Buttons and Knobs

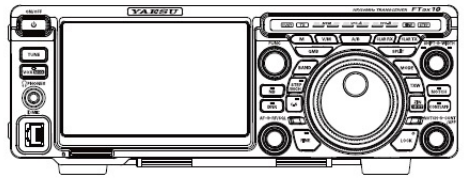
How to use modern HF rig controls

Top Advice: Read the Manual.

YAESU
The radio

HF/50MHz TRANSCEIVER
FTDX10

Operation Manual



ICOM

FULL MANUAL

HF/50 MHz TRANSCEIVER
IC-7300

Icom Inc.

KENWOOD

INSTRUCTION MANUAL

HF/ 50 MHz ALL MODE TRANSCEIVER
TS-590S

NOTIFICATION
This equipment complies with the essential requirements of Directive 1999/5/EC.
The use of the warning symbol ① means the equipment is subject to restrictions of use in certain countries.
This equipment requires a licence and is intended for use in the countries below.

AT	BE	DK	FI	FR	DE	GR	IS
IE	IT	LI	LU	NL	NO	PT	ES
SE	CH	GB	CY	CZ	EE	HU	LV
LT	MT	PL	SK	SI	BG	RO	

ISO3166

JVC KENWOOD Corporation
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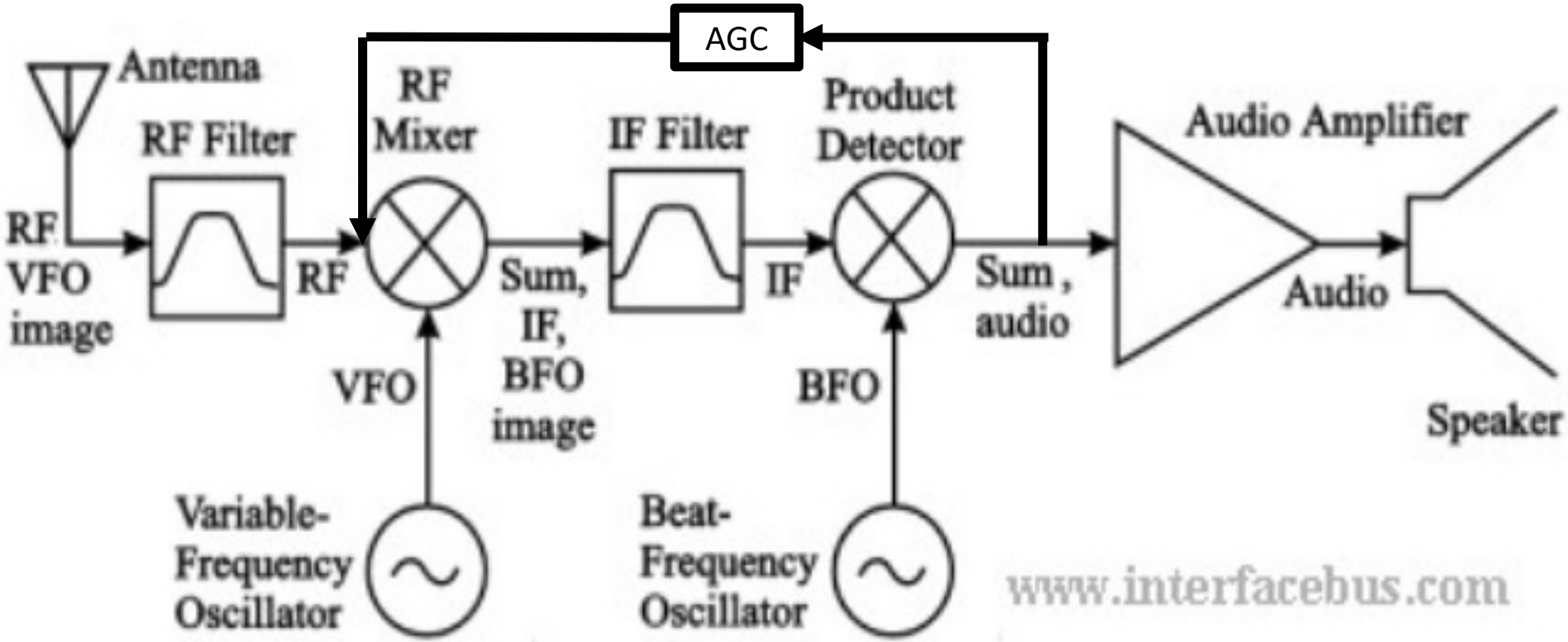
09 08 07 06 05 04 03

