gary@ke4zv.uucp (Gary Coffman) writes:

>In article <9301041923.AA01850@mwunix.mitre.org> m22755@mwvm.mitre.ORG (Terry
Alford) writes:
>> A few weeks ago, I purchased an FT-470 2m/70cm HT. I've been monitoring
>>this newsletter for about 2 months, but so far have found no references to any
>>mods pertaining to this HT. I do not have access to ftp, but would welcome e-
>>mail, or a posting here advising me of possible mods to increase receive
>>bandwidth, etc. --- or any other information of interest about this model.

-=-

                     Yaesu FT-470 MODS
                    Rev D (Aug 28, 1992)

This is a collection of hardware and software mods for the Yaesu 470.
I have collected every mod seen on the net (ie. Usenet) since the
introduction of the 470, so I think this list is fairly complete. I
am interested in getting updates and corrections to this list, so
please send me e-mail if you find something that needs updating.
(This includes typos, wrong or missing attributions, caveats, warnings
about unmentioned side effects, serial numbers of radios that won't do
some of these mods, etc.)

SOME OF THESE MODIFICATIONS CAN DAMAGE YOUR RADIO IF YOU PERFORM
THEM IMPROPERLY. WHEN IN DOUBT, DO NOT PERFORM THE MODIFICATION.

This advice is free, so remember that you get what you pay for.

        Brian McMinn (brian@nucleus.amd.com)
        N5PSS
        512-462-5389

-=-

Full Reset:

        Effect: Severe! :-)

        1) Make hard (paper) copy of all memory info
        2) Turn radio off
        3) Hold down VFO and MR and turn radio on
        4) Replace all memory contents

        Notes: This will reset the auto repeater offset function, so
        you will need to re-enable it if you use it. This will also
        disable (mask) all memories except #1, so you will have to
        enable each of them by hand.

        Attributed: Yaesu

-=-

MARS Mod:

Effect: Enable extended 2m receive, 2m transmit

1) Make hard (paper) copy of all memory info
2) Turn radio off
3) Hold down up-arrow and down-arrow and turn radio on
4) Replace all memory contents

Notes: This mod wipes all memory contents. This is a "toggle"
mod in that it can be un-done by repeating the above steps.
The normal->MARS mod only wipes the memories. The MARS->
normal mod not only wipes the memories, it appears to do a
complete controller reset (see above).

Result: Receive range 130-180 MHz, transmit 140-151MHz (I
think, I haven't tried it.)

Attributed: Yaesu

-=-

Crossband Repeat:

Effect: Enable crossband repeat

1) Dial up two frequencies you want to crosslink (be sure to
   pay attention to transmit offsets, if any)
2) Turn radio off.
3) Hold down the RPT key and turn radio on

Result: The tone encode/decode flags and the -+ flags will be
flashing and the radio will be in low power mode. When either
band's squelch opens, the other band is moved into the primary
frequency display and the transmitter keys. Audio link
appears to be speaker to mike.

Attributed: Collier Chun (NM7B @ WA7ARI)

-=-

Crossband Repeat Audio Cable:

Effect: Provide better audio for crossband repeat.

1) Parts:
        a) mini plug
        b) 100K ohm resistor
        c) sub-mini plug
2) Assemble cable with resistor connecting the tips of the two
   plugs. The shield (ground) is not connected.
3) Plug it between the earphone jack and the mike jack.

Result: Very good crossband audio. The level is controllable
with the volume control.

Bugs: You can't listen to what is being repeated.

Attributed: Keith McQueen (N7HMF @ NV7V.UT.USA.NA)

-=-

Clone Mode:

Effect: Allow editing of transmit and receive frequencies.

1) Turn radio off.
2) Hold down F key and turn radio on.

Result: All segments of display are turned on. The radio
will send data out the microphone tip when up-arrow is
pressed. The radio will receive data when the down-arrow is
pressed.

Bugs: I have yet to hear of someone who has done this
successfully. Please tell me if you know how it works!

Attributed: szarekw@LONEX.RADC.AF.MIL (William J. Szarek)

-=-

Internal Jumper Mods:

Effect: Change radio from US to European to ???
         Wide band receive

I have located a total of eight straps, four to the left of
the lithium battery, and four others under the flat white
cable that interconnects the upper half with the lower half.

