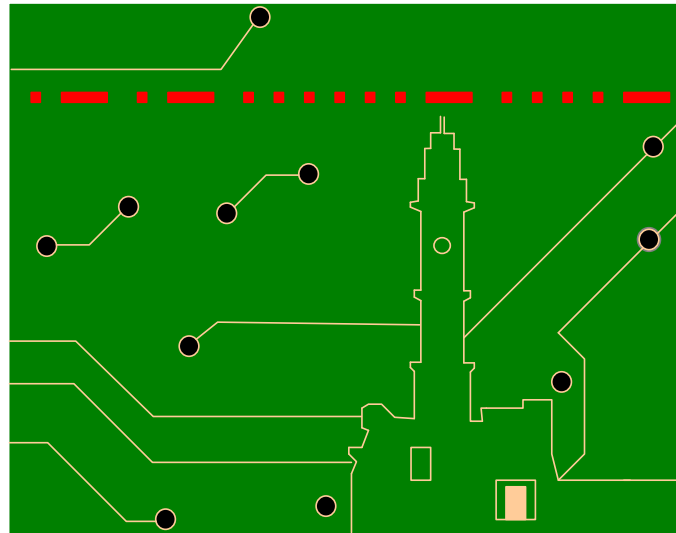


ΤΗΛ412 Ανάλυση & Σχεδίαση (Σύνθεση) Τηλεπικοινωνιακών Διατάξεων

Διαλέξεις 12-13

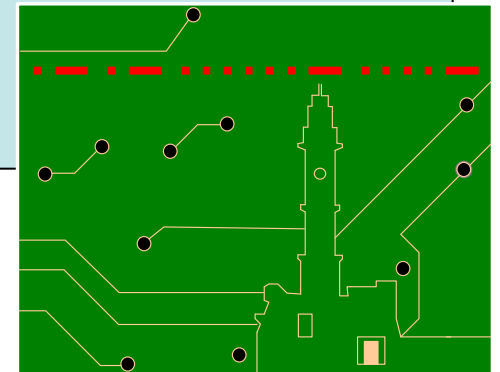


Άγγελος Μπλέτσας

ΗΜΜΥ Πολυτεχνείου Κρήτης, Χειμερινό Εξάμηνο
2014-2015

Διαλέξεις 12-13 – Synthesis

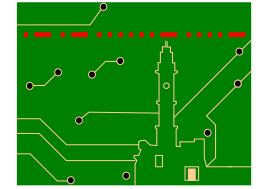
- The adventure of a signal inside a receiver!
- Modules of super-het receiver.
- Synthesis of modules



Για την σημερινή διάλεξη έχει χρησιμοποιηθεί υλικό από το βιβλίο
«Σύνθεση τηλεπικοινωνιακών διατάξεων, Σεργιάδης Γεώργιος Δ.,
University Studio Press A.E.»



Can you read this inside the receiver (you are an electronics engineer, right)?



LEARN RADIO FROM REAL RADIO ENGINEERS

HERE THEY ARE!

LET THESE ENGINEERS RIGHT FROM THE HEART OF THE BIG RADIO INDUSTRY Train You at Home for

GOOD PAY RADIO WORK
MANY R.T.I. TRAINED MEN MAKE \$35 to \$75 A WEEK

We OK

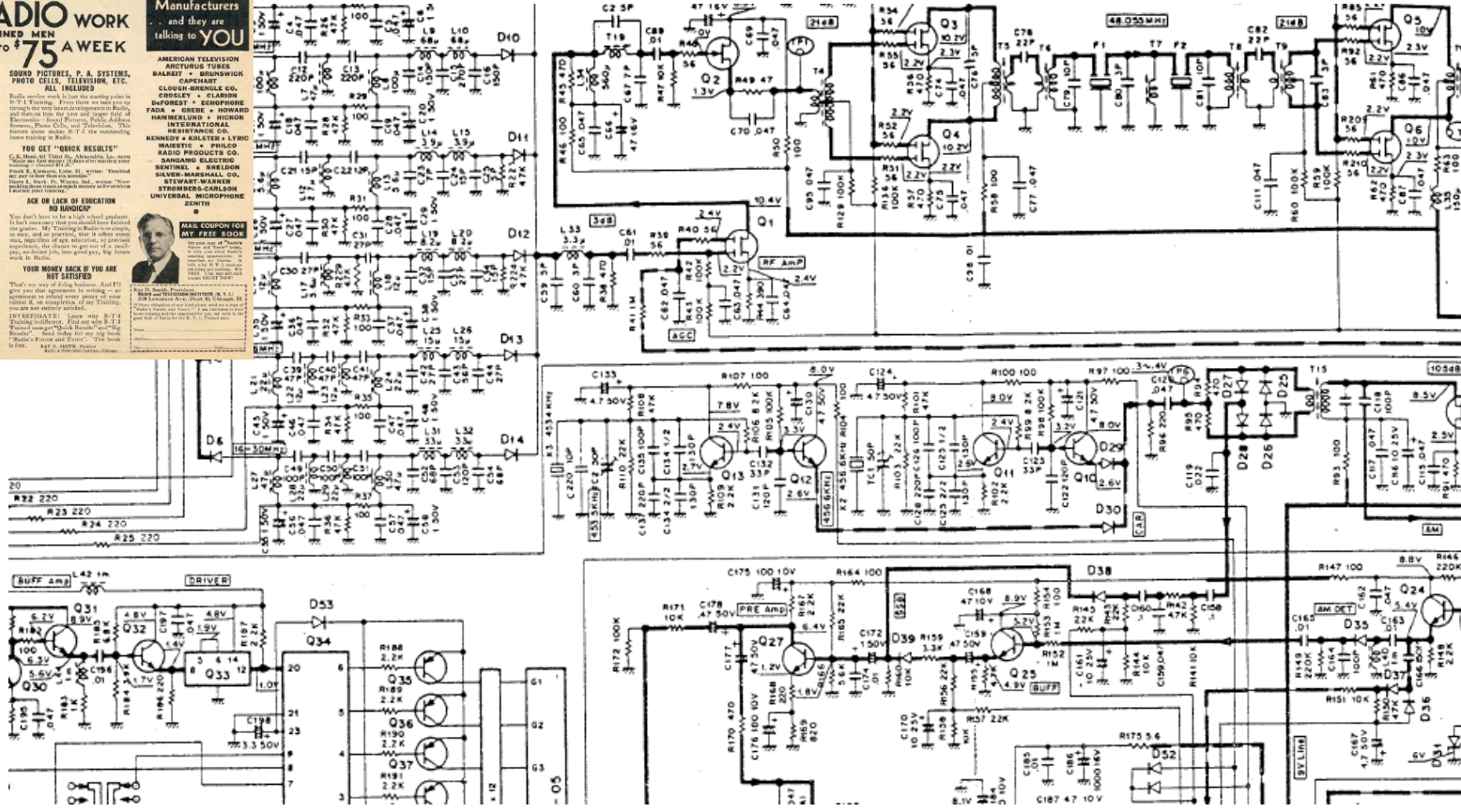
RADIO and TELEVISION INSTITUTE HOME TRAINING

