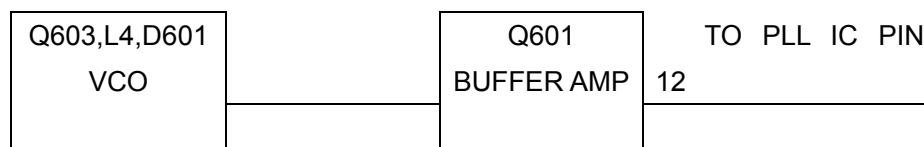


CIRCUIT DESCRIPTION

INTRODUCTION

THE FREQUENCIES FOR TRANSMITTER AND RECEIVER LOCAL FREQUENCIES ARE ALL DRIVEN FROM A SINGLE 10.240MHz CRYSTAL (X1) BY MEANS OF A PHASE LOCKED LOOP.

THE FIRST LOCAL OSCILLATOR FREQUENCIES ARE 16.27MHz(CH.1) TO 16.71MHz(CH. 40) FOR RECEIVER. THE SECOND LOCAL FREQUENCY IS FIXED AT 10.240MHz(X1) TO GENERATE SECOND IF 455KHz. DURING TRANSMIT, THE VCO OF THE PLL OPERATES 13.4825MHz TO 13.7025MHz.



RX LOCAL FREQUENCY : 16.27MHz(CH.1) TO 16.71MHz(CH. 40)

TX FREQUENCY : 13.4825MHz TO 13.7025MHz

THE VCO OPERATING FREQUENCY FOR THE RECEIVER IS 16.27MHz (CH. 1) TO 16.71MHz (CH. 40) AS THE FIRST LOCAL OSCILLATOR, INJECTED THROUGH THE BUFFER AMP Q601 INTO THE FIRST TR MIXER Q103.

DESCRIPTIONS OF EACH BLOCK

INTRODUCTION

THE SYNTHESIZER IS IMPLEMENTED WITH THE FOLLOWING COMPONENTS : PLL IC(IC1), CRYSTAL(X1) VCO, VARI_CAP DIODE(D601)

THE IC1 IS A BIPOLA_LSI THAT INCLUDES PRESCALLER, THE Q603, Q602, L4, C606, D601, C608, C609 ARE CLAP OSCILLATOR CIRCUIT TO OPERATE AS A VCO OF THE IC1.

THE Q602 IS A SWITCHING DIODE TO CONNECT OR DISCONNECT THE TUNING CAPACITOR IN THE VCO OSCILLATOR TANK CIRCUIT FOR TRANSMITTER OR RECEIVER.

THE Q601 WORKS AS A BUFFER AMP FOR RX LOCAL FREQUENCIES AND TX CARRIER GENERATING FREQUENCIES.

REFERENCE FREQUENCY (CRYSTAL)

THE CRYSTAL, X1(10.240MHZ) AND OTHER COMPONENTS AS PIN.9,10 OF IC1 CAN MAKE A REFERENCE FREQUENCY OSCILLATOR WITH INTERNAL AMPLIFIER. THIS SET IS USED EXTERNAL CLOCK SOURCE BY THE CRYSTAL. THE REF_FREQUENCY(10.240MHz) IS ADJUSTED BY CT1 EXACTLY.

VCO

THE Q603 AND SURROUNDING PARTS ARE CONSISTING A CLAPP OSCILLATOR WORKS AS A VCO OF IC1 WITH APPROPRIATE CONTROL VOLTAGE ON D601. THE VCO CAN BE OSCILLATE OVER THE REQUIRES RANGE OF 13.4825MHz TO 16.71MHz .

PROGRAMMABLE DIVIDER AND ITS CONTROL

THE PROGRAMMABLE INPUTS FOR EACH CHANNELS ARE SETTED IC INSIDE. THE IC1 OUTPUT IS FED TO THE PHASE DETECTOR FOR COMPARING WITH THE 2.5KHZ REFERENCE FREQUENCY INSIDE.

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 PULSE 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 VARI_CAP D601 CONTROL THE VCO FREQUENCY.

TRANSMITTER / RECEIVER BUFFER AMP

OUTPUT SIGNAL OF Q603 IS FED INTO THE BUFFER AMP Q601 TO INCREASE THE STRENGTH OF TX CARRIER FREQUENCY AND 1ST LOCAL FREQUENCIES.

SWITCHING OF TUNING CAPACITOR IN VCO

THE VCO CIRCUIT MUST USE WITH A WIDE RANGE OF FREQUENCIES 13.4825MHz TO 16.71MHz FOR TRANSMITTER AND 16.27MHz(CH.1) TO 16.71MHz MHz FOR RECEIVER.

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

THE TUNING CIRCUIT CONSISTS WITH C609, Q602 WHEN THE VCO IS WORKING AS A RECEIVER, WHEN TRANSMITTING MODE, C609, Q602 BECOMES TURN ON. WHEN RECEIVING MODE, C609, Q602 BECOMES OFF, L4 AND THE D601 CAPACITANCE OF MAKE TUNING FUNCTION.