                    Yeasu FT-470 Straps

R69 Vertical, at the 10 o'clock position by the lithium cell
R68 Horizontal, to the lower left of R69
R67 Horizontal, just below R68
R66 Horizontal, just below R67

R71 Vertical, the leftmost of three, to the left of the upper
     corner of the ribbon cable connector.
R70 Vertical, the center of three of which R71 is the leftmost
R72 Vertical, the rightmost of the three
R74 Vertical, to the left of the ribbon cable connector, below
     the three. (Note that R74 is below an unpopulated capacitor
     that does not have a C number.

There is no R73, or at least it is not on the circuit board
and it is not in the schematic. And, yes, the order of those
three is indeed R71, R70, R72, left-to-right.

                  UHF CHOICES

     R71   R70   R72   Rx and Tx   Rx only
     ----
     0   0   0   430 to 440   430 to 500
     0   0   1   430 to 450
     0   1   0   430 to 440
     0   1   1   432 to 438
     1   0   0   430 to 440**
     1   0   1   220 to 225
     1   1   0   430 to 440
     1   1   1   210 to 235

                    VHF CHOICES

     R66   R67   R68   R69   Rx and Tx   Rx only
     ----
     0   0   0   0   144 to 146   130 to 180
     0   0   0   1   144 to 146
     0   0   1   0   1260 to 1300
     0   0   1   1   1240 to 1300
     0   1   0   0   140 to 150*   130 to 180
     0   1   0   1   140 to 174
     0   1   1   0   303 to 343
     0   1   1   1   8AL to 242
     1   0   0   0   144 to 148
     1   0   0   1   144 to 146**
     1   0   1   0   1240 to 1300
     1   0   1   1   404 to 444
     1   1   0   0   140 to 160
     1   1   0   1   1260 to 1300
     1   1   1   0   101 to 141
     1   1   1   1   1R3 to 158L
     ----

* This is the normal US configuration after MARS mod.
** This is the normal European configuration.

(Note: the receive only ranges are enabled by powering up the
unit with the up and down arrow buttons depressed...kjm)

When there is more than one combination which has the same
frequency range, the difference is the default step size
and/or the default repeater offset. Of course, choices that
do not match the VCO and filters do not actually transmit or
receive on those frequencies. A particularly strange example
is that the VHF side of the set can be set to tune from 404 to
444 MHz, but again, it won't actually lock. Even in the
101-141 mode, the VHF VCO will not lock - this must be for use
with some other sort of VCO (It looks like this would cover
the aeronautical band rather nicely.) There are two really
wierd VHF settings, those for 8AL-242 and 1R3-158L. These
must be for use with some other LCD controller - it displays
truly unusual and non sequential thins when stepped through
the "bands".

R74 seems to have something to do with selecting the IF
frequency, or something similar. When set, it really screws
up the VHF reception.

My technique for determining these straps is to remove the
straps that come in the unit, solder wires to each pad, run
the wires out of the unit to a bank of DIP switches, screw the
unit back together, and then go through all of the DIP switch
combinations. I usually use a stereo microscope and 30 guage
wire for this. Since I didn't try powering the unit on with
every combination of keys held down for each DIP switch
combination, there may still be other secrets possible.

I was looking for something like receive and transmit from
zero to infinity, but I didn't find it. I determined, from

studying the schematic, that there should be a hiddem
strapping diode from CPU pin 2 to CPU pin 22. I installed
one, but nothing changed. In fact, changing it and powering
the unit up did not cause a reset. Therefore, I concluded
that this really wasn't a mystery strap, afterall. However,
there could be others. I'm trying to get a data sheet for the
CPU, from Hitachi, to see if any of the grounded pins are
actually I/O pins -- they might be good candidates,
particularly if their traces are routed in such a way as to be
easily accessible for cutting.