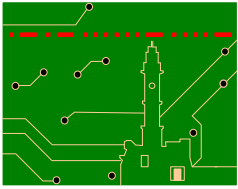
say these 30 Leading Radio Manufacturers and they are talking to YOU

AMERICAN TELEVISION
ARCADIAN TUBES
BASKETT • BRUNSWICK
CAPREARY
CLOUGH-SHREVE CO.
CROSBY • ELAPHOR
EUFORST • EUPHRORE
FADA • GEISE • HOWARD
HARRIS-LEED • HICRON
INTERNATIONAL
KENNEDY • KAPLAN • LYRIC
MAESTRO • PHILCO
RADIO PRODUCTS CO.
SANDAKO ELECTRIC
SANTAL • HARRISON
SILVER-MARSHALL CO.
SWEARD-WALKER
FRANKS-CHILDREN
UNIVERSAL MICROPHONE
ZENTH

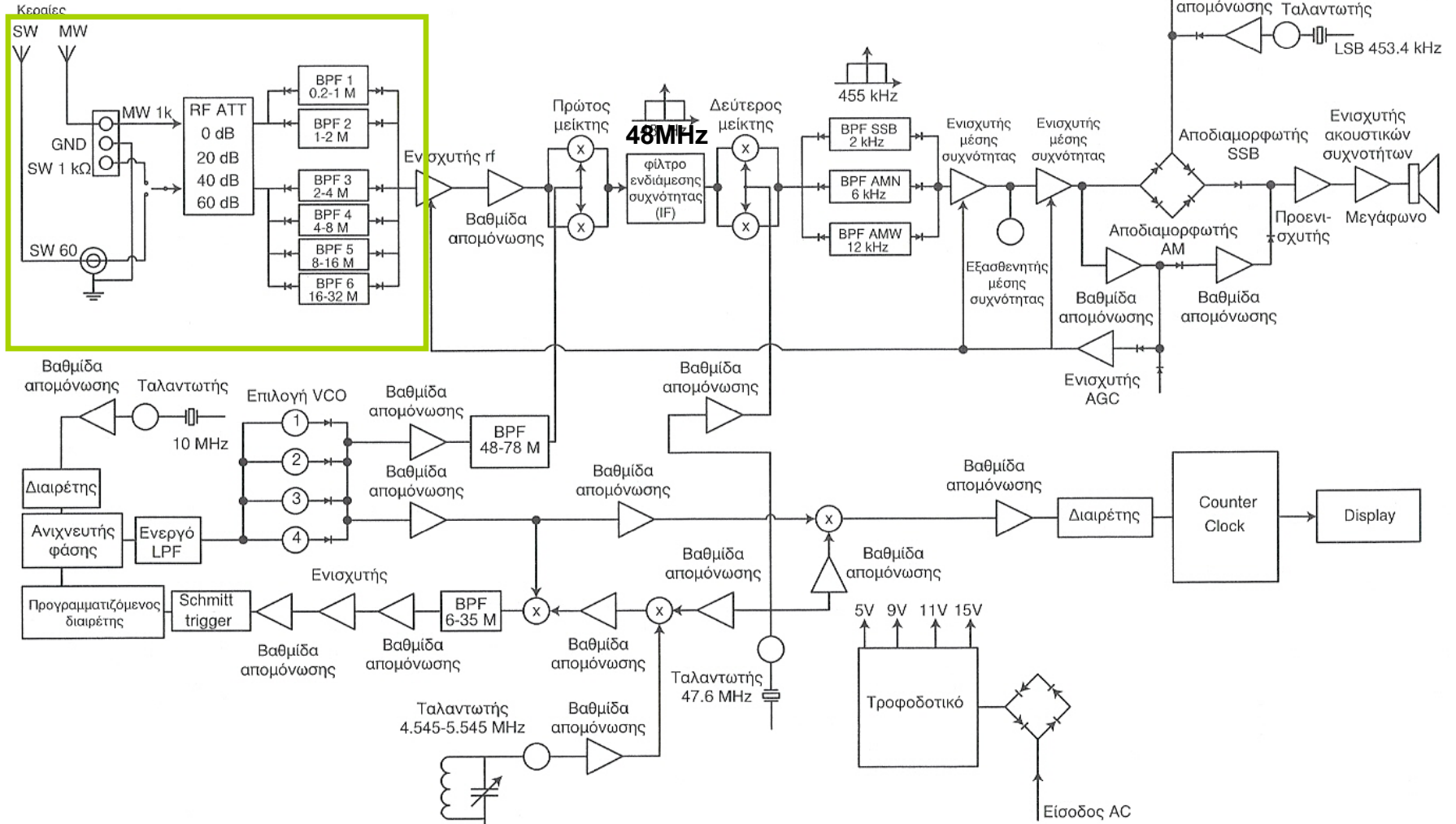
