

# Tait T-800 II - modification for digital modes (D-Star, Fusion and DMR)

Hardware modifications on the T-835 RX (VHF) module only !

Open the module (take both sidepanels off)

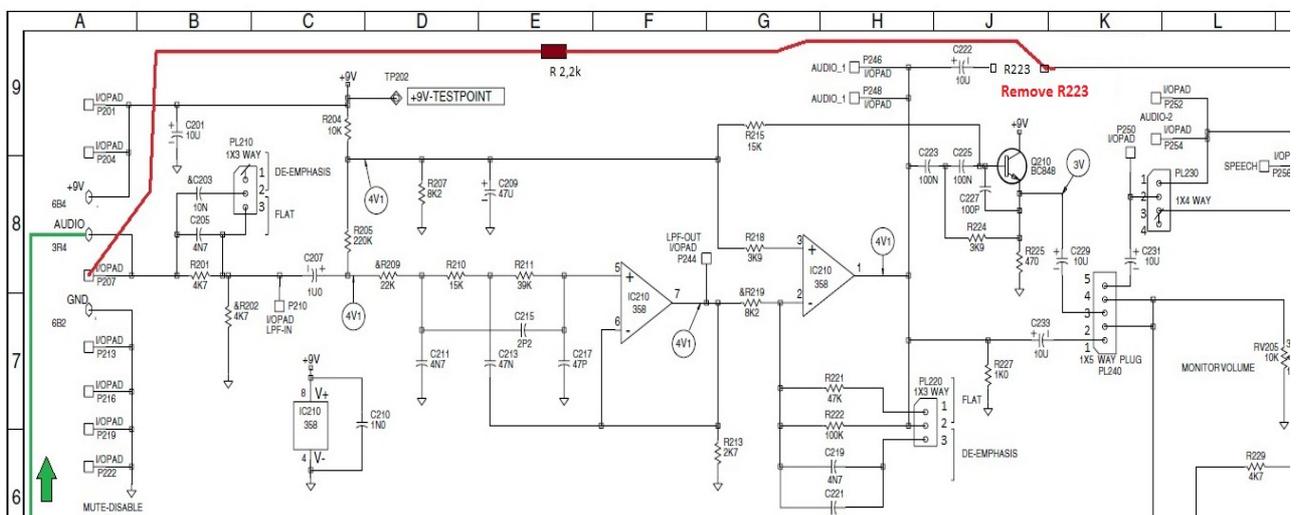
Locate resistor R223, remove it. **Do NOT add resistor R338 on the open pad (discriminator) !**

Solder a 1.5k to 2.2k resistor between PCB hole **P207** and PCB hole on the picture below:  
(it is necessary to have the first Op-amp stage intact (IC-390) to have enough audio level)



This will bypass a lot of the audio circuit (Op-amps etc.) on RX that will lead to delay and phase shift/phase distortion in digital modes. Audio is outputted at 15-pin D-sub at rear panel of module on pin 6 (PL-100). This pin goes to backplane pin 24 (Unbalanced RX Audio Out, with no SQL) on backplane **800-50-0001**

B6.2.22 T835 PCB Infor





The discriminator audio (IC350, NE614AN) on T-835 RX (VHF) is very low output, so the first Op-amp stage needs to be intact to have enough audio level. The first Op-amp is a TL 084 (IC390).

The balanced audio path on the module is still fully functional, so you can use this path for ordinary FM mode. In FM mode the SQL (RX Relay or RX Gate) circuit is used with CTCSS so the module will only open SQL when a valid FM signal with correct CTCSS is detected.

