

ALAN-100 B AM/FM (4 WATT) CIRCUIT DESCRIPTION

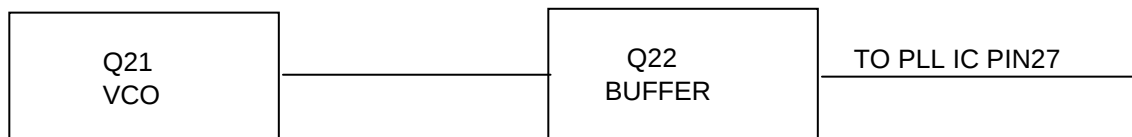
INTRODUCTION

1. ALAN 100B AM/FM 40 CHANNEL "EMG 9/19" AND THE POWER OUTPUT 4.0W
FREQUENCY 26.9650MHz - 27.4050MHz

2. THE FREQUENCIES FOR TRANSMITTER AND RECEIVER LOCAL FREQUENCIES ARE ALL FROM A CRYSTAL (X1) 10.2381MHz BY MEANS OF A PHASE LOCKED LOOP.

THE FIRST LOCAL OSCILLATOR FREQUENCIES ARE 16.26MHz(CH.1) TO 16.70MHz(CH.40) FOR RECEIVER AND THE SECOND LOCAL FREQUENCIES OF FIXED AT 10.2381MHz GENERATE TO IF2 (455KHz).

THE VCO OF PLL OPERATES FREQUENCIES ARE 13.48MHz(CH.1) TO 13.70MHz(CH.40) FOR TRANSMIT.



FREQUENCY TX : 13.48MHz(CH.1) TO 13.70MHz(CH.40)
LOCAL FREQUENCY RX : 16.26MHz(CH.1) TO 16.70MHz(CH.40)

THE VCO OPERATE FREQUENCY FOR THE RECEIVER IS 16.26MHz(CH.1) TO 16.70MHz(CH.40) AS THE FIRST LOCAL OSCILLATOR, INJECTED THROUGH THE BUFFER AMPLIFIER Q22 INTO THE FIRST MIXER Q3

DESCRIPTIONS OF EACH BLOCK

INTRODUCTION

THE SYNTHESIZER IS IMPLEMENTED WITH THE FOLLOWING, COMPONENTS ARE : PLL IC(IC1), CRYSTAL(X1), Q21, Q22, D19 ARE CLAPP OSCILLATOR CIRCUIT TO OPERATE AS VCO OF THE PLL IC. THE Q20 IS A SWITCHING TO CONNECT OR DISCONNECT THE TUNING CAPACITOR IN THE VCO OSCILLATOR TANK CIRCUIT FOR TRANSMITTER OR RECEIVER.

THE Q22 WORKS AS A BUFFER AMP FOR RX LOCAL FREQUENCIES AND TX CARRIER GENERATING FREQUENCIES.

REFERENCE FREQUENCY(CRYSTAL)

THE CRYSTAL X1(10.2381MHz) AND OTHER COMPONENTS AS IC1 PIN.20(XIN) MAKE A REFERENCE FREQUENCY OSCILLATOR WITH CLOCK DATA FOR INTERFACE. THIS SET IS USED EXTERNAL CLOCK SOURCE BY THE CRYSTAL. THE REFERENCE FREQUENCY(10.2381MHz) IS ADJUSTED BY C76, C77 AND CT1 EXACTLY

VCO

THE Q18, Q19 AND SURROUNDING PARTS ARE CONSISTING A CLAPP OSCILLATOR WORKS AS A VCO OF PLL IC WITH APPROPRIATE CONTROL VOLTAGE ON D19 WITH BY ADJUST T7. THE VCO CAN BE OSCILLATE OVER THE REQUIRED RANGE OF 13.48MHz TO 13.70MHz.

PHASE DETECTOR AND VCO CONTROL

THE PHASE DETECTOR IS A DIGITAL PHASE COMPARATOR WHICH COMPARES THE PHASE OF THE REFERENCE SIGNAL WITH PROGRAMMABLE DIVIDER OUTPUT SQUARE WAVES AND DEVELOPS A SERIES OF PULSES WHOSE DC LEVEL DEPENDS ON THE PHASE ERROR OF EACH SIGNAL.