MAIL COUPON FOR FREE INFO

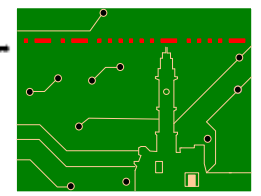
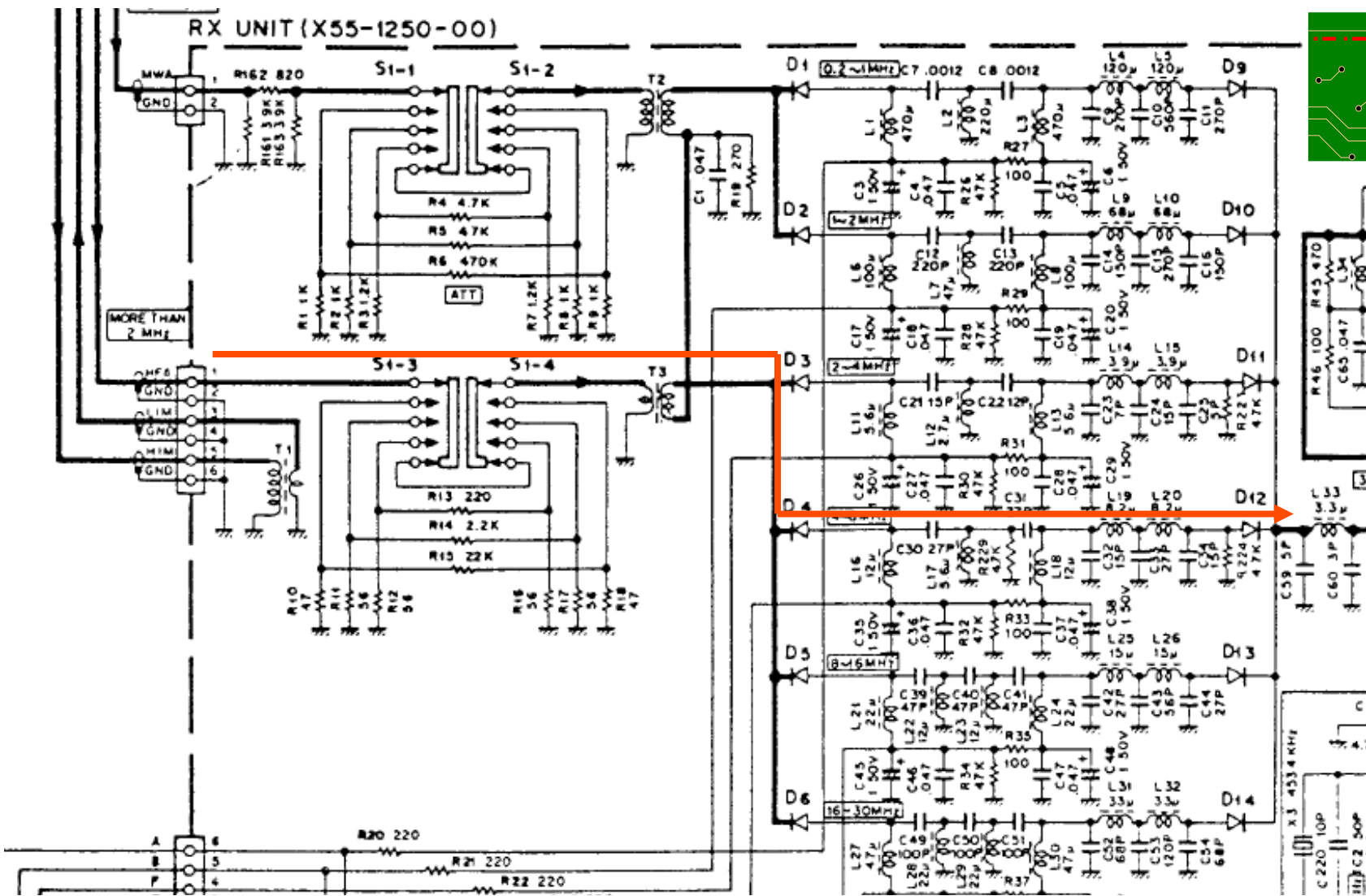
NAME _____
ADDRESS _____
CITY _____ STATE _____
I am interested in the Radio and Television Institute Home Training course. Please send me a free information kit.



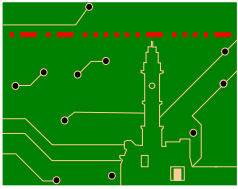


Example of Super-Het Receiver

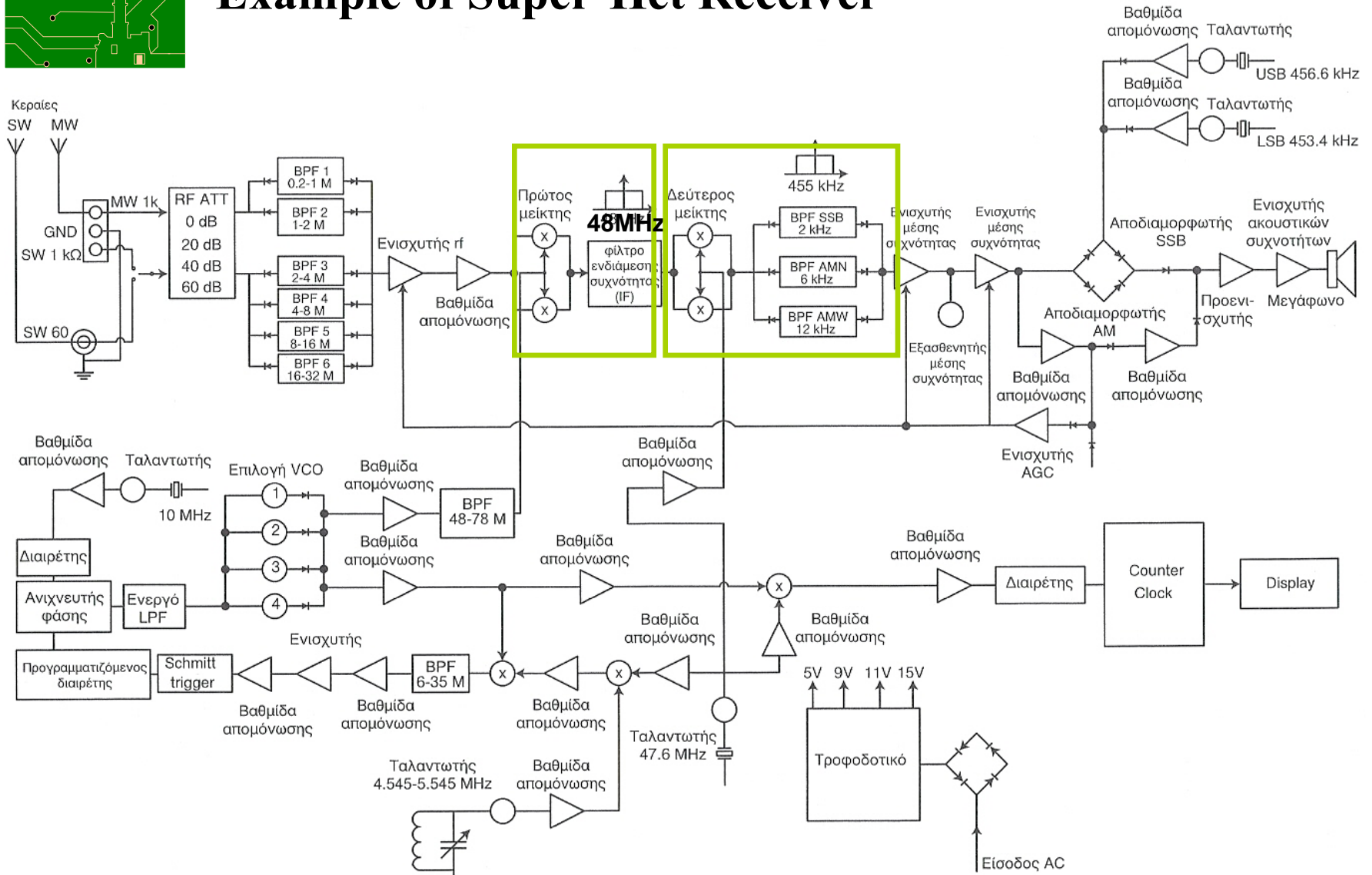




- Notice the symmetry at the attenuation resistor network (why?)
- Notice the BPF doubling of center frequency and BW (why?)

