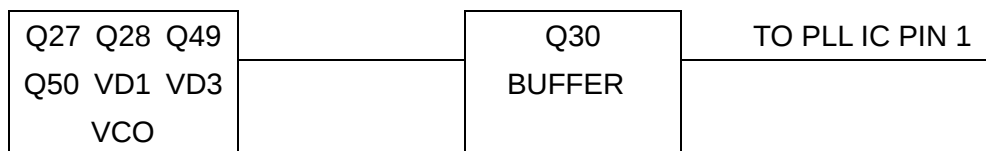


MIDLAND220 (10W/4W) MULTI CIRCUIT DESCRIPTION

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 14.915MHz(Poland-400CH CH.1) TO 20.875MHz(Sweden CH.24) FOR RECEIVER. THE SECOND LOCAL FREQUENCY IS FIXED AT 10.240MHz(X1) TO GENERATE SECOND IF 455 [KHz] . DURING TRANSMIT, THE VCO OF THE PLL OPERATES 12.805MHz TO 15.785MHz.



RX LOCAL FREQUENCY : 14.915MHz(Poland-400CH CH.1) TO 20.875MHz (Sweden CH. 24)

TX FREQUENCY : 12.805MHz TO 15.785MHz

THE VCO OPERATING FREQUENCY FOR THE RECEIVER IS 14.915 MHz (Poland-400CH CH. 1) TO 12.805MHz (Sweden CH. 24) AS THE FIRST LOCAL OSCILLATOR, INJECTED THROUGH THE BUFFER AMP Q30 INTO THE FIRST TR MIXER Q3 Q4.

DESCRIPTIONS OF EACH BLOCK

INTRODUCTION

THE SYNTHESIZER IS IMPLEMENTED WITH THE FOLLOWING COMPONENTS : PLL IC(U13), CRYSTAL(X4) VCO, VARI_CAP DIODE(VD1)

THE U13 is a high performance dual frequency synthesizer with two integrated high frequency pre-scalers for RF operation up to 1.1GHz.

THE Q27, Q28,,Q48,Q51, T3, C108, VD1, C109, C105, C106, C107 ARE CLAP OSCILLATOR CIRCUIT TO OPERATE AS A VCO OF THE U13.

THE Q31 IS A SWITCHING DIODE TO CONNECT OR DISCONNECT THE TUNING CAPACITOR IN THE VCO OSCILLATOR TANK CIRCUIT FOR TRANSMITTER OR RECEIVER.

THE Q30 WORKS AS A BUFFER AMP FOR RX LOCAL FREQUENCIES AND TX CARRIER GENERATING FREQUENCIES.

THE Q49 Q50 IS A SWITCHING DIODE TO CONNECT OR DISCONNECT THE TUNING CAPACITOR IN THE VCO OSCILLATOR TANK CIRCUIT FOR BAND SELECTS.

REFERENCE FREQUENCY (CRYSTAL)

THE CRYSTAL, X4(10MHZ) AND OTHER COMPONENTS AS PIN.3 OF U13 AND U9 CAN MAKE A REFERENCE FREQUENCY OSCILLATOR WITH CK (Pin6), DATA (Pin7), EN (Pin8) terminals in U13 are used for MCU serial data interface . THIS SET IS USED EXTERNAL CLOCK SOURCE BY THE CRYSTAL. THE REF_FREQUENCY(10MHz) IS ADJUSTED BY TC1 EXACTLY.

VCO

THE Q 2 7 Q 2 8 AND SURROUNDING PARTS ARE CONSISTING A CLAPP OSCILLATOR WORKS AS A VCO OF U13 WITH APPROPRIATE CONTROL VOLTAGE ON VD1.THE VCO CAN BE OSCILLATE OVER THE REQUIRES RANGE OF 12.805MHz TO 20.875MHz .

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 FILTE

R, AND FED TO VARI_CAP VD1 CONTROL THE VCO FREQUENCY.