CE 0682 ①

Current Basic Transceiver Designs:

- Super Heterodyne
- SDR (software defined) such as an IC 7300
- Hybrid – Super Heterodyne front end, SDR backend such as a Yaesu FTDX10, FTDX101D or FTDX101MP

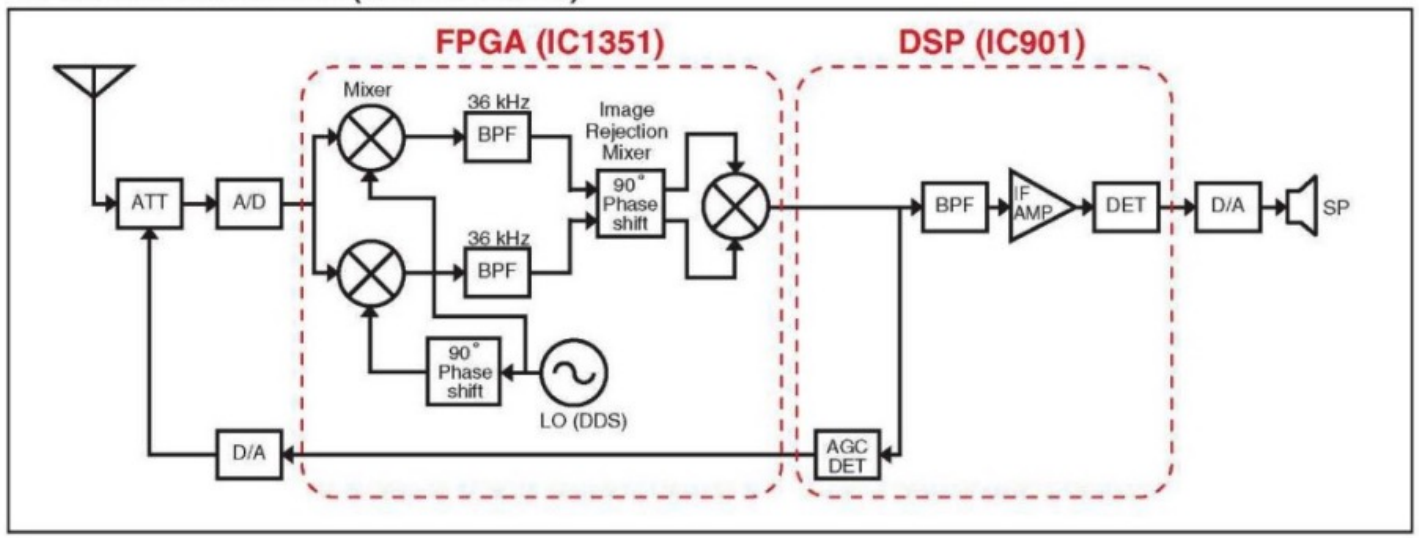
Basic Block Diagram



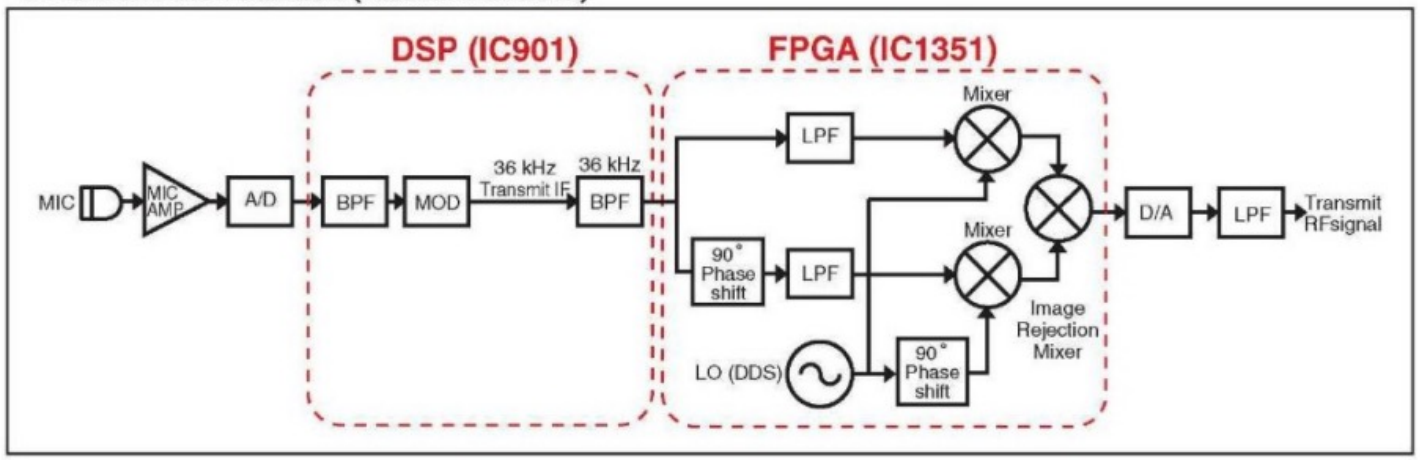
Superheterodyne Receiver

Block Diagram – IC 7300:

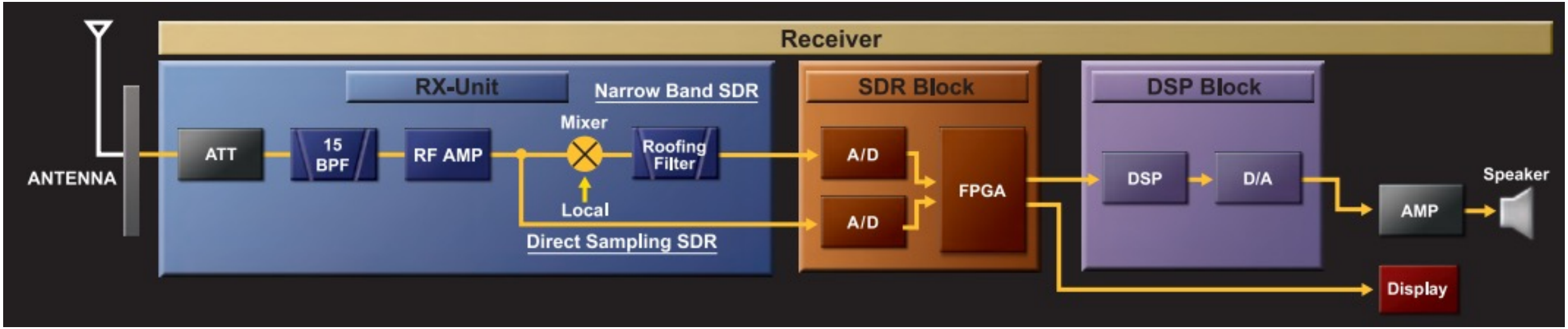
• FPGA BLOCK DIAGRAM (Receive circuits)



• FPGA BLOCK DIAGRAM (Transmit circuits)



FTDX 10 Block Diagram:



How the controls help:

- Increase your signal to noise ratio
- Reduce “noise” (QRN) in general (reduce level of static crashes)
- Eliminate interference (QRM) from other stations
- Make the receive audio more pleasant or less tiresome to listen to or otherwise make it more intelligible

Controls that may be available:

- Mode
- Band Stacking
- RIT or CLAR RX
- XIT or CLAR TX
- Tune (antenna tuner or matching)
- ATT (attenuation)
- Pre-Amplifier
- Roofing Filter
- AGC
- RF Gain
- AF Gain
- Noise Blanker
- Digital Noise Reduction
- Digital Notch
- IF Notch
- IF Contour
- IF Shift
- IF Width
- Monitor
- Lock
- VOX/MOX

Different Modes:

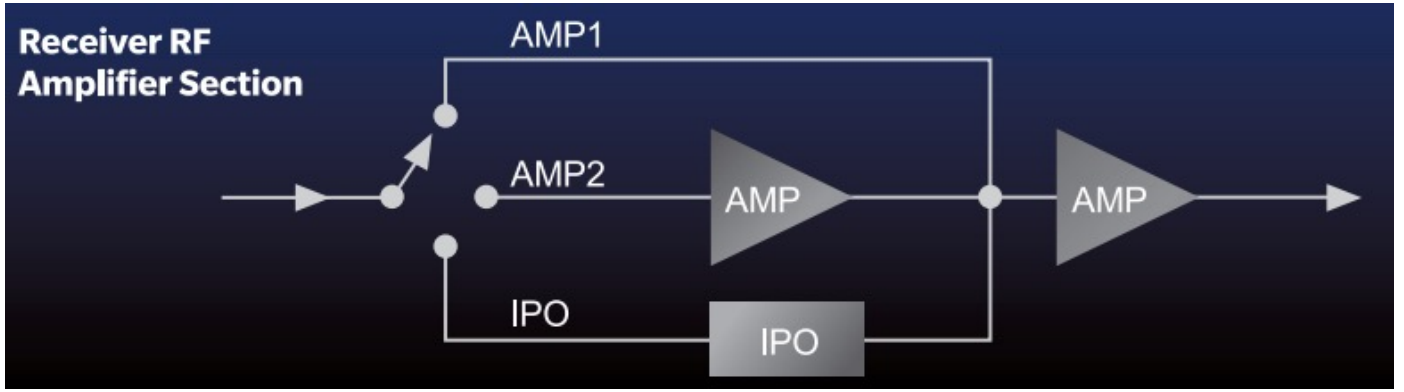
- LSB
- USB
- CW-L
- CW-U
- AM
- AM-N
- FM
- FM-N
- DATA-L
- DATA-U
- DATA-FM
- D-FM-N
- RTTY-L
- RTTY-U
- PSK

RIT or CLAR RX and XIT or CLAR TX:

- These controls permit you to leave the VFO on its frequency and to change either the receive frequency or the transmit frequency, leaving the other function on the original frequency:
  - Use RIT to be able to hear a station that is not exactly on your transmit frequency.
  - Use XIT to transmit a little off frequency from the one the other station is using, permitting your signal to stand out – may help in a pile-up

ATT or Pre-Amp:

- ATT and Pre-Amp are performed prior to going to the first mixer
- ATT will reduce the entire incoming signal power (on a Yaesu, 6 dB, 12 dB or 18 dB)
- Pre-Amp will amplify the signals before going through the first mixer (in a Yaesu 10 dB and 20 dB gain). The cascade is shown correctly but the IPO bypasses AMP1, unlike the picture.



AGC:

- AGC or automatic gain control performs two main functions:
  - To maintain a constant audio output level once a minimum threshold is met
  - To limit the signal level going into the ADC (analog to digital converter)
- AGC adjusts based on a time constant and has values like slow (for SSB or AM), medium (for data), and fast (for CW)

RF Gain and AF Gain:

- RF sets the gain level for the RF and IF stages, while AF is essentially a volume control.
- Olden days many people turned back the RF gain and turned up the AF gain so that the signals can be heard (rolling back RF gain works kind of like a squelch where the strength of signals has to be higher than the floor to be heard – watch the S meter as an indication of the increasing floor caused by rolling back RF gain). Still used, but not as much. Modern signal processing is much better.
- Most modern radios do not need any reduction in RF gain so it usually remains in the full on or clockwise setting.

Noise Blanker:

- Used to reduce pulse noise, like automobile ignition noise or powerline noise.
- The NB is trying to anticipate when and where a repeating QRM will occur and remove it by phase reversal.
- I don’t use this very often, given my shack environment.

DNR – Digital Noise Reduction:

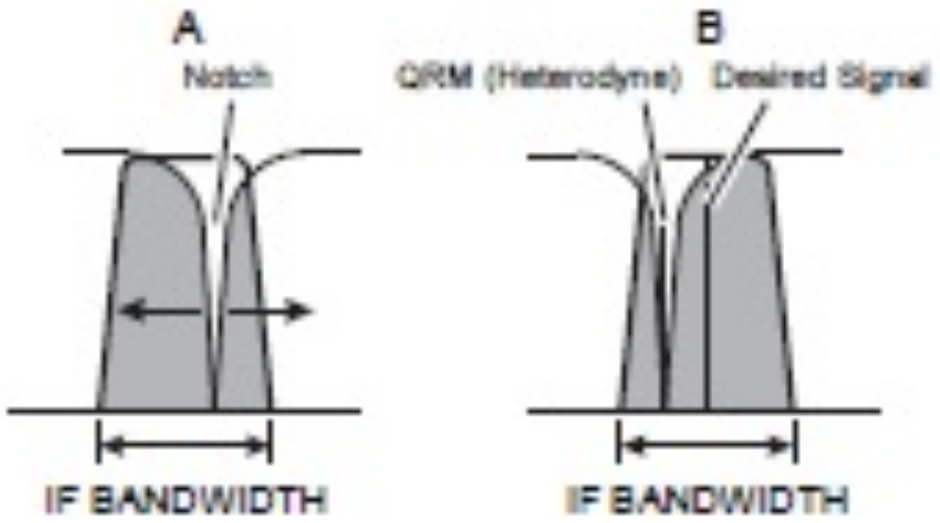
- In modern radios, this adjustable setting works wonders – especially when operating SSB.