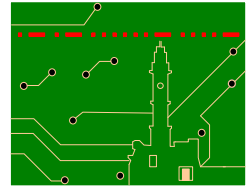


Example of Super-Het Receiver



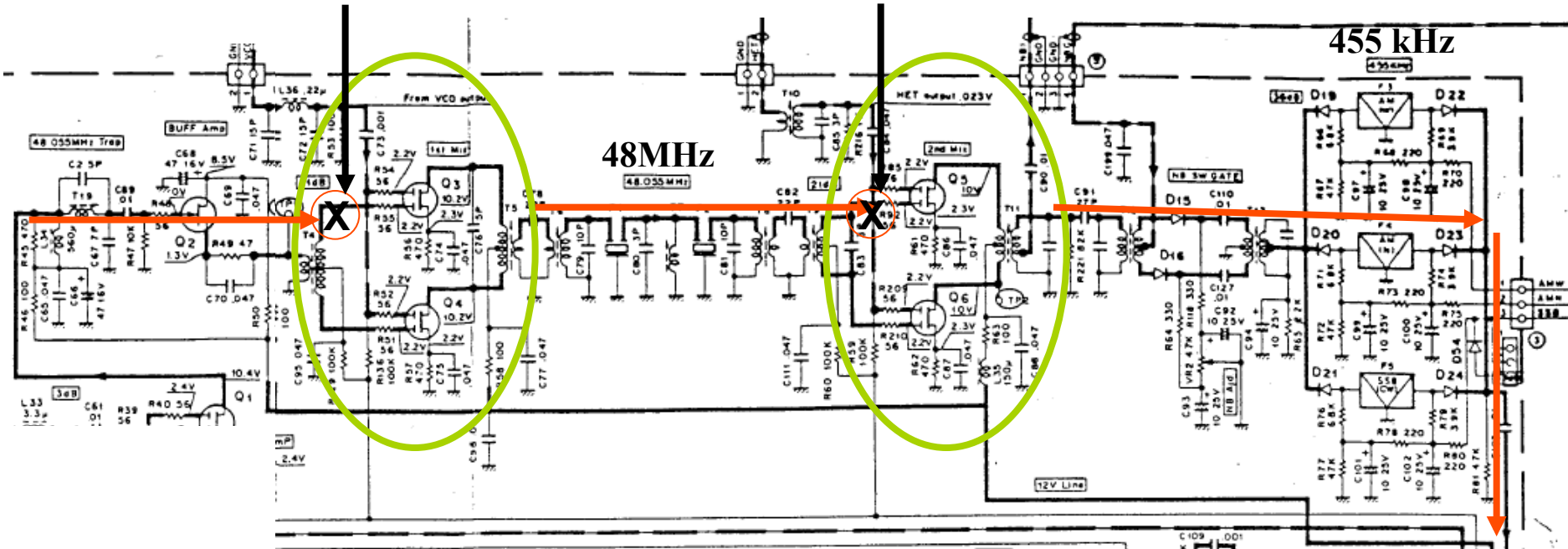
➤ Why doesn't 2nd mixing suffer from image?

Upconversion (super-heterodyne mixing)



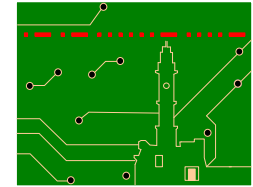
48-78MHz from PLL

47.6MHz from PLL



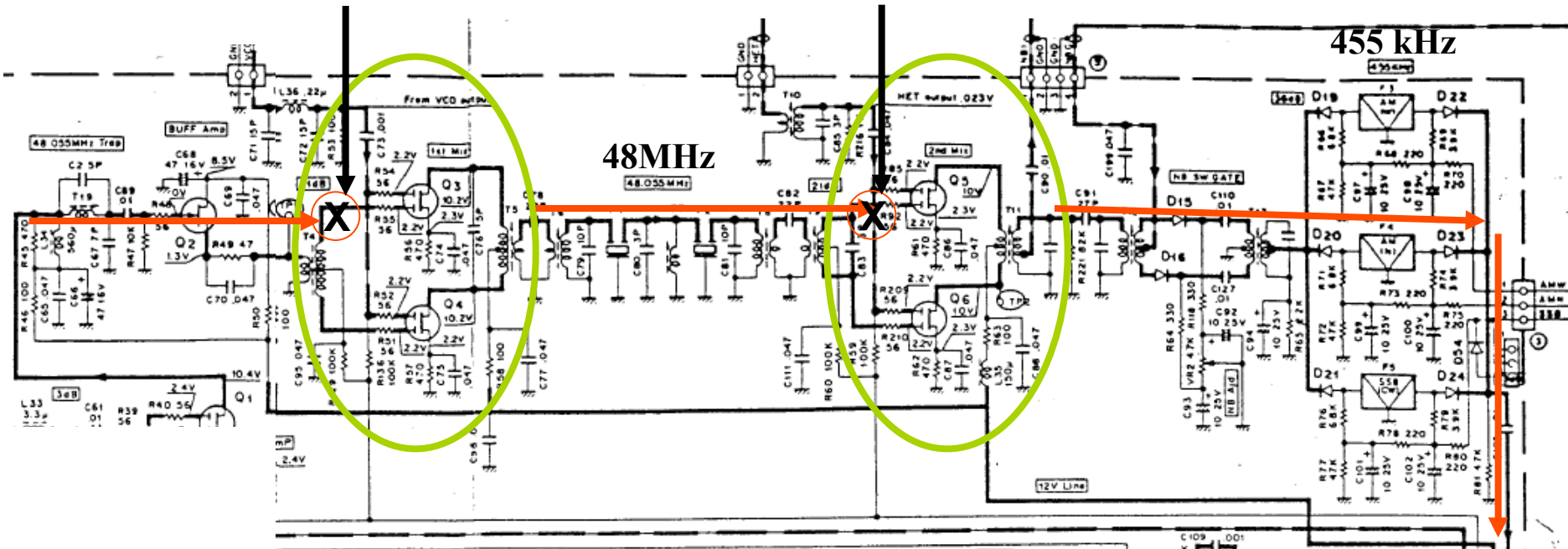
- Notice the SAW architecture of the first image reject filter (why?).
- Remember the advantage of upconversion!