I've learned that one of the ways to get some of the other,
new Yeasu handhelds to go out-of-band involves dumping data
out of the clone port, editing the data, and then dumping it
back in. I called Yeasu and asked if the FT-470 could be
cloned. They said no, so I ignored them. I haven't figured
out how to get it to dump data, but I believe it will accept
data. The clone mode is entered by powering up the unit with
the F key held down. (It's also a neat way to see all of the
indicators on the LCD!) The data must be presented in the
ring ("right channel") of a stereo 2.5 millimeter plug which
is placed into the mic jack. This is cryptically marked on
the schematic, anyway. However, I have no idea what the
format for the data should be. If you come across this, I'd
love to know. This may be the trap door to getting the rig to
receive and transmit in more interesting places.

Attributed: Ed Boakes (WB3FLD) att!hocpa!ewb

-=-

VHF Transmit mod:

Effect: Enables extended VHF transmit (this is exactly the
   same as one of the previously listed mods).

1) Open the radio such that the two halves open like a sandwich.
2) Locate the internal lithium battery
3) Locate several solder pads to the left of the lithium battery.
4) Just to the top left of the lithium battery is ONE vertical
   solder pad (a.k.a. R69). It is almost under the top left
   edge of the battery.
5) solder a jumper accross this pad.

Result: Extended VHF transmit

Bugs: The automatic repeater shift (- offset below 147,
+ above etc...) goes away with this mod.

Attributed: randall@informix.com (Randall Rhea)
Also attributed to: Bernie NU1S @ K1UGM

-=-

Software UHF Receive Expansion:

Effect: extend UHF Rx to 500MHz without shrinking Tx range

How: Trick 470 into accepting big number in U register.

Caveat: This mod acts differently on different radios.

1) Turn the beep on. (Some, perhaps all, 470's require that
   the key-press-beep function be on in order to do this.)
2) Program the frequency of 450.00 MHz simplex.
3) Set the repeater offset to zero (F/M RPT 0000) but DON'T
   get out of the set mode (don't hit RPT again).
4) Turn the radio off then back on.
5) Set a "+" offset (press RPT twice).
6) Press the REV button one time.
7) The radio should now display 1450 MHz.(The radio will not
   operate at these frequencies. My service monitor shows
   that above 500 MHz the rx is very weak.)
8) Use the shifted down-arrow key to tune this frequency down to
   around 500 MHz (press F/M, press and hold down-arrow). Yes,
   this takes a while.
9) Store this in the "U" memory. (press and hold F/M until
   you hear two beeps, rotate tuning knob until "U" appears in
   upper left, press F/M again).
10) Reset the repeater offset to 5 MHz. (F/M RPT 0500 RPT)

   Result: By selecting the "U" memory and the using the memory
   tune fuction (select "U" memory and then press MR), you can
   tune to the desired frequency and then store it in another
   memory.

   Bugs: Above 500 MHz, some radios will let you tune up and
   down in frequency, some won't (they jump back to the ham
   band). Some radios will let you enter a frequency above 500
   MHz on the keyboard while in memory tune mode, some won't.

   Attributed: Darrell Sego KM9S

-=-

Software Range Extention Tricks:

   Effect: Force a non-standard frequency into a VFO, store this
   as an upper limit in the "U" or "L" memory.

   Caveat: For these steps to work properly, I had to have
   "Beep" enabled and *NOT* have the "L" and "U" memories locked
   out.

   Steps for setting the UPPER UHF limit to 500 MHz

   1. Program the frequency for 430.00 MHz *SIMPLEX*.
   2. Press F/M, then RPT for the offset.
   3. Enter the code 0000 into the keypad.
   4. Shut the transceiver off, then turn it back on.
   5. Press RPT key twice for a "+" (plus) offset indication.
   6. Press REV button once.
   7. The radio should now display 1430.00 MHz.
   8. Press F/M then hold the down-arrow key to lower the
       displayed frequency. Stop when 500.00 MHz is displayed.
   9. Press RPT once to select simplex operation.
   10. Press F/M and hold until you hear two beeps.
   11. Rotate the (DIAL) knob until the channel "U" is displayed.
   12. Press F/M again, you should hear a beep.
   13. Press F/M then RPT then enter 0500 (5 MHz repeater offset)
       then press RPT again.

