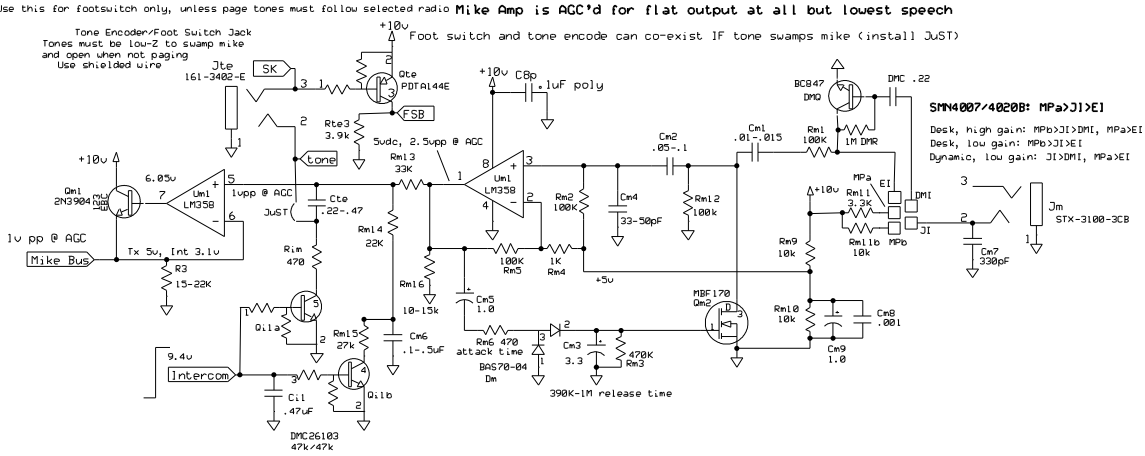
See TEQ page for alt jack notes

Use this for footswitch only, unless page tones must follow selected radio **Mike Amp is AGC'd for flat output at all but lowest speech**



Intercom/MonSet mike bus DC=3.1v, Line after Dx3 ~2.5v; Mon hold is ~1.3v, Mon FF acts at ~.9v. Rm15 selected for best action: min 2.2v to mute Rx

If intercom is not needed or causes feedback (users too close) install Rim. Then Q1la shorts mike by Cte.

Rim can be 0 ohm but can overload encoder output; 470 divides mike by 66

Install JuST if the tone encoder follows radio selection. Tones will swamp ALL voice.

Install JuTK and JuFT instead if the tone encoder is wired to one radio. User will then hear tones.

See page 10.

Cm1/Rm12 gives rolloff below 300Hz, mostly below 200Hz. This reduces pop muting to nil.

Rm13/14 divides 2.5v AGC'd level down to 1vpp for end-to-end gain of about 13-14

Cm6 sets Mike Bus DC to 5v. When Qm3 on, bus is about 3v

MBF170 gate threshold ~1.6v + Dm drop sets AGC knee (2.4v or so)

