

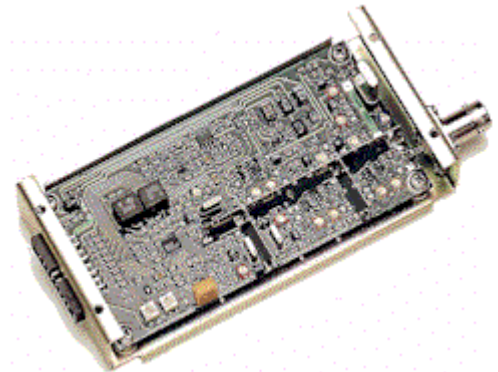
**SINGLE CHANNEL XTAL CONTROLLED
VHF-UHF RECEIVERS**

AR52/AR57

- **VHF 136 - 175 MHz**
- **UHF 400 - 470 MHz**
- **12.5 - 20 - 25 - 50 KHz CHANNEL SPACING**
- **FM or PM MODULATION**
- **OPEN or ENCLOSED VERSIONS**

GENERAL DESCRIPTION

The AR52 receivers (136 - 175 MHz VHF band) and the AR57 receivers (400 - 470 MHz UHF band) have been designed in accordance with ETS 300-086 (VOICE) and ETS 300-113 (VOICE + DATA) regulations and work in frequency modulation. The modules are manufactured using Surface Mount Technology (SMT) and are therefore compact and reliable. The reception frequency is determined by a crystal which can be rapidly supplied by STE on the



GENERAL SPECIFICATIONS	
Supply voltage	: 12 VDC nom (10,8 to 15,6 VDC)
Supply current	: 35 mA (7 mA STAND-BY)
Operating temp.	: - 10 TO 55°C
RF imped.	: 50 Ohm
Size (open module)	: 108 x 55 x14 mm
Weight (open module)	: 40 g
Size (enclosed module)	: 120 x 63 x 26 mm
Weight (enclosed mod.)	: 250 g

frequency required. A special care has been devoted to design the radio frequency circuit using highly selective double tuned circuits and to design the demodulation and supply circuit to make the module suitable to meet the most various requirements. Either the "FM" (linear frequency response) or the "PM" (6dB/octave deemphasis) modulations can be chosen and the cut-off frequency of the demodulator can be changed. An audio output which is not blocked by the squelch circuit is foreseen to detect in-band or out-band pilot tones (subaudio or superaudio tones) as well as selective calling tones. A direct output from the discriminator (D.C. coupled) is available to demodulate

complex digital signals as well as an "RSSI" output which helps measure the received signal intensity. An open collector output controlled by the carrier detection and squelch circuit and a "MUTE" input to block the audio output are also foreseen. The "STB" input allows to switch off the module supply (for example during transmission) whereas the audio circuit supply can be maintained (to decrease the transmitting-receiving switching times in case of digital signal reception).

X1 CHANNEL CRYSTAL

The local conversion oscillator frequency (Fol in TP1) is determined by the X1 crystal frequency multiplied by 12 in VHF receivers and multiplied by 24 in UHF receivers. Fx1 frequency shall be:

- 21.4 MHz higher than the reception frequency for VHF AR52 receivers
- 45 MHz lower than reception frequency for UHF AR57C and AR57N receivers
- 21.4 MHz lower than the reception frequency for UHF AR57F receiver.

X1 crystal frequency:	
a) AR52	$F_{x1} = (F_R + 21.4) / 12$ (MHz)
b) AR57C-AR57N	$F_{x1} = (F_R - 45) / 24$ (MHz)
c) AR57F	$F_{x1} = (F_R - 21.4) / 24$ (MHz)

DESCRIPTION OF "S" SELECTORS

Note 1 - "S" selectors are made of solder jumpers on the printed circuit; it is recommended to use a welder with thin tip and to take due precautions.

Note 2 - In selectors where the "A" and "B" positions can be chosen, take care for the tin spatter not to short-circuit both positions.

S1 - AUDIO STAGE SUPPLY:In standard position with jumper in "A" the audio stage supply (IC2-Q9-Q10) is removed during "STAND-BY", i.e. when J1 terminal no. 3 (STB) is grounded. When the jumper is in "B" position the audio stage supply is steady: therefore the delay in receiving digital signals or selective tones during the transmitting-receiving switching is reduced.