       - alternative procedure (faster but a little more complicated)

```
8.  Press RPT twice to select the "-" repeater offset.
9.  Press REV twice.  Frequency shown should be 630.00 MHz.
10. Press F/M then hold the down-arrow key to lower the
    displayed frequency.  Stop at 500.00 MHz.
11. Press RPT twice to select simplex operation.
12. Go back to #10 in previous list...

------------------------------------------------------------------

Steps for setting the LOWER UHF limit to 400 MHz.

1.  Program the frequency for 450.00 MHz *SIMPLEX*.
2.  Press the F/M, then RPT for the offset.
3.  Enter the code 0000 into the keypad.
4.  Shut the transceiver off, then turn it back on.
5.  Press RPT once (for a "-" (minus) indicated offset).
6.  Press REV *THREE* times.
7.  The radio should now display 050.00 MHz.
8.  Press F/M, then hold the up-arrow key to increase the
    displayed frequency.  Stop at 400 MHz.
9.  Store this in the "L" memory.  (See above steps...)
10. Press F/M then RPT then enter 0500 (5 MHz repeater offset)
    then press RPT again.

    - alternative procedure
    - note:  this short-cut requires you to enter 430.00 MHz
      in step 1.

5.  Press RPT twice for a "+" (plus) indicated
    repeater offset.
6.  Press REV once.
7.  Press RPT twice to select the "-" (minus) repeater offset.
8.  Press REV once.  You should have 1030.00 MHz displayed.
9.  Press F/M and hold the down-arrow stopping at 999.00 MHz.
10. Press REV once.  You should have 399.00 MHz displayed.
11. Press F/M, then hold the up-arrow) key to increase the
    displayed frequency.  Stop at 400 MHz.
12. Press RPT twice to select simplex operation.
13. go back to #9 in previous list

------------------------------------------------------------------

Steps for setting the UPPER VHF limit to 200 MHz.

1.  Program the frequency for 140.00 MHz *SIMPLEX*.
2.  Press F/M, then RPT for the offset.
3.  Enter the code 0000 into the keypad.
4.  Shut the transceiver off, then turn it back on.
5.  Press RPT twice (for a "+" (plus) indicated offset).
6.  Press REV *ONE* time.
7.  The radio should now display 1140.00 MHz.
8.  Press F/M, then hold the down-arrow key to decrease the
    displayed frequency.  Stop at 800 MHz.
9.  Press RPT twice to select the "-" (minus) repeater offset.
10. Press REV once.  You should have 200.000 MHz displayed.
11. Press RPT twice to select simplex.
12. Store this in the "U" memory.  (See above steps...)
13. Press F/M then RPT then enter 0060 (600 Khz repeater
    offset) then press RPT again.

------------------------------------------------------------------
```

Steps for setting the LOWER VHF limit to 100 MHz.

1. Program the frequency for 140.00 MHz *SIMPLEX*.
2. Press the F/M, then RPT for the offset.
3. Enter the code 0000 into the keypad.
4. Shut the transceiver off, then turn it back on.
5. Press RPT twice (for a "+" (plus) indicated offset).
6. Press REV *ONE* time.
7. The radio should now display 1140.00 MHz.
8. Press F/M, then hold the down-arrow key to decrease the
    displayed frequency. Stop at 1100 MHz.
9. Press RPT twice to select the "-" (minus) repeater offset.
10. Press REV twice. You should have 100.000 MHz displayed.
11. Press RPT twice to select simplex.
12. Store this in the "L" memory. (See above steps...)
13. Press F/M then RPT then enter 0060 (600 Khz repeater
    offset) then press RPT again.

    Notes: To use the higher frequencies you have to select the "U"
    channel and press MR. This puts the handheld in the "MT" (memory
    tune) mode. From there you can scan down or use the (DIAL) knob to
    go to a lower frequency. ...Likewise for the lower frequency
    memory. Any frequency selected using this method can be stored in
    any memory.

    My radio will not let me go up in frequency, only down. If I try, the
    rig will default back to the original ham band. I had to be careful
    when doing these mods.