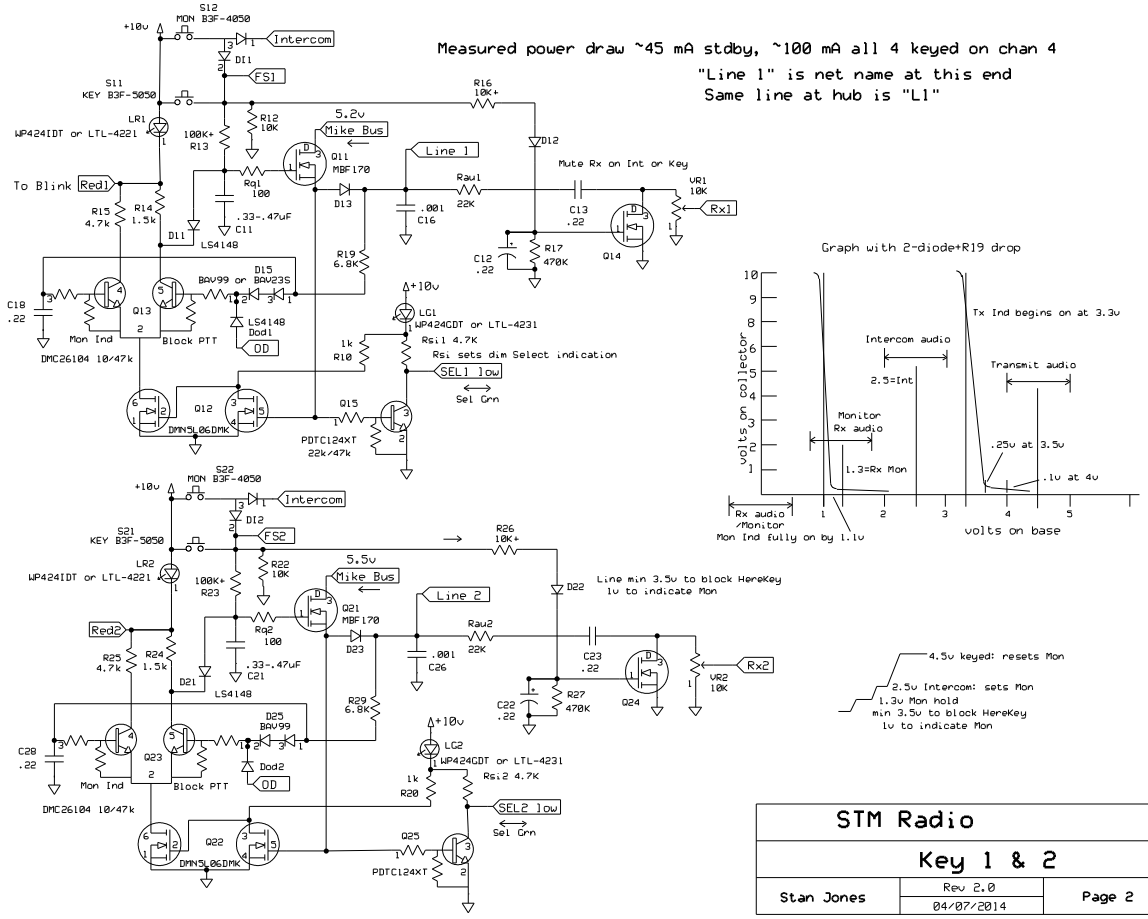
Values shown are carefully balanced, except as noted, for DC and output levels and AGC action.

Select Rm15 to supply enough DC to fully mute RxAGC's in hub (15k not enough)

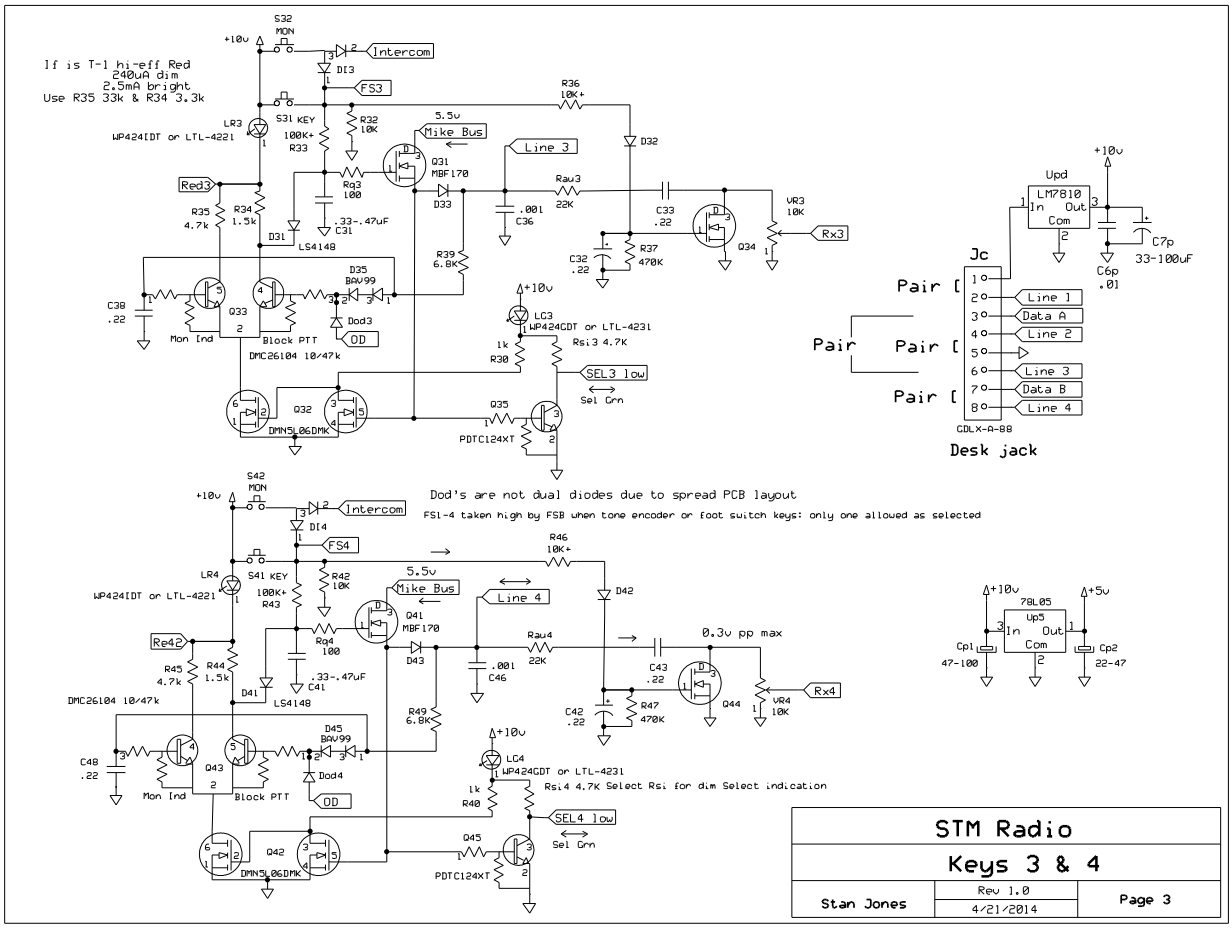
+AF pks clipped by Q11-Q41 if DC here too high (Qx1 gate max 8v due to Red led drop)