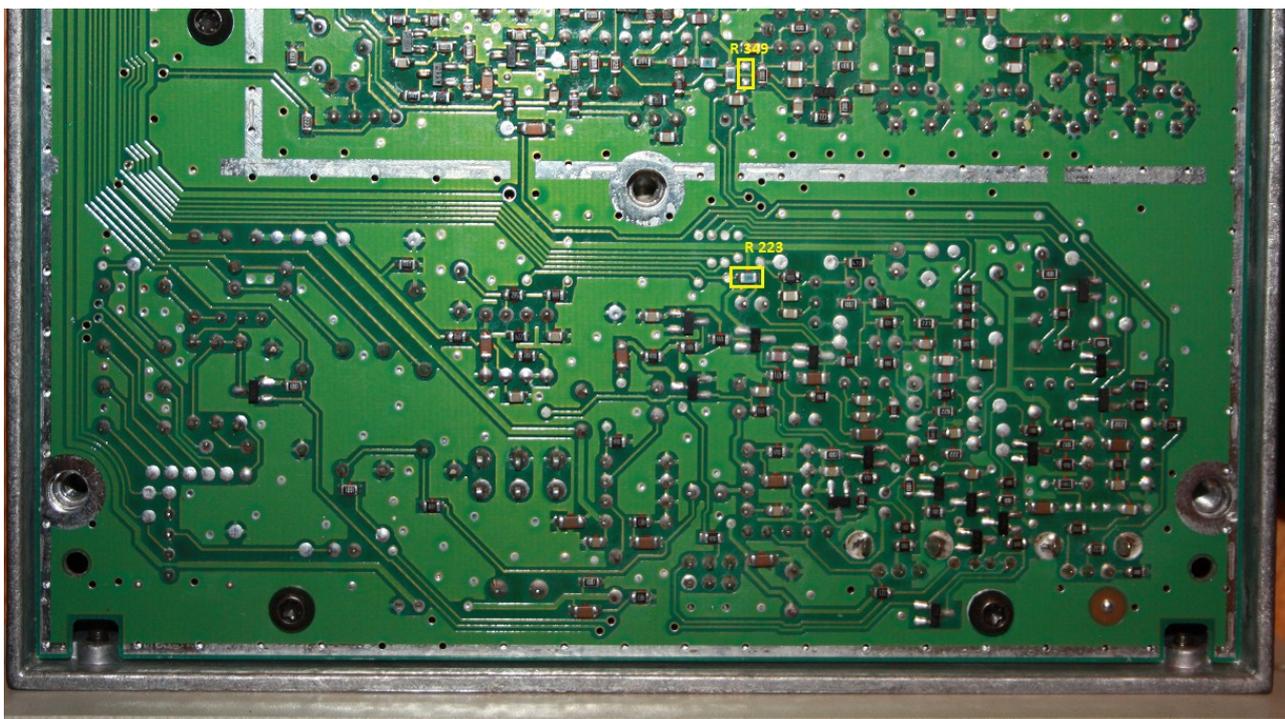
In digital modes the SQL circuit is not used, so the digital path is unaffected by CTCSS etc.

### **The T-855 RX module (UHF) is different and requires a different modification !**

Open the module (take both sidepanels off)

Locate resistor R223, remove it.