- Each setting is a slightly different algorithm. Might be worth experimenting if you think you need it. Some settings can degrade the receive quality enough that you may not want to use that setting.

Notch Filters:

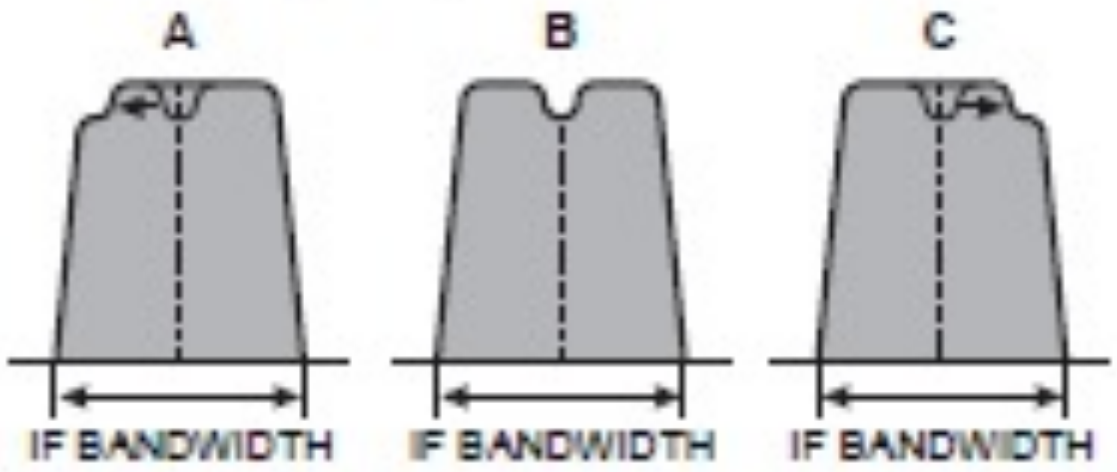
- Newer radios have two notch filters:
  - IF Notch Filter
  - Digital Notch Filter
- A Notch filter attenuates a portion of the pass band, effectively blocking it from being heard. Great way to cancel an interfering signal (heterodyne or (tone)) but intelligibility may be reduced
- The Digital Notch Filter can be used to track and eliminate multiple interfering signals even when frequencies are changing. Works to minimize disruption from someone “tuning up” on your frequency.
- The IF Notch Filter is manual and may be adjusted for different widths

IF Notch Filter:



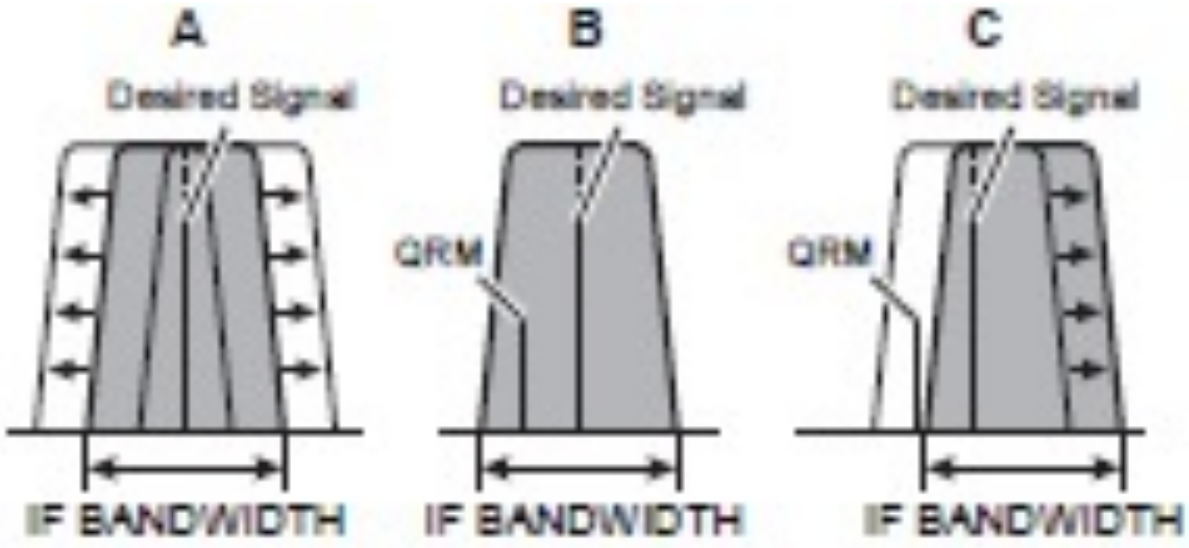
Contour (not available on all rigs):