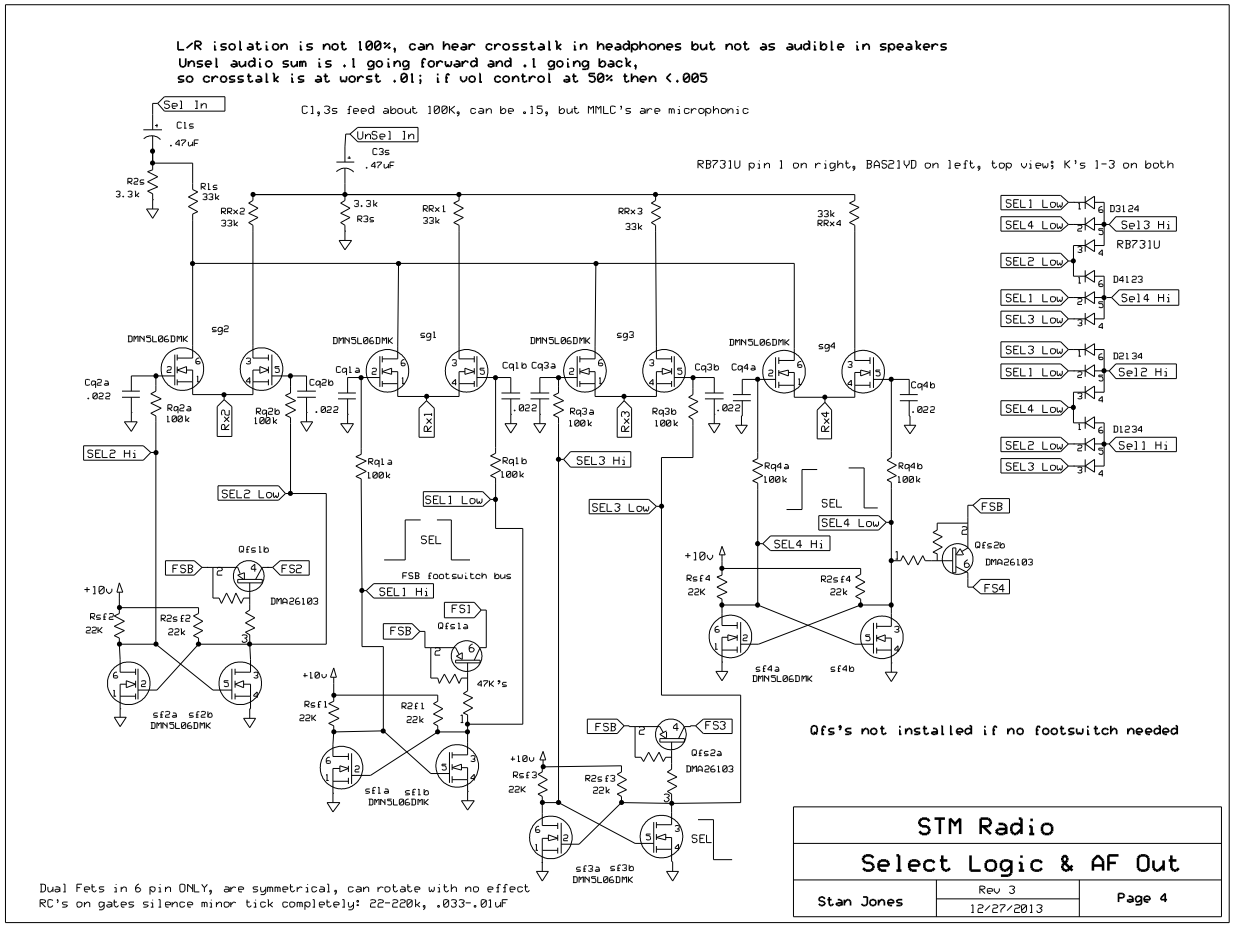
Note that Q11-41 FET gates do not fully pass audio until the gate is 2v higher than the DRAIN