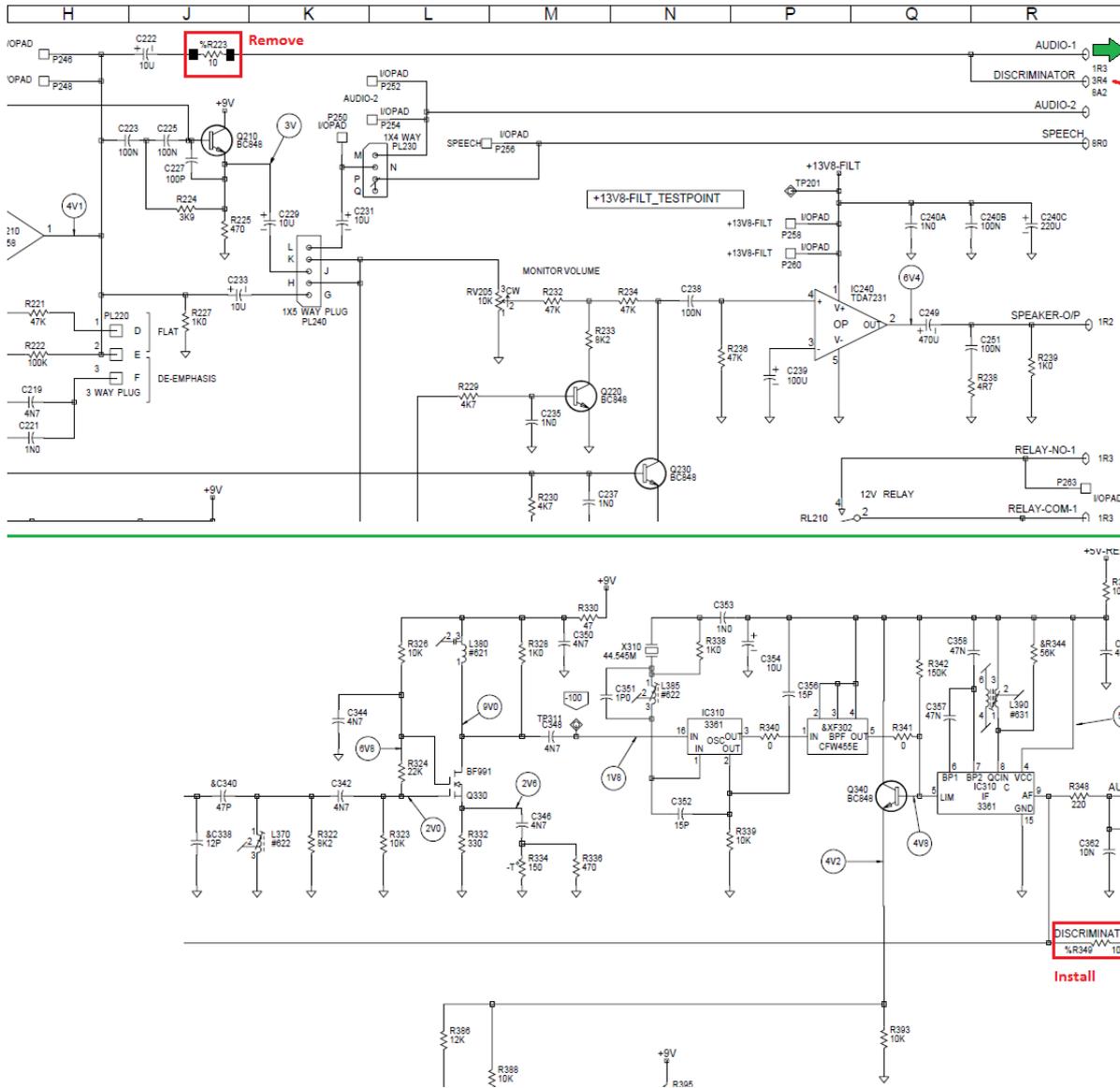
Install resistor R349 (**100  $\Omega$ , SMD size 0805**) on the open pad, see picture below:



This will bypass most of the audio circuit and allow discriminator audio to pass directly to Pin 6 on on 15-pin D-sub (PL-100) on rear panel of module. This will eliminate delay and audio phase shift/phase distortion etc. in digital modes.

The Audio Chip (MC3361CP, IC310) in the T-855 (UHF) is a lot more powerful than in the T-835 (VHF), so the first Op-amp stage is not necessary in the T-855 UHF module. IC310 has an output of 1 Vp-p for 60% system deviation. So it can drive the input of MMDVM Zum board directly.

B6.3.22 T855 PCB Information



The balanced audio path on the module is still fully functional, so you can use this path for ordinary FM mode with CTCSS. **You MUST use CTCSS in FM**, if not the digital audio will also open SQL and go directly from RX to TX via the balanced audio path. That will make a mess out of everything.

#####

Next, here is a description on settings we used with the T-855 RX/T-856 TX and the **MMDVM Zum** board. Turn MMDVM RX pot (the one to the left) fully **clockwise** (minimum level) until it clicks. Turn MMDVM TX pot (the one to the right) fully **counter-clockwise** until it clicks (max level).

Wiring diagram between MMDVM Zum and T-800 II backplane 800-50-0001 is in a separate file.