SWITCHING OF TUNING CAPACITOR IN VCO

THE VCO CIRCUIT MUST USE WITH A WIDE RANGE OF FREQUENCIES 12.805 MHz TO 15.785MHz FOR TRANSMITTER AND 14.915MHz(CH.1) TO 20.875MHz FOR RECEIVER.

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

THE TUNING CIRCUIT CONSISTS WITH C119, Q31 WHEN THE VCO IS WORKING AS A RECEIVER, WHEN TRANSMITTING MODE, C119, Q31 BECOMES TURN ON. WHEN RECEIVING MODE, C119, Q31 BECOMES OFF, T3 AND THE VD1 CAPACITANCE OF MAKE TUNING FUNCTION.

RECEIVER LOCAL OSCILLATOR OUTPUTS

1ST MIXER : THE OUTPUT SINGLES OF Q28 IS INJECTED TO THE SOURCES OF 1ST MIXER Q3 Q4 IN THE 1ST IF MIXER SECTION.

2ND MIXER : THE OUTPUT OF 10.240MHz OSCILLATOR CIRCUIT WITH X1 IS INJECTED INTO THE U1. INCOMING IF SIGNAL AND 10.695MHz SIGNAL ARE MIXED INSIDE THE U1 TO EXTRACT 2ND IF SIGNAL 455 [KHz] .

DESCRIPTION OF OTHER CIRCUITS

TRANSMITTER

RF AMPLIFICATION

THE OUTPUT OF BUFFER AMP Q40 IS FED THROUGH TUNING C111,L10,L11 TO THE BASE OF PRE DRIVER AMP Q42(BAND CONTROL Q41). THE PRE DRIVER AMP OUTPUT SIGNAL FED THROUGH TO DRIVER AMP(Q43), FED THROUGH TO POWER AMP(Q65) TO THE ANTENNA.

CIRCUIT FOR SUPPRESSION OF SPURIOUS RADIATION

THE TUNING CIRCUIT BETWEEN THE OUTPUT OF FINAL AMP Q65 AND ANTENNA, 3 STAGE "LPF TYPE" NETWORK L16, L22, L20, C99, C100, C125, C180 C181,ANT(180PF); SERVES AS A SPURIOUS RADIATION SUPPRESSOR.

THIS NETWORK ALSO SPURIOUS RADIATION SUPPRESSOR.

THIS NETWORK ALSO SERVES TO MATCH THE IMPEDANCE BETWEEN TX POWER TR Q44 AND ANTENNA.

MAXIMUM MODULATION CONTROL

MODULATION SIGNALS ARE FILTERED WITH RC NETWORK AND GOES TO THE AUDIO_AMP IC(U6) TO MAKE NOMINAL SIGNAL LEVEL TO ACHIEVE WANTED MODULATION.

TO CONTROL INCOMING AUDIO SIGNAL BY ALC CIRCUIT. THE ALC ARE Q17,Q18 Q12,D16,VR5, THAT'S CIRCUIT CONTROL MAXIMUM MODULATION CAPABILITY AND MAXIMUM MODULATION LIMITTING.

RECEIVER

(1) RF AMP Q1 AMPLIFY RF SIGNAL FROM ANTENNA(Q52 Q53 BAND CONTROL), AND THEN THE AMPLIFIED RF SIGNAL IS FED THROUGH MIXER(Q3 Q4) TO THE BASE OF MIXER Q3 Q4, 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 CF1 TO 2'ND MIXER U1.

(3) THE 455 [KHZ] FREQUENCY SIGNAL IS PRODUCED FROM U1 BY MIXING THE OUTPUT SOURCE OF CF1 10.695MHz FILTER AND THE SOURCE OF 10.24MHz FREQUENCY FROM CRYSTAL OSCILLATOR X1.

(4) THE U1 IS IF AMP, AND D4(AM) D5(FM) IS DETECT DIODE. AUDIO SIGNAL RECOVER BY THAT DIODE.

THE AUDIO SIGNAL IS FED THROUGH C36 TO ESP(key esp) and AUDIO POWER AMP(U6) FOR DRIVING SPEAKER.

(5) THE U8 IS MULTI COLOR CONTROL.