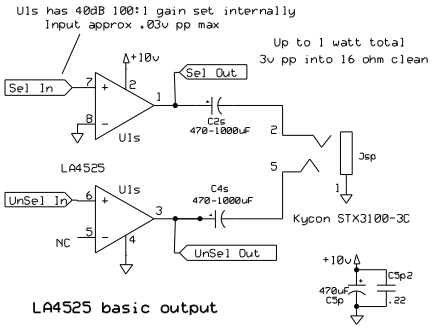
STM Radio		
Mike AGC		
Stan Jones	Rev 1.5 1/5/2016	Page 1



STM Radio		
Key 1 & 2		
Stan Jones	Rev 2.0 04/07/2014	Page 2

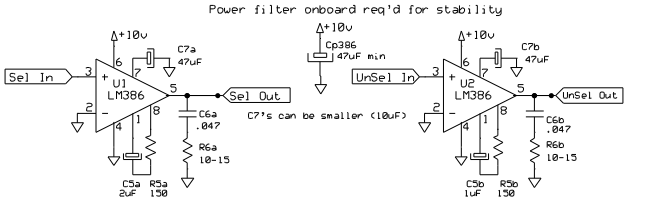

If is T-1 hi-eff Red
240uA dim
2.5mA bright
Use R35 33k & R34 3.3k
S32 MON
+10v
Intercom
DI3
FS3
S31 KEY
LR3
WP424IDT or LTL-4221
100K+ R33
R32 10K
5.5v
Mike Bus
Q31 MBF170
Line 3
D32
R36 10K+
Red3
R35 4.7k
R34 1.5k
Rq3 100
.33-.47uF C3l
D3l LS4148
D33
Rav3 22K
.001 C36
C33 .22
VR3 10K
Rx3
C32 .22
R37 470K
Q34
R39 6.8K
D35 BAV99
C38 .22
Q33
Mon Ind
Block PTT
Dod3
OD
DMC26104 10/47k
LC3
WP424CDT or LTL-423l
1k R30
Rsi3 4.7K
SEL3 low
Sel Grn
Q32
DMN5L06DMK
Q35
PDTC124XT
Jc
Pair [
Line 1
Data A
Line 2
Line 3
Data B
Line 4
GDLX-A-88
Desk jack
Upd
LM7810
In Out Com
C7p 33-100uF
C6p .01
Dod's are not dual diodes due to spread PCB layout
FS1-4 taken high by FSB when tone encoder or foot switch keys: only one allowed as selected
S42 MON
DI4
FS4
S41 KEY
LR4
R46 10K+
R42 10K
R43 100K+
Q41 MBF170
Line 4
D42
Rav4 22K
0.3v pp max
Red2
R45 4.7k
R44 1.5k
Rq4 100
.33-.47uF C4l
D41 LS4148
D43
.001 C46
C43 .22
C42 .22
R47 470K
Q44
VR4 10K
Rx4
R49 6.8K
D45 BAV99
C48 .22
Q43
Mon Ind
Block PTT
Dod4
OD
LC4
WP424CDT or LTL-423l
Rsi4 4.7K Select Rsi for dim Select indication
1k R40
SEL4 low
Sel Grn
Q42
DMN5L06DMK
Q45
PDTC124XT
78L05
Up5
In Out Com
Cp1 47-100
Cp2 22-47
STM Radio
Keys 3 & 4
Stan Jones
Rev 1.0
4/21/2014
Page 3