    One trick I found when initially setting up the VFO with the
    expanded upper and lower frequencies is that in steps 5 (and 9) if
    you select "+", pressing REV adds 1000 MHz to the display or
    subtracts 1000 MHz if it has already been added. If you selected
    the "-" (minus) repeater offset, pressing REV will subtract 400 MHz
    if the displayed frequency is 1000 MHz or higher, or subtract 600
    MHz if the displayed frequency is below 1000 MHz, until any more
    subtractions would run the frequency negative, after which it
    alternatively adds or subtracts 600. You can mix the up-arrow
    down-arrow method with the "+ -" offset/REV combination to reduce
    the time getting to the desired frequency. With these tricks, many
    permutations can be found to get where you want to be very quickly.

    I have discovered the code "5555" works as well as "0000" for the
    enabling code.

    Attributed: fletcher@lode.uwyo.EDU (Walter Reid Fletcher, WB7CJO)

-=-

Fix One-Way Tune Bug in Expanded Receive:

    Effect: Allow tuning in both directions when software range extend
    mods have been performed.

    Due to a loophole in the tuning software, you may tune from the
    current frequency towards the normal operating range (430.00 -
    450.00), but not away.

    Unfortunately, you are still subject to the "tune one way only"

syndrome. To bypass it, you must store some frequency in the "L"
memory. It doesn't matter what this frequency is, but it has to be
below the "U" memory and, preferably, below any other frequency you
want to use. You may store a very low frequency here too
(0.00MHz).

BUT, the software isn't that dumb. To trick it, both the "L" and
"U" memories must be filled and active (not set for SKIP), AND you
must access the out of band frequencies from the MT (memory tune)
mode, AND you must start from either the "L" or the "U" memory.

To use MT:
1) Press MR and select either the L or U memory.
2) Press MR again, a small MT should appear on the left of the
   display.
3) You may now tune with the arrow keys, Dial knob, or directly
   enter frequencies with the numeric keypad.

Attributed: kd6hr.El_Segundo@xerox.com (Pete McAfee)
[ed. It looks like Pete may have been the first to discover some
of these neat tricks... any comments?]

-=-

Out of Band Sensitivity:

Effect: This is not a mod. Just information.

I measured the sensitivity of my Yaesu FT-470 over frequency
to see how well it holds up outside of the ham bands. I
wanted to see how useful the extended receive info being
handed out really was.

The measurement is a relative one. I was using an HP8657
Signal Generator, with the internal FM modulation set to 5 KHz
deviation and a 400 Hz tone. I input a signal with an
amplitude of -100 dBm directly into the RF input of the radio.
I noted the reading on the signal strength meter in the Yaesu.
On the VHF band the number nine was on steadily, on the UHF
band the number nine was blinking. As I changed frequencies I
adjusted the amplitude of the signal generator to keep the
signal strength meter on the Yaesu at the same level. The
amount I had to crank up the output of the signal generator is
the reduced sensitivity, here is the data:

VHF
freq: relative sensitivity:
136   -14 dB
140   -3 dB
144   +1 dB
146   0 dB   reference point
148   -1 dB
155   -6 dB
160   -22 dB
165   -29 dB
170   -38 dB
174   -44 dB

UHF:
freq: relative sensitivity:
400   no reading, nothing, -infinity dB
401   -40 dB

```
402      -38 dB
405      -34 dB
410      -27 dB
420       -9 dB
430       +1 dB
440        0 dB
450        0 dB
460      -17 dB
470      -26 dB
```

Results: The radio is good outside the ham bands, but the
sensitivity really starts to suffer. I hear the local police
at 460.375 quite well, so -17 dB is still usable, but not as
good as a scanner would probably be. VHF down to 100 MHz or
UHF down to 400 MHz is a fantasy. As I mentioned in another
post, if the frequency ranges are extended too far, you start
picking up signals at the wrong frequencies. National weather
service (162.4) received at 119 MHz, coast guard channel 12
(156.8) received at 200 MHz, 2 meter repeaters received around
190 MHz and again around 182 MHz. Its hard to say just what
the usable ranges are, but something like 136-165 MHz in VHF
and 410-470 MHz in UHF, and even then its not great at the
ends of these ranges.

Attributed: frankb@hpsad.HP.COM (Frank Ball)

-=-

Hyperscan:

Effect: faster memory scan rate.