Upconversion (super-heterodyne mixing)



48-78MHz from PLL

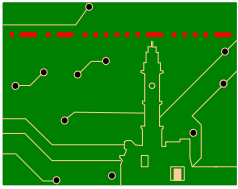
47.6MHz from PLL



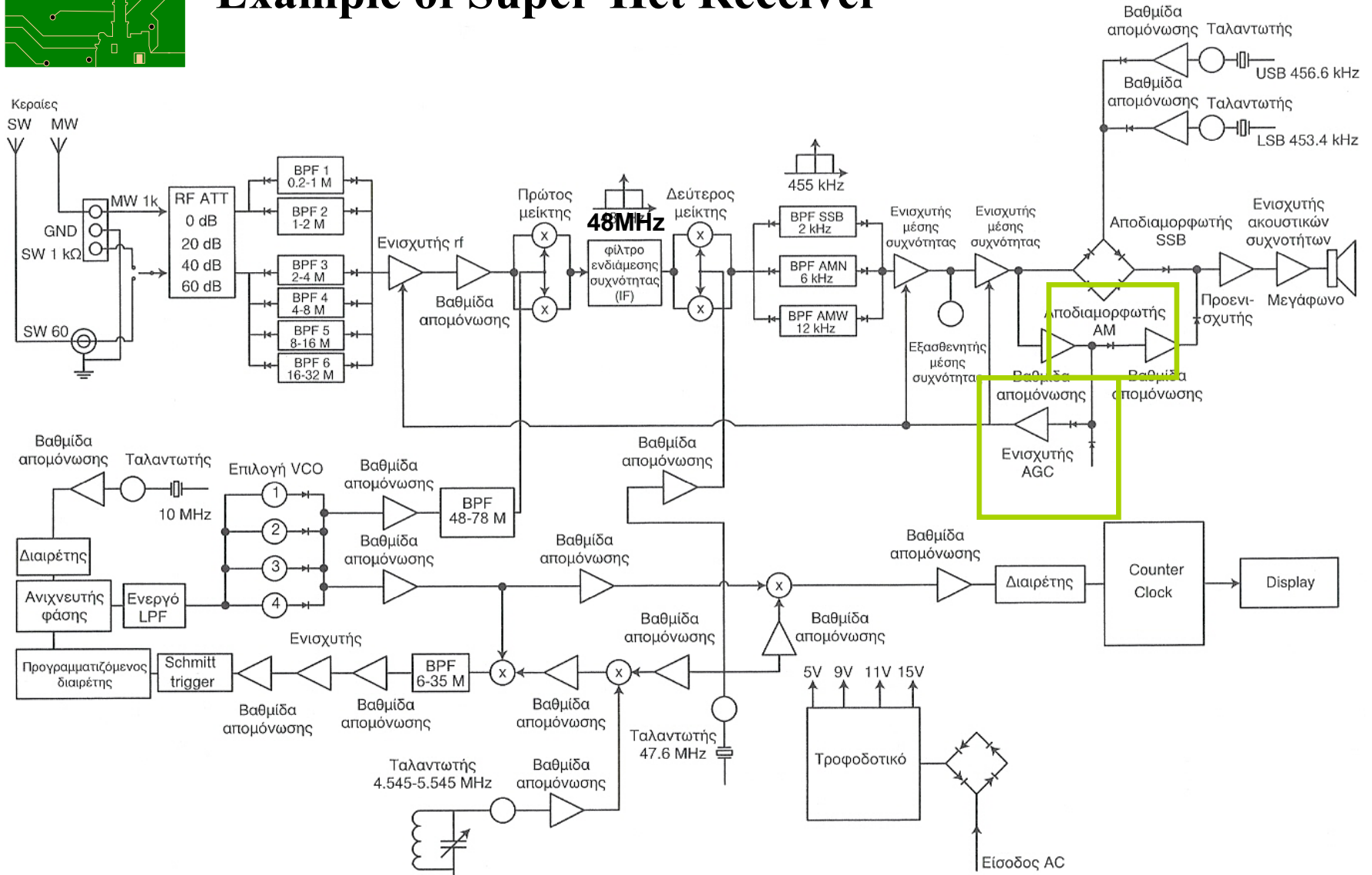
➤ Notice the balanced architecture of each mixer (why?).

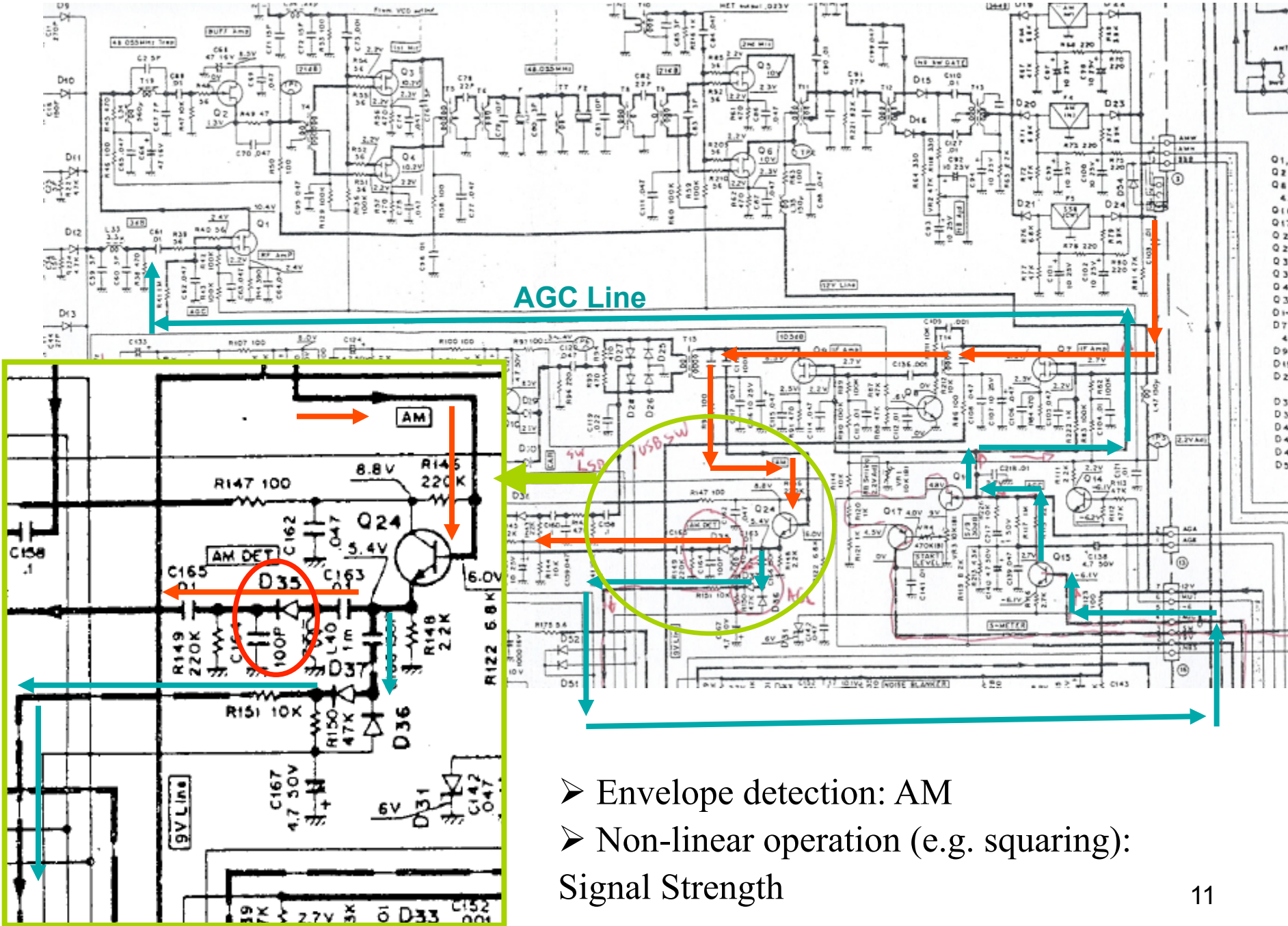
[mixer = switch at mixing frequency => output could potentially include mixing frequency due to non-idealities]