L/R isolation is not 100%, can hear crosstalk in headphones but not as audible in speakers
Unsel audio sum is .1 going forward and .1 going back,
so crosstalk is at worst .01; if vol control at 50% then <.005
Sel In
C1s .47uF
C1,3s feed about 100K, can be .15, but MMLC's are microphonic
UnSel In
C3s .47uF
RB731U pin 1 on right, BAS21VD on left, top view; K's 1-3 on both
R2s 3.3k
R1s 33k
RRx2 33k
3.3k R3s
RRx1 33k
RRx3 33k
33k RRx4
SEL1 Low
SEL4 Low
D3124
Sel3 Hi
RB731U
SEL2 Low
SEL1 Low
SEL3 Low
D4123
Sel4 Hi
SEL3 Low
SEL1 Low
D2134
Sel2 Hi
SEL4 Low
SEL2 Low
SEL3 Low
D1234
Sel1 Hi
DMN5L06DMK
sg2
sg1
sg3
sg4
Cq2a .022
Rq2a 100k
Rx2
Rq2b 100k
Cq2b .022
Cq1a
Rx1
Cq1b
Cq3a
Rq3a 100k
Rx3
Rq3b 100k
Cq3b .022
Cq4a
Rx4
Cq4b .022
SEL2 Hi
SEL2 Low
Rq1a 100k
Rq1b 100k
SEL3 Hi
SEL1 Low
SEL3 Low
Rq4a 100k
Rq4b 100k
SEL
SEL4 Low
SEL4 Hi
FSB
Qfs2b DMA26103
FS4
Qfs1b
FSB
FS2
DMA26103
FSB footswitch bus
SEL1 Hi
FS1
Qfs1a
47K's
+10v
Rsf2 22K
R2sf2 22K
sf2a sf2b DMN5L06DMK
Rsf1 22K
R2sf1 22K
sf1a sf1b DMN5L06DMK
Rsf4 22K
R2sf4 22K
sf4a DMN5L06DMK
sf4b
FSB
FS3
Qfs2a DMA26103
Rsf3 22K
R2sf3 22K
sf3a sf3b DMN5L06DMK
SEL
Qfs's not installed if no footswitch needed
Dual Fets in 6 pin ONLY, are symmetrical, can rotate with no effect
RC's on gates silence minor tick completely: 22-220k, .033-.01uF
STM Radio
Select Logic & AF Out
Stan Jones
Rev 3
12/27/2013
Page 4



LA4525 basic output

LM386 x2 750mW per channel audio out



Clipping is at about 7vpp

R5's selected for 5vpp out into 8 ohm speaker with .03vpp input

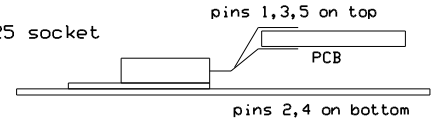
Gain set: 150/2uF gives gain ~160 down to about 300Hz, dropping off to ~120 at 200Hz

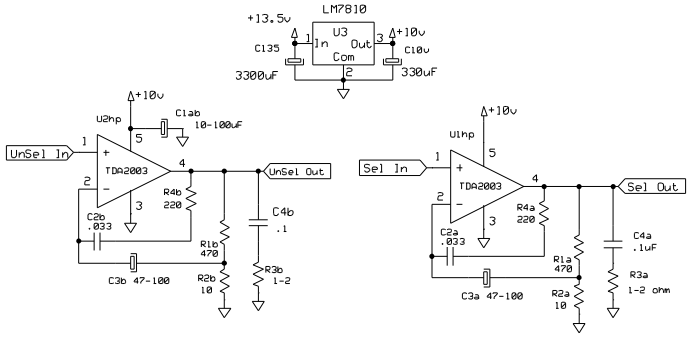
High Power Audio Out Option

10 watt per channel audio out

Heatsink is bottom of enclosure

Connects to audio board with harness that plugs into LA4525 socket

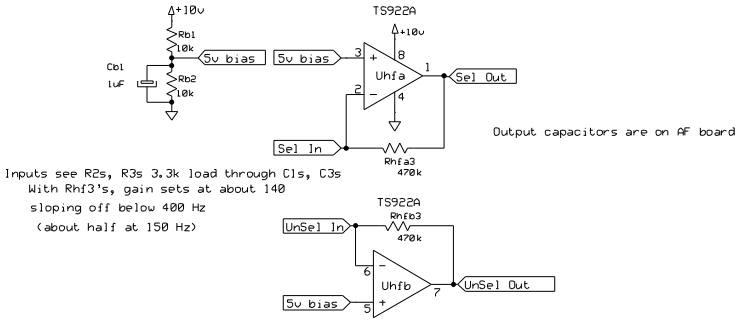




R4-C2 values shown yield ~10kHz -3dB rolloff (per specs)