RECEIVER LOCAL OSCILLATOR OUTPUTS

1ST MIXER : THE OUTPUT SINGLES OF Q601 IS INJECTED TO THE SOURCES OF 1ST MIXER Q103 IN THE 1ST IF MIXER SECTION.

2ND MIXER : THE OUTPUT OF 10.240MHz OSCILLATOR CIRCUIT WITH X1 IS INJECTED INTO THE Q201. INCOMING IF SIGNAL AND 10.695MHz SIGNAL ARE MIXED INSIDE THE Q201 TO EXTRACT 2ND IF SIGNAL 455KHz.

AM SIGNAL ARE RECEIVED WITH ENVELOPE DETECTOR.

FREQUENCY STABILITY

LET :

F_o =CRYSTAL OSCILLATOR FREQUENCY

F_r =PHASE DETECTOR REFERENCE FREQUENCY

F_{vco} =VCO FREQUENCY

F_t =TRANSMIT FREQUENCY

THEN : $F_r = F_o / 2500$

AND UNDER LOCKED CONDITIONS : $F_r = F_{vco} / N$

WHERE, "N" IS THE DIVIDE RATIO OF PROGRAMMABLE DIVIDER.

THEN : $F_{vco} = N * F_r$

FROM WHICH IT CAN BE SEEN, THE PERCENTAGE ERROR IN THE SAME AS THE PERCENTAGE ERROR IN F_o .

THE STABILITY OF THE CRYSTAL OSCILLATOR IS DETERMINED IN F_t IS THE SAME AS THE PERCENTAGE ERROR IN F_o .

THE HAVING PASSIVE COMPONENTS OF THE OSCILLATOR.

THE CHOICE OF CRYSTAL AND COMPONENTS IS SUCH THAT THE REQUIRES FREQUENCY STABILITY IS MAINTAINED OVER THE REQUIRED VOLTAGE AND TEMPERATURE RANGE.

DESCRIPTION OF OTHER CIRCUITS

TRANSMITTER

RF AMPLIFICATION

THE OUTPUT OF BUFFER AMP Q11 IS FED THROUGH TUNING C75,L5,L6 TO THE BASE OF PRE DRIVER AMP Q12. THE PRE DRIVER AMP OUTPUT SIGNAL FED THROUGH TO DRIVER AMP(Q13), FED THROUGH TO POWER AMP(Q14) TO THE ANTENNA.

CIRCUIT FOR SUPPRESSION OF SPURIOUS RADIATION

THE TUNING CIRCUIT BETWEEN THE OUTPUT OF FINAL AMP Q14 AND ANTENNA, 3 STAGE "LPF TYPE" NETWORK L802, L803, L804, C802, C803, C805, C7 SERVES AS A SPURIOUS RADIATION SUPPRESSOR.

THIS NETWORK ALSO SPURIOUS RADIATION SUPPRESSOR.(OVER THEN 60DBC)

THIS NETWORK ALSO SERVES TO MATCH THE IMPEDANCE BETWEEN TX POWER TR Q14 AND ANTENNA.

MAXIMUM MODULATION CONTROL

MODULATION SIGNALS ARE FILTERED WITH RC NETWORK AND GOES TO THE AUDIO_AMP IC(IC2) TO MAKE NOMINAL SIGNAL LEVEL TO ACHIEVE WANTED MODULATION.

TO CONTROL INCOMING AUDIO SIGNAL BY ALC CIRCUIT. THE ALC ARE Q9,D8,RV2, THAT'S CIRCUIT CONTROL MAXIMUM MODULATION CAPABILITY AND MAXIMUM MODULATION LIMITTING.

RECEIVER

(1) RF AMP Q102 AMPLIFY RF SIGNAL FROM ANTENNA, AND THEN THE AMPLIFIED RF SIGNAL IS FED THROUGH MIXER(Q103) TO THE BASE OF MIXER Q103, ALSO VCO SOURCE'S FREQUENCY LOWER 10.695MHz THAN THE FREQUENCY OF EACH CHANNEL IS SUPPLIED TO MIXER.

(2) THE SOURCE OF 10.695MHz FREQUENCY IS FED THROUGH CF-1 TO 2'ND MIXER Q201.

(3) THE 455 KHz FREQUENCY SIGNAL IS PRODUCED FROM Q201 BY MIXING THE OUTPUT SOURCE OF CF-1 10.695MHz FILTER AND THE SOURCE OF 10.24MHz FREQUENCY FROM CRYSTAL OSCILLATOR X1.

(4) THE Q202 IS IF AMP, AND D3 IS DETECT DIODE. AUDIO SIGNAL RECOVER BY THAT DIODE.

THE AUDIO SIGNAL IS FED THROUGH C4 TO AUDIO POWER AMP(IC2) FOR DRIVING SPEAKER.