➤ Balanced architecture: mixing frequency adds with opposite sign at the output (and cancels out).

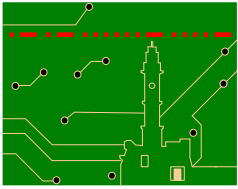


Example of Super-Het Receiver

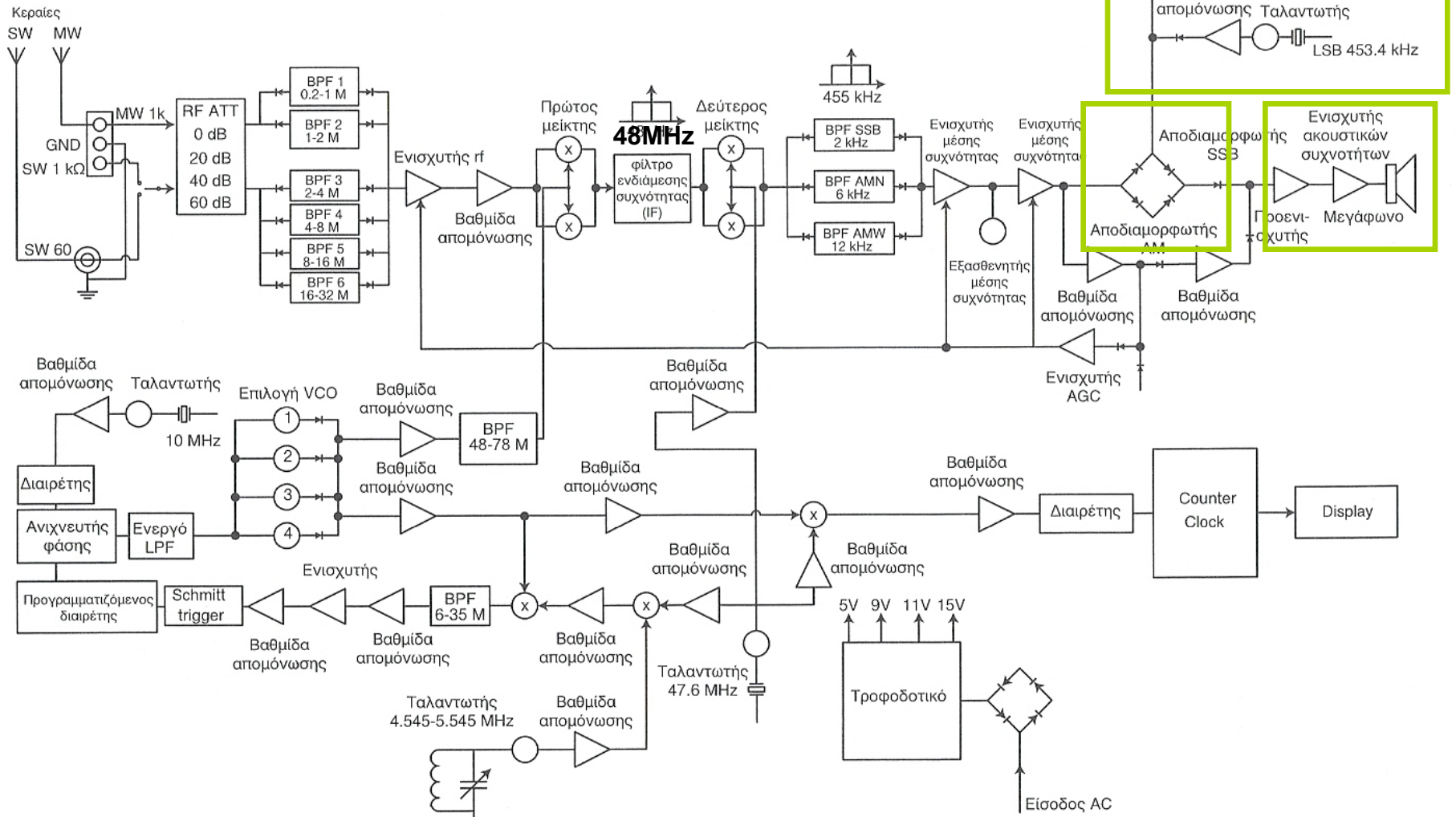


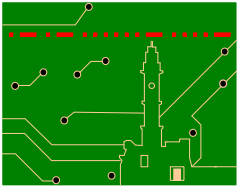