STM Radio		
Higher Power Audio Out		
Stan Jones	Rev 1.0 1/16/2015	Page 5

Cb1 can be left off or much smaller if 10 supply is very quiet



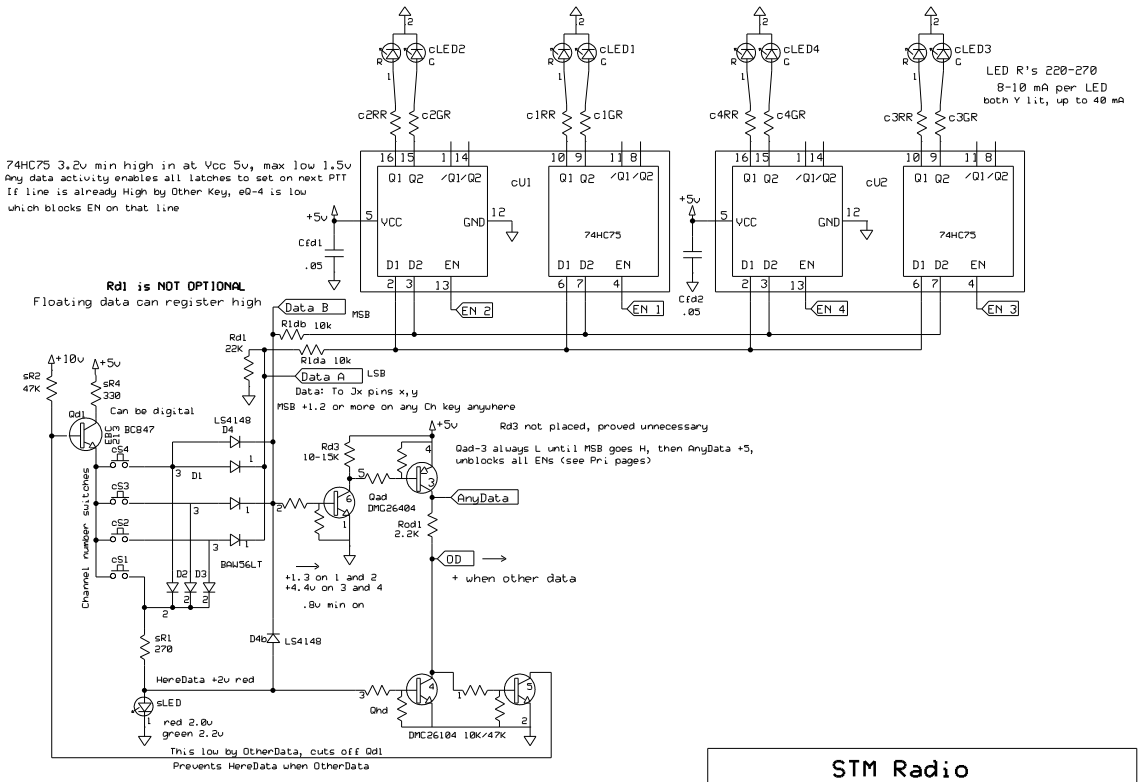
Inputs see R2s, R3s 3.3k load through C1s, C3s
With Rhf3's, gain sets at about 140
sloping off below 400 Hz
(about half at 150 Hz)

This circuit is built on a plug in card that sockets instead of an LA4525

TS922A or MC33202 high output Op Amp can drive 32 ohm headphones with modest distortion and drive external amplified speakers with no distortion

STM Radio		
Headphone Output		
Stan Jones	Rev 1.0 2/1/2016	Page 5b

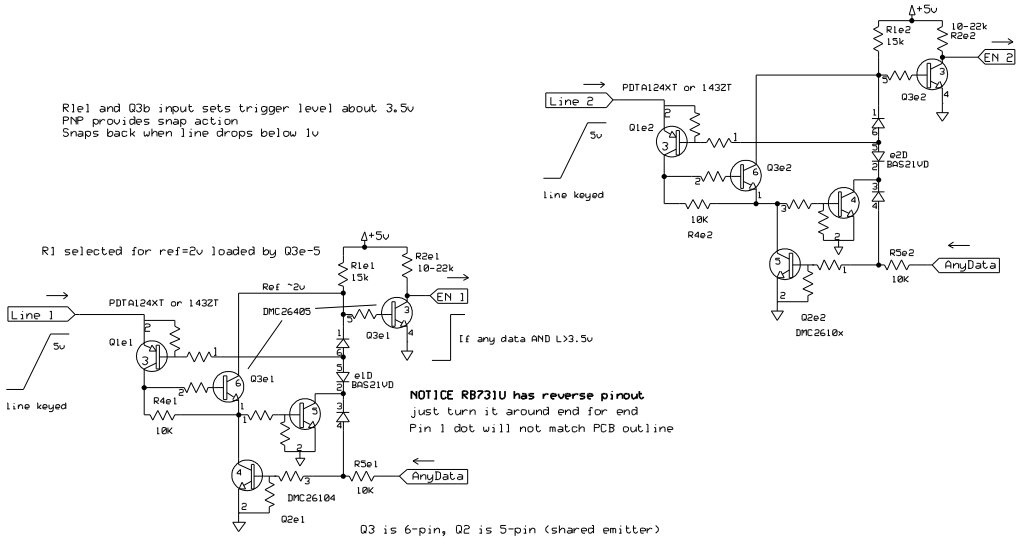
To use: press and hold sw of channel number wanted, tap PTT of radio to set, then release ch sw



sLED sets reg 2v, can drive up to 10mA load
D4b junction diode drops that to 1.4v to MSB