S2 - INTERNAL OR EXTERNAL AUDIO SIGNAL:In standard position, S2 is short-circuited by a jumper and the audio signal demodulated by IC1 is sent through RV1 (AUDIO LEVEL) to the audio stages (IC2-Q9-Q10).If the jumper in S2 is removed, the demodulated audio signal is available at J1 terminal no. 10 (DIS) and therefore sent again to RV1 through J1 terminal no. 11 (AIN). During this changeover

the signal can be adequately processed, i.e. filtered to eliminate possible subaudio or superaudio tones.

S3 - SELECTION OF DEMODULATION.

In standard position with a jumper in "A", audio stages have a 6dB/ octave deemphasis response (PM modulation). If the jumper is in "B" the audio response is flat in the audio band (FM modulation).

S4 - CHOICE OF AUDIO CUT-OFF

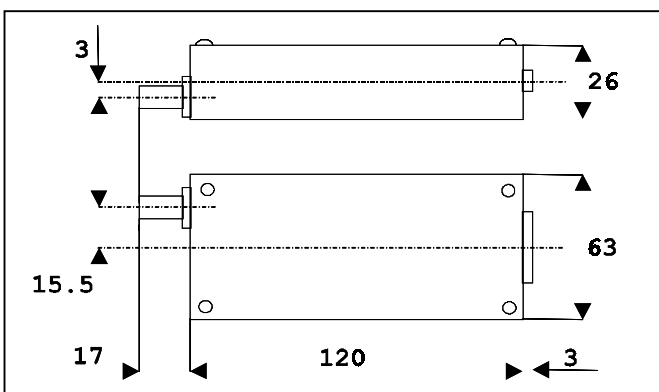
FREQUENCY:The output audio signal in

J1 terminal no. 8 (OUT) has a frequency response limited by a low-pass filter (IC2A). Under normal conditions the cut-off frequency (-3dB) is 3.3 KHz: higher frequencies are attenuated to improve the audio signal S/N ratio.If a wider audio band is required, a jumper in S4 (wich short-circuits the bump contacts) increases the cut-off frequency approximately 7 KHz.

S5 - AUDIO OUTPUT BIAS CURRENT:Under normal conditions S5 is open. The signal recieved is available in J1 terminal no. 8 (output signal from audio stages): it is possible to drive 2 KOhm or higher impedance loads.By short-circuiting S5 it is possible to drive 600 Ohm loads with -10 dBm level and a dynamic range exceeding 12 dB (relative to the standard modulation signal). This causes a 3 mA increase of IC2A bias current eliminating any crossover distortions.

See also [Sizes, component positions, "S" selectors and test points](#) and [Block Diagram](#).

X1 Crystal specifications		
Holder	HC49T	(note 1)
Resonance	parallel	
Load capacitance	20 pF	
Calibration tolerance	± 10 ppm	
Temperature stability	± 10 ppm (VHF)	
	± 5 ppm (UHF)	(note 2)
Note 1	HC49T holder is 11 mm high. It is also possible to use HC49U or HC18U holders (13 mm high).	
Note 2	Approximate value; stability specifications depend on operating temperature range	