- Envelope detection: AM
- Non-linear operation (e.g. squaring):
Signal Strength

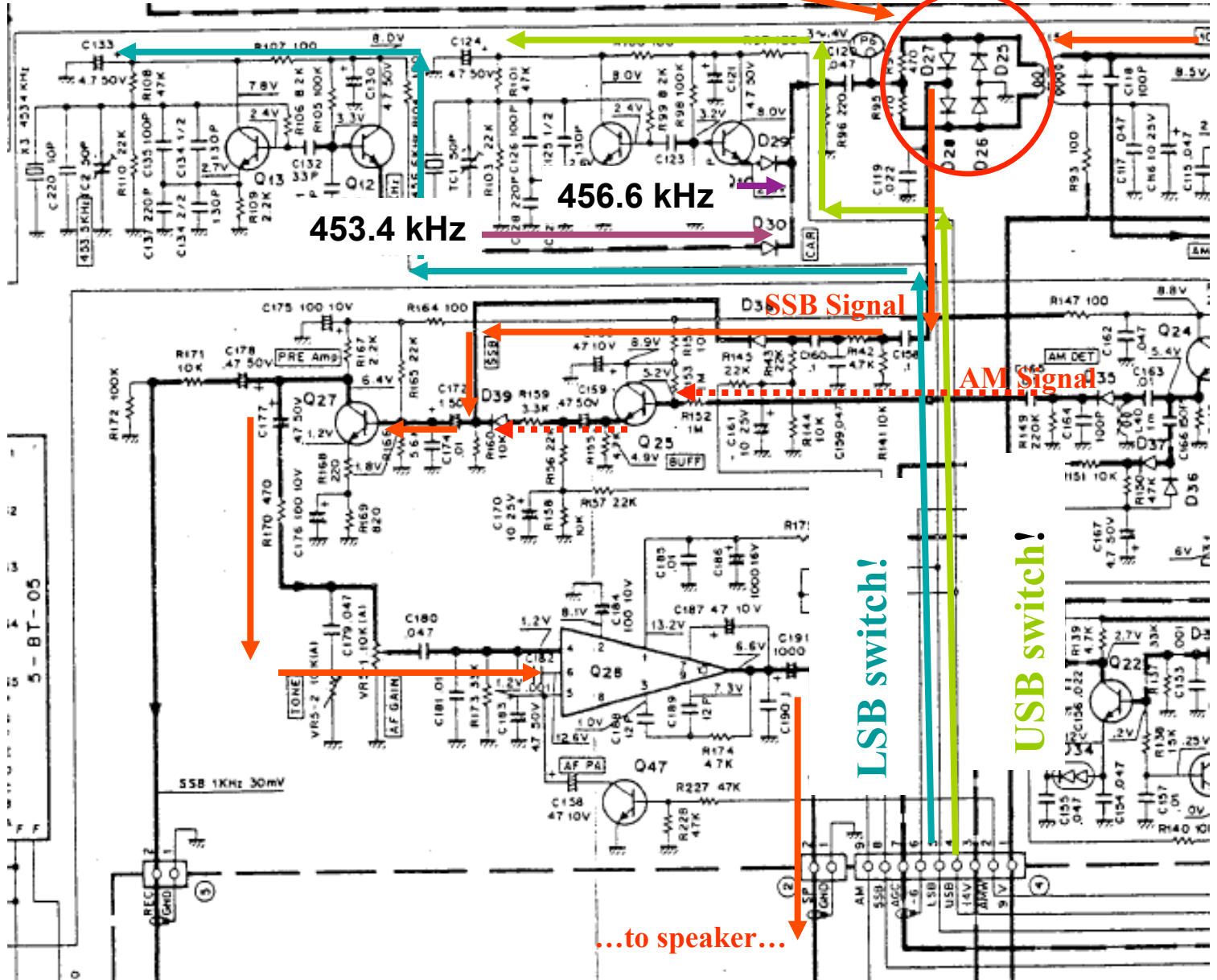


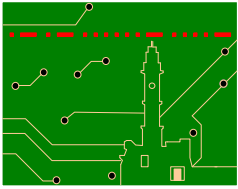
Example of Super-Het Receiver



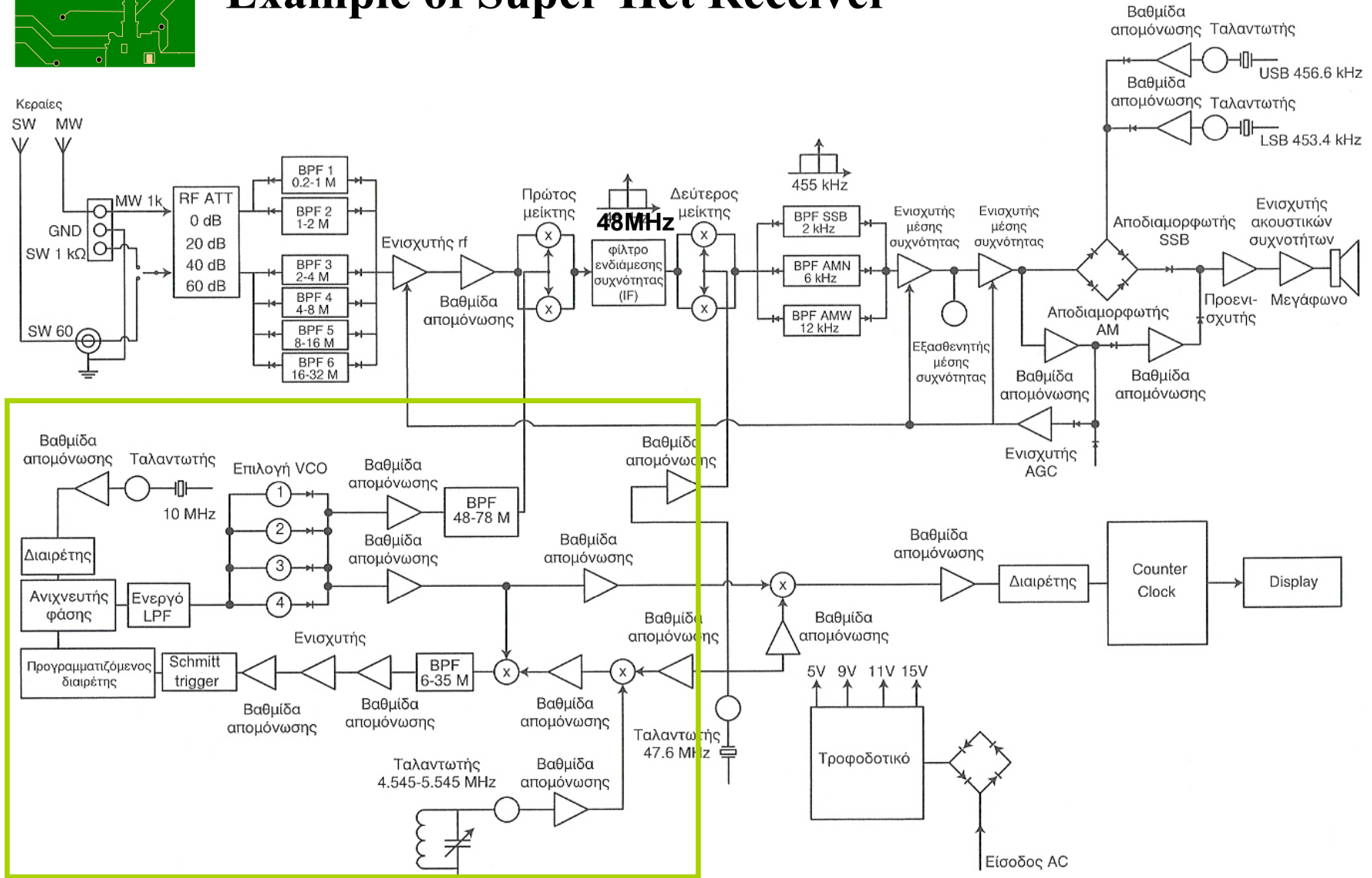


➤ Notice the double-balanced mixer!