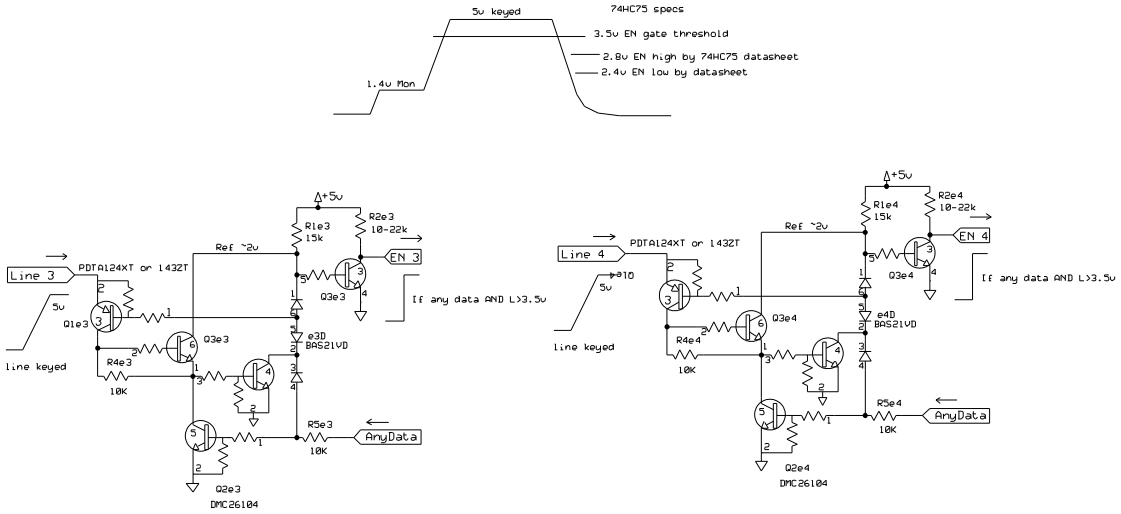
HereData high reaches Qhd before Qad, blocking it on HD
so Qhd-5 stays off. Qhd-5 goes low on OD

STM Radio		
Channel Set		
Stan Jones	Rev 3.0 04/08/2014	Page 6



Base of Q3b set ~2.2v by R1 and input R of Q3b. Q3b on, EN low.
If no data and line rises past 3.5v (Q1 input+exD 6-1 drop, off ref), Q1 turns on
eQ2-4 drops (driven thru R4), snapping Q1 on (ref unaffected due to diode)
Q2-4 low blocks late AnyData thru D 3-4. If taken high and Line released, line has to drop below ~1v
before Q2-4 rises, below level needed to turn Q3a on: no EN pulse
If Data before Line rise: Q2-5 low. When Q1 turns on (L>3.5v) its output is entirely across R4.
When R4 drop>1v Q3a turns on, pulling ref down, snapping Q1 on. Ref low turns off Q3b, EN high.
Normally Line is released before Data: dying line starves Q3a, ref rises, EN falls,
rising ref snaps Q1 off. If data released first: Q2-5 goes off, Q2-4 on, Q3a off, ref high, EN low.