- Although these pictures show a reduction in the signal, contour may be used to enhance rather than reduce. In this configuration it's like a wider, more shallow, notch filter.
- The width adjustment adjusts the Q of the Contour circuit



Shift:

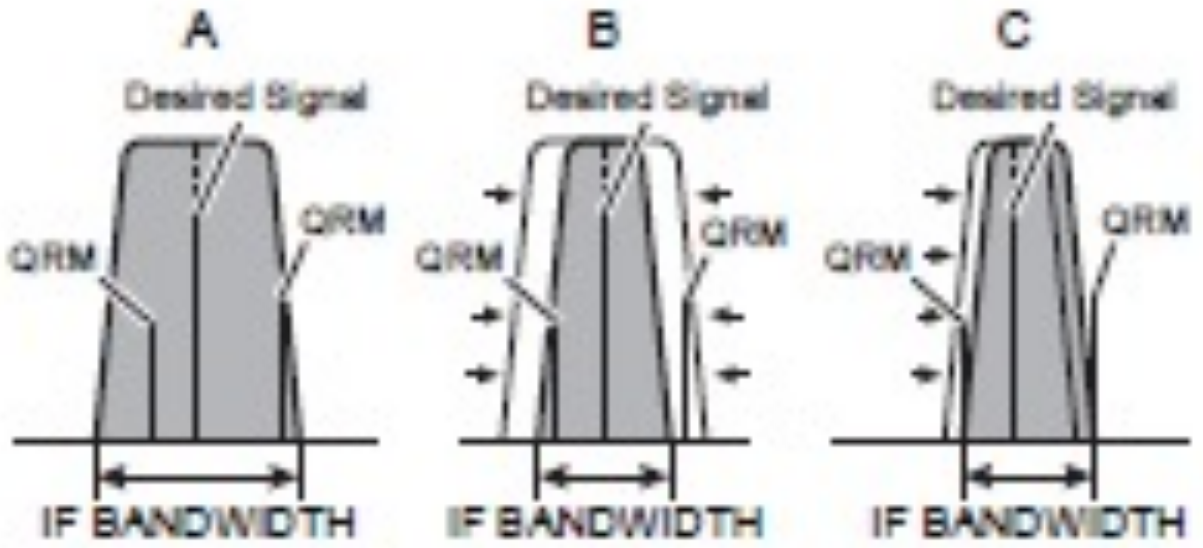
- Leaves the desired signal alone while moving the pass band up or down so that interference will be outside the IF band pass range.



Width:

- Narrows the IF pass band which will help reduce noise or interference that is outside the new width of the IF pass band.

Shift and Width Together:

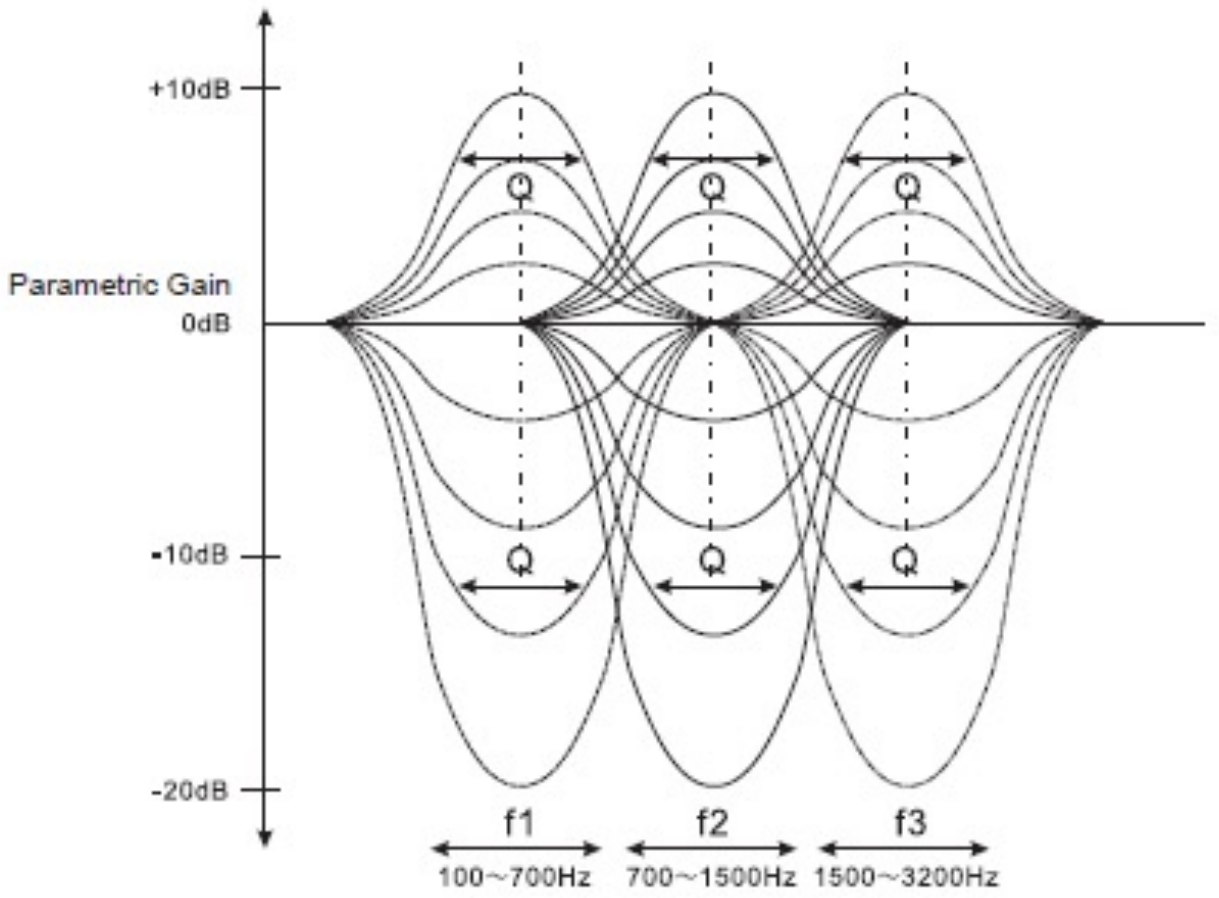


Specialized Controls - SSB

Parametric Microphone Equalizer:

Adjustments (may be made separately for AMC or Speech Processing on or off):

- Center Frequency (for the high, middle and low ranges)
- Gain or attenuation (for each of the frequencies, high, middle and low)
- Q (Bandwidth) (for each of the high, middle and low center frequencies) Remember high Q is narrow and low Q is wide.



Specialized Controls - CW:

- Break in
  - Type – full (QSK) or semi-break in
  - Delay
- Keyer Settings
  - Elekey A
  - Elekey B
  - ACS
  - Off – for straight keys and bugs
- Side Tone Freq
- CW Auto Mode – permit CW while in SSB mode
- Zin/Spot – automated zero beating
- APF – Audio Peak Filter
- CW-U/CW-L – this changes the side tone, not the carrier

Split Operation:

- A/B – switch the frequencies between VFO A and VFO B
- A>B – copy the frequency from VFO A to VFO B
- Split operation – puts rig into split operation
- Auto Split – puts rig into split operation and shifts VFO B up or down the specified number of Hz
- TWX – permits the operator with a single receiver that has both VFO A and VFO B to rapidly listen on either the A or B frequency and to return to the split setting upon release. Helps monitor the other chasers

Be careful:

- If the filter is too narrow, or shifted too far, or other settings adjusted too much, the signal could be lost or made unintelligible
- If AGC is turned off the rig could over-load and distortion could result
- RIT or XIT can cause confusion if not removed when no longer needed
- Improper settings can lead to unintended results, many of which make using the rig more difficult and less enjoyable