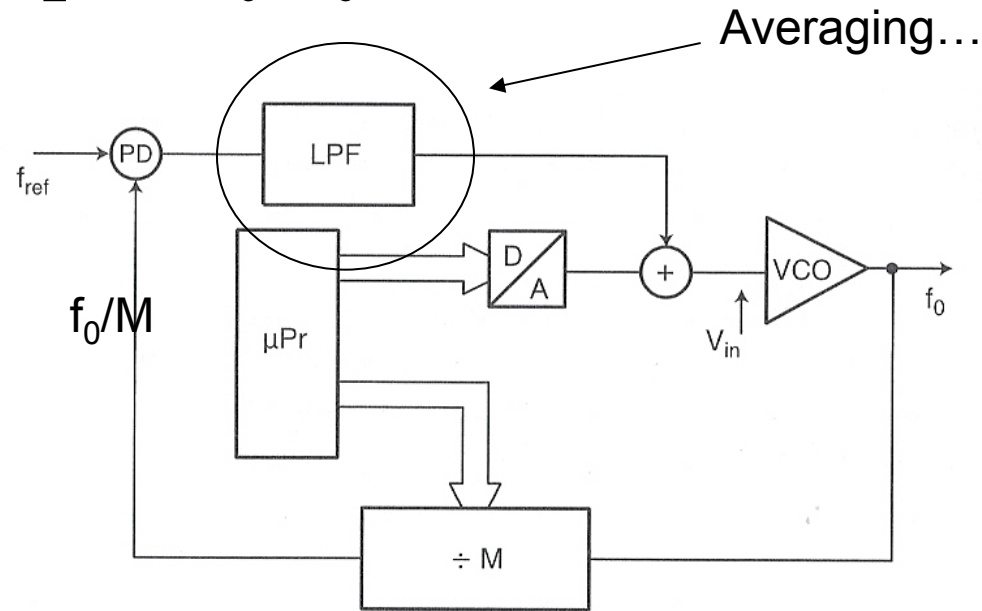
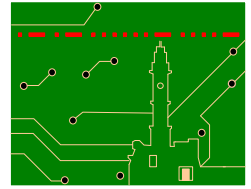




Example of Super-Het Receiver

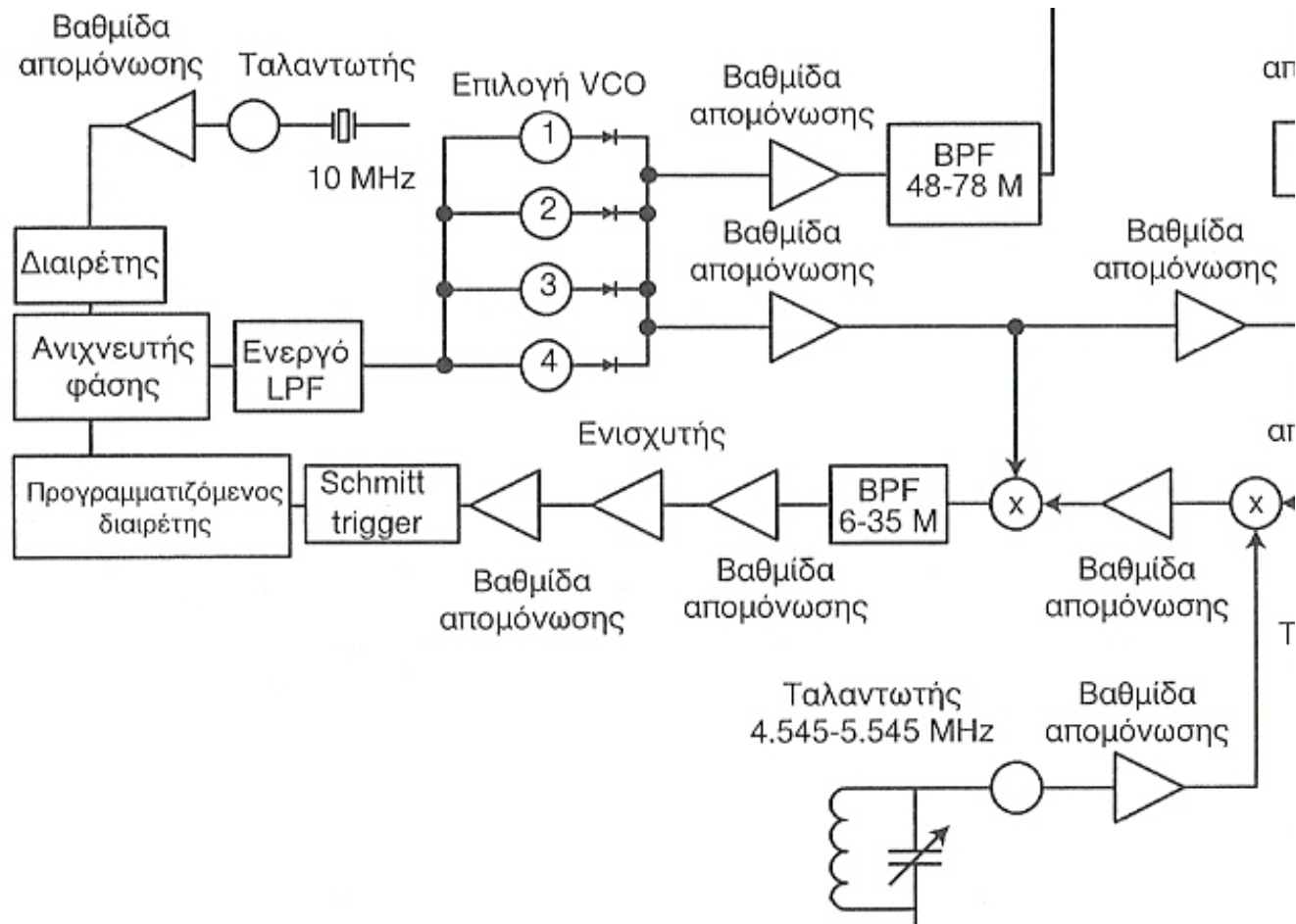
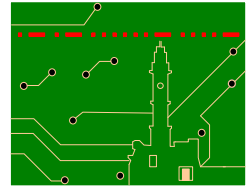


PLL as frequency synthesizer



- Voltage control oscillator (VCO): multiple frequencies but temperature-unstable.
- Crystal: (relatively) temperature-stable but single frequency.
- PLL: multiple, temperature-stable frequencies.
- PLL range of frequencies: discrete steps, depends on divisor M .

PLL as frequency synthesizer



Questions?