1) Go into Alt mode by pressing [F] 2 (Alt).
2) Press the Up or Down Arrow to activate the Memory Scan.
3) When the Scans stops on a VHF frequency on the Left Display (The
   Main Band), Hit [F] VFO.
4) Press the Up or Down Arrow to activate the HyperScan.
5) To Stop the Function, Press [F] Alt.

Result: Faster scan rate. (Mod is non-permanent)

Attributed: KB2JFI ???

-=-

Extended RCV side effect #1:

     I have found what I would consider an interesting side
effect with my FT-470 now that I have performed the UHF
extended receive modification. [not sure which UHF mod this
is, ed.]

     After I had done this mod, I found out that if I was
scanning (in either Memory Tune mode or band-scan mode(between
U & L)) the VHF side of the radio in the sub-band, and
listening to an extended frequency in the UHF main band, the
scanning would stop and revert back to whatever frequency it
started from whenever a signal was received on the UHF side.
(I don't know what frequency it reverts back to if you are
scanning a VFO, but I do know that a similar thing happens).

Attributed: v108qhu6@ubvmsd.cc.buffalo.edu (David N Smernoff)

-=-

1750Hz tone burst:

        FT470's in the UK come with the 1750 Hz tone burst option
    built in. It is on a tiny sub card that is wedged in down the
    bottom at one side. I bought one from the UK distributors and
    figured out how to connect it when I got back to the US. As
    far as I can tell my mod is the same as would be done if it
    was officially installed although the service manual doesn't
    show where to connect it. It has just 3 wires, power, ground
    and audio out. It is activated by applying power using the
    small button above the PTT so you can press both at once to
    call and then slide your thumb down to release the tone
    button.

        The board consists of a 2*color burst freq xtal and a
    74HC4060 CMOS oscillator divider giving 7.16MHz divided by
    4096 = 1748 Hz. The chip is surface mounted so they can get
    the whole thing down to less than 0.5" square.

        Attributed: gingell%aurfs1%aurgate@mcnc.org (Mike Gingell)

-=-

Battery latch R&R:

        To replace the battery latch simply remove the battery
    pack. Looking at the bottom of the transceiver you will see
    the battery retainer plate. Remove the 4 screws from each
    connor and lift the plate out. The battery latch will come
    with it. Part of the retainer plate is used as a spring for
    the latch. Stick the new catch on the end of the spring and
    reinstall in reverse order.

        I have broken mine twice so far. The rest of the radio
    seems to be pretty rugged and I have given mine a lot of
    punishment so far and it seems to have taken it well.

        Atrributed: rogerm@hpfcso.FC.HP.COM (Roger Mitchell)

-=-

Extended RCV side effect #1:

        After doing the software receive mod, the radio will pick
    up 2m frequencies when the display is in the 180-190MHz range.

        Also, the ARS (Automatic Repeater Shift) will turn on
    once in a while when scanning from 100 MHz to 200 MHz.

        Attributed: plkorhon@vipunen.hut.fi (Mikko Noromaa)

-=-

TNC wiring:

        The FT470 is wired like an Icom. You connect the audio from
    the TNC to the tip of the mike plug through a capacitor and
    connect the PTT to the tip with a resistor. The Icoms and
    Yaesus use a "leaky ground" to generate PTT. The problem with

this approach is there is a tradeoff between rapid PTT and
audio level and response. Typical values are .1 ufd and 2.2 k
ohms. The RC time constant limits TR turnaround.

A better scheme is to use a tiny audio transformer sideways
like so,


```
TNC PTT----------)))))))))))))------------> radio tip (audio)
                 ============
TNC AF OUT-------))))))))))))))----X--------> radio sleeve (gnd)
                                  |
TNC GND------------------------|
```

You can rip a suitable transformer out of an old transistor
radio or buy one from Radio Shack.

You should carefully set the audio level so you wind up with a
3 khz deviation for your tones. Don't exceed that level or
many units will have trouble decoding your packets. Make sure
you have the power saver on the 470 turned off when you run
packet or you'll miss the first part of every packet. This
can drive you nuts because everything seems to be working but
nothing prints.

One last note: put some distance between the antenna and the
radio and use shielded cables on your TNC. Otherwise the RFI
and RF feedback will ruin your packet operation.

