are closed anyway. You can probably get by without them.

[Geoffrey S. Mendelson, N3OWJ](#) said that it depends on where you are. In the Philadelphia area most of the open 440 MHz repeaters use CTCSS and none of the 2-meter ones do. At least one uses CTCSS for remote inputs. About 60 miles away in southern New Jersey, all of the 2 meter and 440 repeaters use CTCSS.

Frequency range differences

We were discussing whether the unmodified UHF transmit range is different in the different modes. [Kenneth E. Harker](#) passed on the VHF - UHF bands authorized in France: 50.2 to 51.2 with a special authorization, 144 to 146, 430 to 440 (shared band). [Lawrence Chen](#) provided the authorized bands in North America: 50-54, 144-148, 220-225 (222-225 in US and soon to be Canada), 420-450 (420-430, a shared band available only by special permission.

This led to the conclusion that the TH-78e only does 144-146 and 430-440 while the TH-78a does 144-148 and 440-450.

[Torsten Leibold](#) tied it all up. "Yep, you're right. The TH-78e does 144-146 MHz and 430-440 MHz without modifications. I guess there are some secret codes to switch it to the American bands, but I don't know them.

As mentioned before, we believe it's one of the [as-yet unused diodes](#) that toggles between 'A' and 'E' performance.

Customizing the start-up message

[William A. Kirsanoff](#) reminded us "just in case you're doing a message write, don't pick slot zero. That would change your start-up message, which by default is "TH-78A", mine is "KD6MCI" :-). You can crack open the manual and read up on how these features work. I use the autodialer regularly. I don't have much use for the message memory other than the start-up trick though.

Greg Hammond's Receiver Tests

[Greg Hammond](#) shared with us the results of a quick comparison of TX power output between the TH-78a, the Alinco DJ580, and the Standard C558.

Test conditions: Powered from 7.2 volt battery pack. Single band mode used. All figures are for NFM mode unless stated otherwise.

Method: FM mode: The audio output from the earphone jack was measured with an AC millivolt-meter. A calibrated RF generator was connected to the antenna BNC. The RF generator output level was increased until a 12 db fall in audio (noise) was measured. The generator level was recorded in the 'Sensitivity' columns below. There was no modulation on the RF signal.

AM mode: Same as above except the generator level was adjusted so that changing the AM modulation from 0% to 90% caused a 12 db increase in audio output. The modulation frequency was 400 Hz.

Sensitivity was measured at the displayed frequency and the first IF image frequency.

Image frequency = Displayed frequency +or- (first IF frequency * 2).

Results: The Kenwood had by far the highest power output at 477 MHz. Sometimes the TH-78a is more sensitive at its image frequency; 395 MHz to 430 MHz is best received by tuning from 305 MHz to 340 MHz.

First IF = 58.525 MHz

Signal Sensitivity		Image Sensitivity	
MHz	uV	MHz	uV
400	33	282.95	235
405	4.8	287.95	
410	2.5	292.95	990
415	1.2	297.95	
420	0.58	302.95	1200
425	0.28	307.95	
430	0.18	312.95	1800
435	0.18	317.95	
440	0.16	322.95	1750
445	0.22	327.95	
450	0.34	332.95	260

455	0.9	337.95	
460	2.1	342.95	185
465	4.4	347.95	
470	9.3	352.95	160
475	17	357.95	
480	39	362.95	160
485	94	367.95	
490	130	372.95	155
495	225	377.95	
500	400	382.95	90
505	670	387.95	
510	1350	392.95	23

TH78A Receive sensitivities. (Sub UHF)

First IF = 45.05 MHz

Signal Sensitivity		Image Sensitivity	
MHz	uV	MHz	uV
400	4.63	309.9	2920
405	2.85	314.9	2190
410	1.64	319.9	1230
415	0.693	324.9	468
420	0.32	329.9	184
425	0.224	334.9	200
430	0.191	339.9	200
435	0.166	344.9	129
440	0.155	349.9	94.5
445	0.137	354.9	66.1
450	0.135	359.9	36.4
455	0.137	364.9	19.5
460	0.2	369.9	13.2
465	0.372	374.9	11.9
470	0.751	379.9	9.34