Software settings for Pi-star using MMDVM Zum:

**For T-855 (UHF) Only:**

Browser address bar: 192.168.0.199/admin/configure.php

Innstillinger	Verdi
DMR Mode:	<input checked="" type="checkbox"/> RF Hangtime: 10 Net Hangtime: 10
D-Star Mode:	<input checked="" type="checkbox"/> RF Hangtime: 10 Net Hangtime: 10
YSF Mode:	<input checked="" type="checkbox"/> RF Hangtime: 10 Net Hangtime: 10
P25 Mode:	<input type="checkbox"/> RF Hangtime: 10 Net Hangtime: 10
NXDN Mode:	<input type="checkbox"/> RF Hangtime: 10 Net Hangtime: 10
YSF2DMR:	<input type="checkbox"/>
YSF2NXDN:	<input type="checkbox"/>
YSF2P25:	<input type="checkbox"/>
POCSAG:	<input type="checkbox"/> POCSAG Paging Features
MMDVM Skjerm Type:	Nextion Port: Modem Nextion Layout: G4KLX

Bruk endringer

Innstillinger	Verdi
Hostname:	pi-star Do not add suffixes such as .local
Node Kallesignal:	LA7KR
CCS7/DMR ID:	242611
Radio Frekvens RX:	432.625.000 MHz
Radio Frekvens TX:	434.625.000 MHz
Breddegrad:	60.1728 degrees (positive value for North, negative for South)
lengdegrad:	11.9911 degrees (positive value for East, negative for West)
By:	Kongsvinger
Land:	Norway
URL:	http://www.la7v.org <input type="radio"/> Auto <input checked="" type="radio"/> Manual
Radio/Modem Type:	ZUM Radio-MMDVM for Pi (GPIO)
Node Type:	<input type="radio"/> Private <input checked="" type="radio"/> Public
Nodesone:	Europe/G4K...

192.168.0.199/admin/expert/edit\_mmdvmhost.php

**Tait T-800 II UHF RX (T-855) Discriminator audio (R223 removed, R349 installed)**

Bruk endringer		Modem
Port	/dev/ttyAMA0	
TXInvert	1	
RXInvert	0	
PTTInvert	0	
TXDelay	100	
RXOffset	0	
TXOffset	0	
DMRDelay	40	
RXLevel	20	
TXLevel	50	
RXDCOffset	0	
TXDCOffset	0	
RFLevel	100	
CWidTXLevel	50	Repeater TX deviation:
D-StarTXLevel	70	Deviation on analyzer : 1.75-1.85kHz in FM
DMRTXLevel	68	Deviation on analyzer : 3.6 kHz +/- 0.3kHz
YSFTXLevel	65	Deviation on analyzer : 4.65 kHz +/- 0.2kHz
P25TXLevel	65	
NXDNTXLevel	65	
RSSIMappingFile	/usr/local/etc/RSSIdat	
Trace	0	
Debug	1	

FM Deviation analyzer:  
Turn OFF analyzer 300Hz HPF !  
3400Hz LPF is OK, but try testing with LPF both on/off and notice if there is any difference.

192.168.0.199/admin/expert/fulledit\_rssidat.php

Pi-Star 3.4.10 / Dashboard:20181019

## Pi-Star Digital Voice - Expert Editors

Skrivebord | Admin | Oppdater | Upgrade | Backup/Restore | Konfigurasjon

**Quick Edit:** DStarRepeater | ircDDBGateway | TimeServer | MMDVMHost | DMR GW | YSF GW | P25 GW | NXDN GW  
**Full Edit:** DMR GW | PiStar-Remote | WiFi | BM API | DAPNET API | System Cron | RSSI Dat **Tools:** CSS Tool | SSH Access

```
# This file maps the raw RSSI values to dBm values to send to the DMR network. A
# number of data
# points should be entered and the software will use those to work out the in-
# between values.
#
# The format of the file is:
# Raw RSSI Value          dBm Value
#
#
# RSSI Default Values for MMDVM_HS
#
3202          -60
3101          -70
2658          -80
2170          -90
1925          -95
1678          -100
1428          -105
1170          -110
903           -115
734           -118
620           -120
405           -125
363           -130
```

Values for T-855 UHF RX  
(with RSSI option installed)

RSSI value is dependant upon the RSSI level POT inside T-855 RX regarding setting RSSI level to 2.0 V at test point with a signal input on RX of 3.0kHz deviation at level -110dBm.

November 2018 – LA4AMA Roar Dehli