Attributed: gary@ke4zv.uucp (Gary Coffman, KE4ZV)

-=-

DC power:

The 2 meter only model does have a power jack under the rubber
plug, but the 470 doesn't. There's a place on the board for
one, but Yaesu recomends that you use a PA-6 module instead.
This is a module that mounts in place of the battery and
contains regulators for running the radio and charging a
battery connected to the bottom of the PA-6. This is a really
nice accessory and well worth the price.

Attributed: gary@ke4zv.uucp (Gary Coffman, KE4ZV)

-=-

Power Consumption:

Here are some measurements on the Yaesu FT470. Measurements
made with regulated 7.2 volt supply. Power output measured
with Bird and appropriate slugs.

2 Meter Transmit

        LOW POWER- RF OUTPUT: 1 WATT   DRAIN: 400 ma
        HI POWER- RF OUTPUT: 3 WATTS DRAIN: 700 ma

70cm Transmit

        LOW POWER- RF OUTPUT: 1 WATT   DRAIN: 550 ma
        HI POWER- RF OUTPUT: 2.4 WATTS DRAIN: 800 ma

Receive

                As used below, "standby" means squelch closed, no
                signal received.

                Note: "PRIORITY" disables "APO", but not "SAVE"
                Note: Scanning disables both "SAVE" and "APO"
                Note: Open squelch disables "SAVE"

                SCAN or STANDBY, one band: 53 ma
                SCAN or STANDBY, two bands: 90 ma
                STANDBY, "SAVE", one band: 10 ma (53 ma active)
                STANDBY, "SAVE", two bands: 10 ma (90 ma active)
                "APO" does not change above.

        Audio: 50 - 150 ma

        WARNING: The FT470 shuts down and display goes blank when
        supply voltage drops to about 4.8 volts. BUT DRAIN CONTINUES
        AT ABOUT 10 ma. So, there is a danger of over-discharging
        nicads. Shut your equipment off to prevent this.

        Attributed: WA2NQL

-=-

Intermod Cure:

        I sent my Yaesu 470 in to Yaesu U.S.A. almost a month ago for
        them to perform the modification to cure the intermod problem
        and got it back yesterday. They did cure the problem. There
        is no intermod at all on one repeater that I was previously
        getting killed on. There is also a noticeable improvement in
        the sensitivity out of band on the weather frequencies.
        Though my radio is almost 2 years old they did the work free
        of charge. I tried to have them send me the parts to do it
        myself but I couldn't talk them into it.

        Attributed: rogerm@hpfcso.FC.HP.COM (Roger Mitchell)

-=-

Intermod Cure -- Affected Lot numbers:

        There is a free factory upgrade for the FT-470 that applies to
        models from certain lot numbers. I believe lot #19 and lower
        have terrible intermod problems. Mods are made (supposedly)
        to IF stages etc... and sensitivity as well as selectivity are
        increased after the mod. There may be other lots that have
        problems as well (I know lot #30 has quite a number of
        problems ie. batt saver not functioning correctly, low output
        power, mushy squelch etc...). The lot number is usually the
        first two digits of the serial.

        Attributed: Craig Lemon VE3XCL

-=-

More About Intermod:

        The u2AT uses a varactor tuned front end filter to reduce

intermod. It is able to knock out a lot of out of band
signals while still maintaining a wideband receive capability.
The tune voltage for the varactors is developed from the VCO
tune line.

There is a difference between intermod and spurious.
Intermods are developed when two out of channel signals mix to
produce an in channel response. Third order intermod occurs
when the second harmonic of one of these signals mixes with
the other to produce an in channel response. For example say
there are two repeaters on 146.88 and 146.82. These two
frequencies will develop 3rd order products at 146.76 and
146.94. Tuning the receiver to either of these frequencies
you would hear both conversations at the same time (assuming
their signal levels were high enough to cause the intermod).