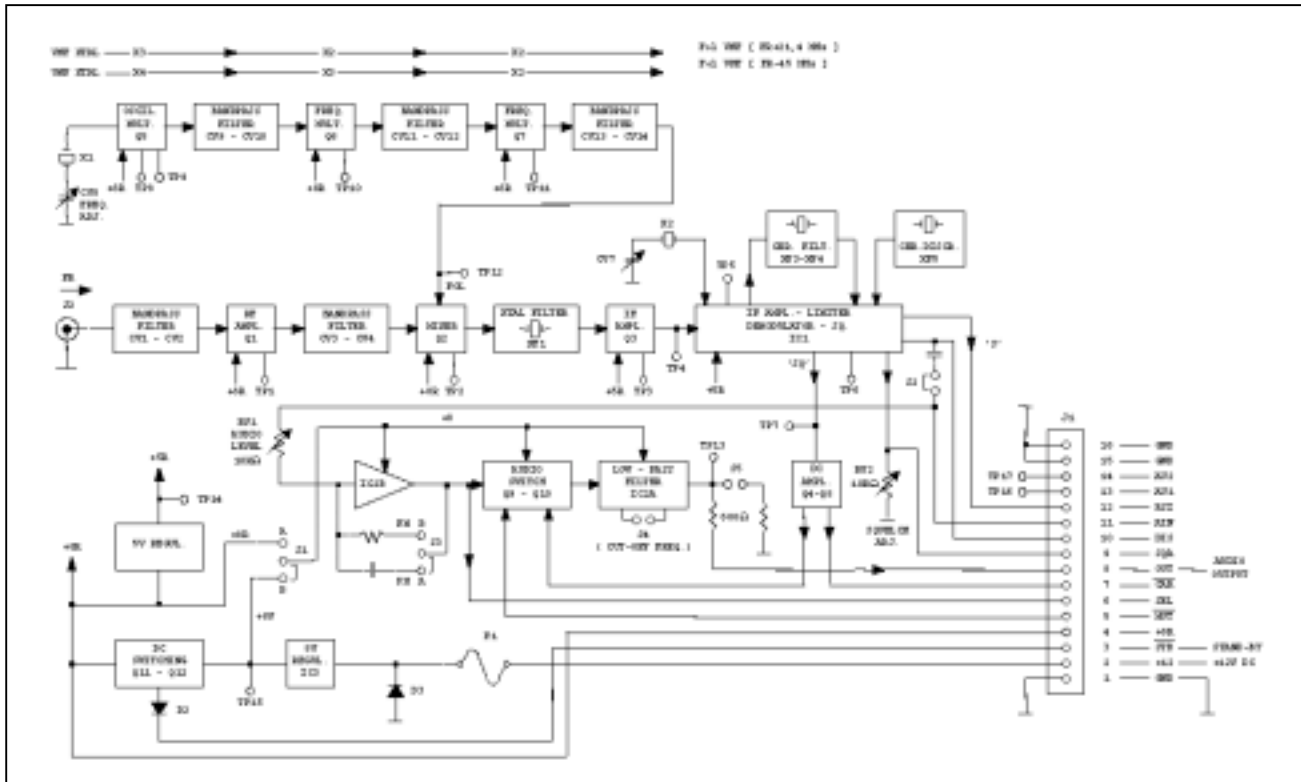
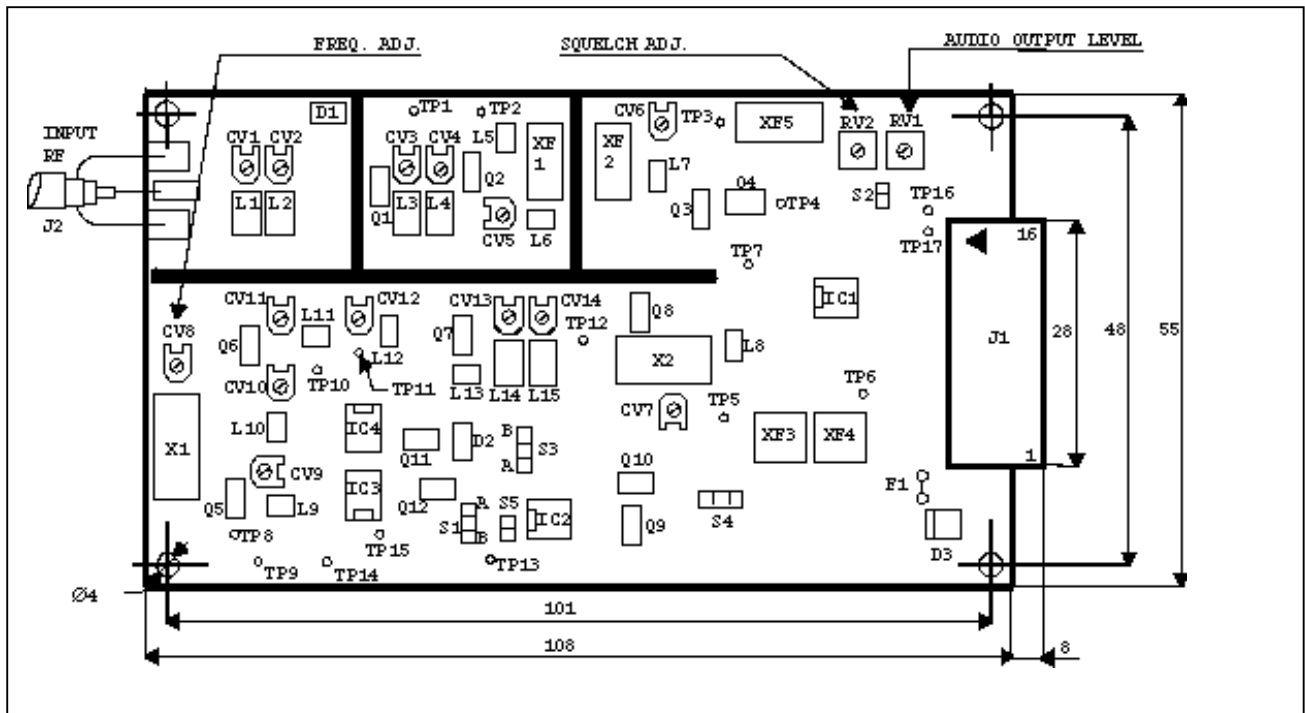