475	1.37	384.9	10.6
480	2.49	389.9	8.72
485	3.59	394.9	5.32
490	3.94	399.9	2.22
495	3.64	404.9	0.956
500	3.76	409.9	0.583
505	4.27	414.9	0.625
510	5.25	419.9	0.742
515	6.03	424.9	0.924
520	6.93	429.9	0.945
525	7.42	434.9	0.913

TH78A Receive sensitivities. (Main VHF)

First IF = 45.05 MHz

Signal Sensitivity		Image Sensitivity		
MHz	uV	MHz	uV	
90	1.9	AM	180.1	1.48
95	1.32	AM	185.1	2.09
100	0.95	AM	190.1	4.68
105	0.75	AM	195.1	
110	0.49	AM	200.1	33.1
115	0.4	AM	205.1	
120	0.33	AM	210.1	234
125	0.26	AM	215.1	
130	0.25	AM	220.1	933
135	0.24	AM	225.1	1780
140	0.14	230.1	600	
145	0.13	235.1	980	
150	0.14	240.1	2100	
155	0.16	245.1	8400	
160	0.24	250.1		
165	0.33	255.1		

170	0.5	260.1
175	0.76	265.1
180	1.1	270.1

TH78A Receive sensitivities. (Sub VHF)

First IF = 58.525 MHz

Signal Sensitivity		Image Sensitivity	
MHz	uV	MHz	uV
110	1.8	227.05	410
115	0.69	232.05	
120	0.4	237.05	655
125	0.32	242.05	
130	0.32	247.05	785
135	0.258	252.05	
140	0.2	257.05	1502
145	0.165	262.05	
150	0.15	267.05	7400
155	0.15	272.05	
160	0.175	277.05	
165	0.168	282.05	
170	0.225	287.05	6200
175	0.335	292.05	2150
180	0.44	297.05	1200

TH78A Receive sensitivities. (Sub UHF 320MHz, NFM Mode)

First IF 45.05 MHz

Signal Sensitivity		Image Sensitivity	
MHz	uV	MHz	uV
305	1.59	395.1	0.324
310	1.32	400.1	0.285
315	1.06	405.1	0.232
320	0.832	410.1	0.189

325	0.646	415.1	0.178
330	0.576	420.1	0.17
335	0.372	425.1	0.18
340	0.335	430.1	0.186
345	0.351	435.1	0.214
350	0.412	440.1	0.292
355	0.519	445.1	0.324
360	0.685	450.1	0.427
365	0.924	455.1	0.625
370	1.28	460.1	0.924
375	1.7	465.1	1.26
380	2.17	470.1	1.76
385	2.6	475.1	2.54
390	2.99	480.1	3.31
395	2.27	485.1	3.2

TH78A Receive sensitivities. (900Mhz)

First IF 58.525 MHz

Signal Sensitivity		Image Sensitivity	
MHz	uV	MHz	uV
800	1.46	682.95	178
810	0.8	692.95	237
820	0.56	702.95	442
830	0.51	712.95	232
840	0.525	722.95	82.3
850	0.617	732.95	49
860	0.814	742.95	35.1
870	1.15	752.95	27.3
880	1.46	762.95	17.8
890	1.89	772.95	11
900	2.49	782.95	7.34
910	2.95	792.95	4.47

920	3.17	802.95	2.63
930	3.2	812.95	1.68
940	3.24	822.95	1.32
950	3.35	832.95	1.19
960	3.64	842.95	1.16
970	3.94	852.95	1.22
980	3.99	862.95	1.28
990	3.68	872.95	1.35
1000	3.28	882.95	1.34

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