A spurious response results when a single input signal, at a
frequency other than the desired receive frequency, mixes with
the first LO to produce an output at the first IF. For
instance suppose that I am tuned to 145.21 MHz and my first IF
is at 21.7 MHz (as is the case in the 470). My first LO is
21.7 MHz above 145.21 MHz or at 166.91 MHz. A signal at
156.06 MHz will generate a spurious response at 21.7 MHz since
2*166.91-2*156.06=21.7 . Thus the second harmonic of the LO
mixing with the second harmonic of the spur frequency ends up
in the IF. Just how susceptable the receiver is to this spur
product depends upon the design of the first mixer and the
gain and linearity of the preamplifer, as well as the ability
of the input filter to reject 156.06 MHz. Since the VHF front
end is fairly broad, the filter will do little good.

I suspect the IF frequency change in the 470 occured as a
result of spurious problems, since the IF frequency should not
affect the intermod dynamic range. In fact, another ham in
the area brought his 470 over and we checked it for its
intermod performance and it was identical to mine, however his
had the original 17.3 MHz VHF IF. Thus I guess my performance
is typical. From email I have received since my original
posting, it appears that this type of performance is typical
for dual band radios made by all of the major manufacturers.

Attributed: Jim Summers, KD7F

-=-

Finding the IF:

The Yaesu intermod fix changes both the first IF and second LO
frequencies. The following changes are made:

		original	modified
RF Unit	- XF2001	17N15AU	21R15AU
	- XF2002	45N15A1	47M15AU
	- L2007	4.7uH	3.3uH
	- L2008	4.7uH	3.3uH
IF Unit	- X3001	16.845MHz	21.245MHz
	- X3002	44.615MHz	47.265MHz
IF Frequency		17.3MHz	21.7MHz
Second LO		16.845MHz	21.245MHz

You can hear the second LO frequency with a general coverage
receiver in SSB mode. As suggested by Al Rabassa, wrap the

FT-470 with several turns of insulated wire and connect the
wire to the antenna connector of the GC receiver. The 2nd LO
frequency should be received.

You can also hear the first LO with a scanner. The first LO
will be at a frequency equal to the FT-470's displayed
frequency plus the IF frequency.

Another way to tell is to hook up a spectrum analyzer to the
antenna input (Be careful not to transmit!!!) and look at the
first LO leakage. It is very easy to see on my radio (about
-50 dBm). The first LO will be offset from the receive
frequency by the first IF frequency. At 144 MHz the LO will
be at 165.7 MHz. For receive frequencies above 157 MHz, low
side injection is used.

Attributed: Jim Summers, KD7F

-=-

Opening Battery Cases:

I`ve opened several FNB-x cases in order to replace the cell
pack. The procedure that I've used is very simple, but does
require patience to prevent damage to the case:

1. Cut the white label with a sharp knife by following the
    case separation line. DO NOT remove the nut on the
    charging connector.

2. Pry the case halves apart by placing a thin wide bladed
    screwdriver into the case line on the label end.
    It may be necessary to separate the black band from
    one case half with a knife tip when it is evident that
    glue has penetrated the joint. NOTE: The black band is
    permanently attached to one case half.

3. Use continuous pressure, not excessive force, to separate
    the case halves. Concentrate the separation procedure on
    the label end of the case. The steady pressure will allow
    the glue to cold flow and release its grip.

4. Yes, a frustration level will occur, but then success will
    appear as the glue gives up after a few minutes.

5. Make a note of where the wires attach to the battery and
    thermal switch. Also note the pack orientation.

6. Connect the replacement pack into the case and attach the
    wires per your note in step 5.

7. Close the pack, charge the cells, attach to the radio for
    a test.

8. If satisfied, place a spot (1/2 inch dia) of clear RTV on
    each side of the cell pack and press the case together and
    place it under a weight for a short time until the RTV
    cures. Because of the reduced amount of glue, the case
    will have a more flimsy feel than previous to replacement,
    but will perform like the original.

9. For the next replacement, the RTV will give up much easier
            than the original glue.

        Attributed: Hugh Wells, W6WTU

-=-

UHF Transmit Extend:

        Since I always get about a dozen requests for ANY information
        on extended UHF transmit, I'll try to head them off by saying
        that I have NEVER heard of one. Rest assured that I will add
        any such mod to this list and IMMEDIATELY repost it!

        Brian

-=-

end of Rev D mod list...

-=-
--

=-=
Randall Rhea   Informix Software, Inc.
Project Manager, MIS Sales/Marketing Systems   uunet!pyramid!infmx!randall