THE PHASE DETECTOR PULSE OUTPUT IS FED TO AN ACTIVE LOW PASS FILTER, AND FED TO VARIABLE CAPACITOR DIODE D19 CONTROL THE VCO FREQUENCY.

SWITCHING OF TUNNING CAPACITOR IN VCO

THE VCO CIRCUIT MUST USE WITH A WIDE RANGE OF FREQUENCIES 13.48MHZ TO 13.70MHZ FOR TRANSMITTER AND 16.26MHZ(CH.1) TO 16.70MHZ(CH.40) FOR RECEIVER.

TO COMPLY ABOVE RANGE OF VCO, THE TUNNING CAPACITANCE SHOULD SWITCHED FOR TRANSMISSION OR RECEPTION.

THE TUNNING CIRCUIT VCO IS WORKING AS A RECEIVER AND TRANSMITTING OF BECOMES TURN ON AND BECOMES OFF BY T7 AND D19 CAPACITANCE OF MAKE TUNNING FUNCTION.

RECEIVER LOCAL OSCILLATOR OUTPUTS

1ST MIXER : THE OUTPUT SIGNAL OF Q22 IS INJECTED TO THE SOURCES OF 1ST MIXER Q3 IN THE 1ST IF MIXER SECTION.

2ND MIXER : THE OUTPUT OF 10.2381MHZ OSCILLATOR CIRCUIT WITH XOUT IS INJECTED IN TO THE Q4

DESCRIPTION OF OTHER CIRCUIT

TRANSMITTER

RF AMPLIFICATION

THE OUTPUT OF BUFFER AMP Q22 IS FED THROUGH TUNNING TO DOUBLER AMP Q23 TO DOUBLER COIL T8,T9 TO THE BASE OF PRE DRIVER AMP Q24. THE PRE DRIVER AMP OUTPUT SIGNAL FED THROUGH TO DRIVER AMP BASE Q25, FED THROUGH TO POWER AMP Q26 TO THE ANTENNA.

CIRCUIT FOR SUPPRESSION OF SPURIOUS RADIATION

THE TUNNING CIRCUIT BETWEEN THE OUTPUT OF FINAL AMP Q26 AND ANTENNA, ANTENNA TYPE "LPF TYPE" NETWORK L9,L7,L8,C114,C115,C116A,C113,C115 SERVES AS A SPURIOUS RADIATION SUPPRESSOR.

THIS NETWORK ALSO SPURIOUS RADIATION SUPPRESSOR.

THIS NETWORK ALSO SERVES TO MATCH THE IMPEDANCE BETWEEN TX POWER TRANSISTOR Q26 AND ANTENNA.

MAXIMUM MODULATION CONTROL

MODULATION SIGNALS ARE FILTERED WITH RC NETWORK AND GOES TO THE PRE MIC AMP IC(IC2-B) TO AUDIO AMP IC(IC3) TO MAKE NOMINAL SIGNAL LEVEL TO ACHIEVE WANTED MODULATION.

TO CONTROL INCOMING AUDIO SIGNAL BY AMC CIRCUIT. THE AMC ARE Q16,Q14,RV4, THAT IS CIRCUIT CONTROL MAXIMUM MODULATION CAPABILITY AND MAXIMUM MODULATION LIMITING.

RECEIVER

A. RF AMP Q2 AMPLIFY RF SIGNAL FROM ANTENNA,AND THEN THE AMPLIFIED RF SIGNAL IS FED THROUGH MIXER 1ST WITH BY SOURCE ALSO VCO FREQUENCY LOWER 10.695MHZ THAN THE FREQUENCY OF EACH CHANNEL IS SUPPLIED TO MIXER.

B.THE SOURCE OF 10.695MHZ FREQUENCY IS FED THROUGH CF1 TO 2'ND MIXER.

C.THE 455KHZ FREQUENCY SIGNAL IS FED THROUGH CF2 TO IF AMP.

D.THE Q5,Q6 IS IF AMP AND D2 DETECTOR DIODE.AUDIO SIGNAL RECOVER BY THAT DIODE.
THE AUDIO SIGNAL IS FED THROUGH TO AUDIO AMP IC(IC3) FOR DRIVER SPEAKER.