Fig.1: Block Diagram



AR52x Features

Single Channel Receivers	VHF	VHF	VHF
RECEIVER TYPE	AR52N	AR52C	AR52F
Frequency range	136 - 175 MHz	136 - 175 MHz	136 - 175 MHz
Sensitivity (1)	0.25 μ V (12dB SINAD)	0.2 μ V (12dB SINAD)	0.4 μ V
Channel Spacing	12.5 KHz	25 KHz	50 KHz
Selectivity (-3 dB)	\pm 3.75 KHz	\pm 7.5 KHz	\pm 15 KHz
Adjacent Channel Selectivity	> 60 dB	> 70 dB	> 70 dB
Spurious Response Rejection	> 70 dB	> 70 dB	> 70 dB
Spurious Emissions (Cond.-rad.)(2)	< 2 nW	< 2 nW	< 2 nW
Co-channel Rejection	< -12 dB	< -8 dB	-
Intermodulation rejection	> 70 dB	> 70 dB	> 70 dB
Intermediate Frequencies	21.4 MHz - 455 KHz	21.4 MHz - 455 KHz	21.4 MHz - 455 KHz
Modulation Type	FM - PM	FM - PM	FM - PM
Audio Response ("OUT" term.)(3)	100 - 3000 Hz (-3 dB)	100 - 3300 Hz (-3 dB)	100 - 5000 Hz (-3 dB)
Audio Response ("DIS" term.)	DC - 3500 Hz	DC - 7000 Hz	DC - 10000 Hz
Audio Level ("OUT" term.) (4)	-10 dBm (600 Ohm)	-10 dBm (600 Ohm)	-10 dBm (600 Ohm)
Squelch Type ("OUT" term.)	noise oper. (2 dB hyst.)	noise oper. (3 dB hyst.)	noise oper. (3 dB hyst.)
Audio S/N ("OUT" term.)(4)	40 dB	46 dB	40 dB
Audio Distorsion(4)	< 5%	< 5%	< 3%
Group Delay			< \pm 150 μ s (1 KHz - 5 KHz)

AR57x Features

Single Channel Receivers	UHF	UHF	UHF
RECEIVER TYPE	AR57N	AR57C	AR57F
Frequency range	400 - 470 MHz	400 - 470 MHz	400 - 470 MHz
Sensitivity (1)	0.3 μ V (12dB SINAD)	0.25 μ V (12dB SINAD)	0.5 mV
Channel Spacing	12.5 KHz	25 KHz	50 KHz
Selectivity (-3 dB)	\pm 3.75 KHz	\pm 7.5 KHz	\pm 15 KHz
Adjacent Channel Selectivity	> 60 dB	> 70 dB	> 70 dB
Spurious Response Rejection	> 70 dB	> 70 dB	> 60 dB
Spur. Emis. (Cond.-rad.)(2)	< 2 nW	< 2 nW	< 2 nW
Co-channel Rejection	< -12 dB	< -8 dB	-
Intermodulation rejection	> 70 dB	> 70 dB	> 70 dB
Intermediate Frequencies	45 MHz - 455 KHz	45 MHz - 455 KHz	21.4 MHz - 455 KHz
Modulation Type	FM - PM	FM - PM	FM - PM
Audio Res. ("OUT" term.)(3)	100 - 3000 Hz	100 - 3300 Hz	100 - 5000 Hz
Audio Response ("DIS" term.)	DC - 3500 Hz	DC - 7000 Hz	DC - 10000 Hz
Audio Level ("OUT" term.) (4)	-10 dBm (600 Ohm)	-10 dBm (600 Ohm)	-10 dBm (600 Ohm)
Squelch Type ("OUT" term.)	noise oper. (2 dB hyst.)	noise oper. (3 dB hyst.)	noise oper. (3 dB hyst.)
Audio S/N ("OUT" term.)(4)	40 dB	46 dB	40 dB
Audio Distorsion(4)	< 5%	< 5%	< 3%
Group Delay			< \pm 150 μ s (1 KHz - 5 KHz)
Note 1	1 KHz PM stand. mod. (\pm 1.5 KHz dev. for 12.5 KHz chan. spacing / \pm 3 KHz dev. for 25 KHz chan.pacing).		
Note 2	Radiated emission limit only for enclosed modules.		
Note 3	PM mod. (mod. index = 0.5 for 12.5 KHz chan. spacing / mod. index = 1 for 25 KHz channel spacing).		
Note 4	1 KHz PM standard modulation.		