STM Radio		
EN Gates 1 and 2		
Stan Jones	Rev 1.5 2/5/2014	Page 7



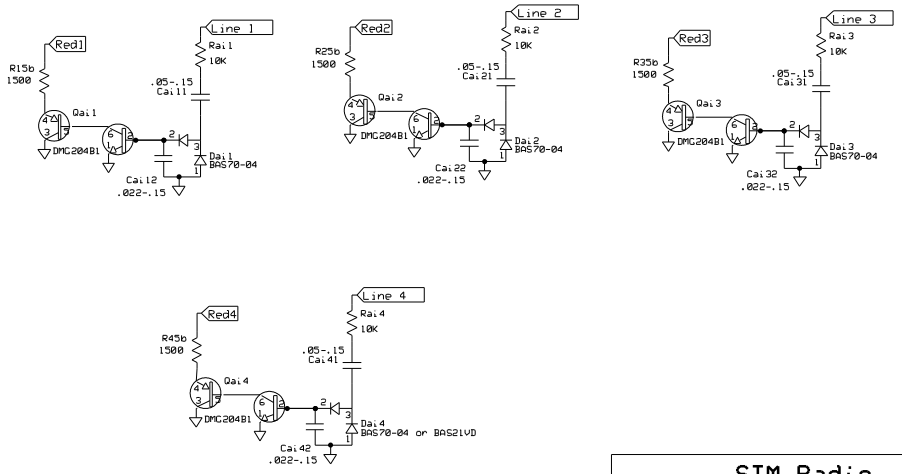
Priority switch: If Line goes high with NoData (AnyData low) then exQ2-4 goes low with line>3.7v
This shunts AnyData by exD so EN stays blocked even if Data arrives now
Therefore any line already keyed when Data appears does not get channel changed.
But if AnyData is high first, then when the line goes high, exQ2-3 is blocked and exQ3a is enabled
EN goes high at line >3.6v, so this latch accepts the data.
If line is high first, then AnyData is taken and held high, then line is unkeyed, exQ2-4 stays low until line<1v
so when PNP snaps off line is too low to turn on exQ3a

STM Radio		
Desk Side Priority Switch		
Stan Jones	Rev 1.5 10/24/2013	Page 8

DMG204B1 dual has best gain and PNP is stronger of pair
DMG20402 dual has good gain and pair is matched

Red flashes with audio both Mon and /Mon, also Tx Mod
User can see which channel is receiving and evaluate miking

R15, 15b chosen for LED used
Use 3300 if red is high-efficiency



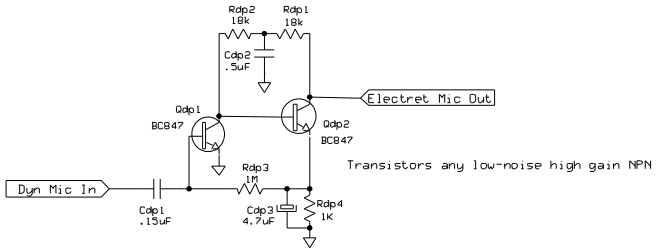
STM Radio		
Rx Audio Indication		
Stan Jones	Rev 1.0 10/17/2013	Page 9

High Gain Dynamic Preamp

Not on audio board; place in mike base

Not supplied with system - special request only

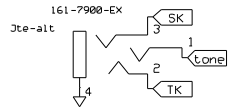
Single-Q preamp provided as jumpered option on audio board

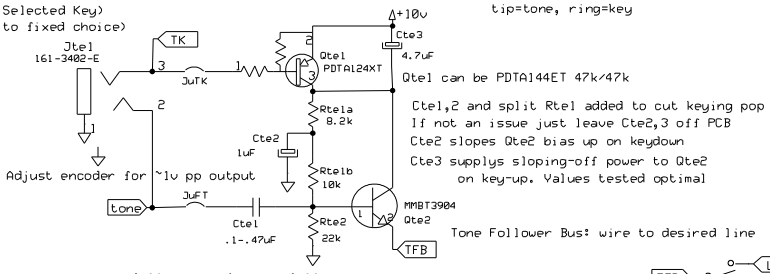


Tone encoder interface

Mount jack on its own nut on rear panel (can use STX-3100-3C PC mt upside down)

Use a TRRS jack if footswitch (SK Selected Key)
must be separate (TK Tone Key sent to fixed choice)





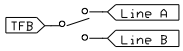
tip=tone, ring=key

Qte1 can be PDTA144ET 47k/47k

Cte1,2 and split Rte1 added to cut keying pop
If not an issue just leave Cte2,3 off PCB
Cte2 slopes Qte2 bias up on keydown
Cte3 supplys sloping-off power to Qte2
on key-up. Values tested optimal

Tone Follower Bus: wire to desired line

Optional SPDT switch if paging really must go out on different radios at different times
TFB must be jumpered to one line (altho you could use a dual CA diode and key two at once; raise bias by .6v)
More than one encoder can be bridged together externally PROVIDED they are invoked one at a time to avoid collision.



optional radio choice switch

See the mike agc and select FF pages for way to send key to selected radio (SK, Select Key).
Note that there the tones feed to the mike AGC buffer and swamp voice
so that no voice keying on any radio (on this desk unit) can happen while tones are being sent.
Install JuTK and JuFT together if no or separate footswitch. If tones key SK then use JuST only.

STM Radio		
Tone Encoder Interface		
Stan Jones	Rev 1.0 7/18/2015	Page 10