MA351 (xxx-A) Description of Circuit Functions

The following circuit description is for model MA351 and which base on the circuit diagram and block diagram.

1. RECIVEING SECTION (BASE)

a. LNA, MIXER, LO and IF amp.

The received frequency will pass through a band pass filter (F16). A low noise amplifier (Q18) will amplify this signal and will be mixed with 2nd LO (local oscillator) frequency derived from the second harmonics of the 1st LO. The mixer (Q23) will amplify the output signal which is the difference between the received frequency and the 2nd LO and will pass through a band pass filter (F18). It will be mixed with the 1st LO signal to attain the IF (10.7MHz) signal. This IF will be filtered further by CF1. The filtered IF will be amplified by the built-in LNA of the COMBO chip IC (U1) and filtered by F2 before demodulation. The LO frequency is generated by the PLL circuit of the combo IC and the VCO circuit (Q20).

b. Demodulator, Expander, Audio Amp

The demodulated signal will be filtered by a low-pass filter to remove residual IF frequency. The filtered audio will pass through a built-in expander then amplified by a built-in amplifier.

c. Final AUDIO amp, Hybrid, RELAY

The audio output from the RF module will be amplified by the final amplifier (Q7, Q8 and Q9). This will also amplify the DTMF signal of the system before sending it to the PSTN. Hybrid provides isolation and a line match to the PSTN. This would also couples the audio to the network and provide the desired side-tone signal to the near-end party. Q3 and RL1 provide the line switch. This also provides the line break and pulse dialing.

2. TRANSMITTING SECTION (BASE)

a. Compressor, Splatter, Modulator

The received line audio and side tone signal from the hybrid will go to the audio input of the combo chip. It will pass through a compressor. From the output of the compressor, it will go to the splatter circuit. The audio will then modulate the Tx VCO (Transmit Voltage Controlled Oscillator) frequency of the modulator (Q13) which is controlled by the PLL of the combo IC.

b. Pre-amp, Final amp

The 3rd harmonics of the Tx VCO frequency is extracted by pre-amp (Q11) and amplified by Q7.
The final Tx signal is then passed through a filter F15 to reduced unwanted harmonics. It is then transmitted through the antenna.

3. RECIVEING SECTION (HANDSET)

a. LNA, MIXER, LO and IF amp.

The received frequency from the antenna will pass through a band pass filter (F16). A low noise amplifier (Q18) will amplify this signal and will be mixed with 2nd LO (local oscillator) frequency derived from the second harmonics of the 1st LO. The mixer (Q23) will amplify the output signal which is the difference between the received frequency and the 2nd LO and will pass through a band pass filter (F18). It will be mixed with the 1st LO signal to attain the IF (10.7MHz) signal. This IF will be filtered further by CF1. The filtered IF will be amplified inside the built-in LNA of the COMBO chip IC (U1) and filtered by F2 before demodulation. The LO frequency is generated by the PLL circuit of the combo IC and the VCO circuit (Q20).

b. Demodulator, Expander, Audio Amp, Receiver

The demodulated signal will be filtered by a low-pass filter to remove residual IF frequency. The filtered audio will pass through a built-in expander then amplified by a built-in amplifier and finally to the receiver.

4. TRANSMITTING SECTION (HANDSET)

a. Compressor, Splatter, Modulator

The received line audio and side tone signal from the hybrid will go to the audio input of the combo chip. It will pass through a compressor. From the output of the compressor, it will go to the splatter circuit. The audio will then modulate the Tx VCO (Transmit Voltage Controlled Oscillator) frequency of the modulator (Q13) which is controlled by the PLL of the combo IC.

b. Pre-amp, Final amp

The 3rd harmonics of the Tx VCO frequency is extracted by pre-amp (Q11) and amplified by Q7. The final Tx signal is then passed through a filter F15 to reduced unwanted harmonics.

5. TELEPHONE LINE INTERFACE

The telephone line interface circuit is established by below sections:

a. Audio power amplifier

Q7, Q8 and Q9 are built as a power amplifier, according to high current output requirement of for line interface.

b. Telephone line relay and isolation transformer

T4 is the line isolation transformer, both audio input and output are passing through this transformer. RL1 is the reed-relay for line-seize, which is controlled by Q3.

c. Ring-detect circuit

IC2-B and IC2-C are used as differential amplifier for picking up the ring signal, which input from two 20MΩ resistors (R44 and R45) as an isolation from the telephone line.

d. Caller ID circuit

The CAS tone and the FSK signal are detected by IC5 (TC112), it has the interface with the base MCU IC3.

6. MA351 DIGITAL SECURITY CODE SYSTEM:

The handset and base of MA351 will exchange a random generated 16-bit digital security code when every time the handset put back on the charging cradle of the base unit. This is to fulfill FCC Part 15.214(d) requirement regarding there must be at least 256 possible discrete digital codes.

***** End *****

FREQUENCY TABLE

Handset Unit Frequency Allocation

Channel No.	Tx Freq.	TXVCO Freq.	RX Freq.	RXVCO Freq.	Channel No.	Tx Freq.	TXVCO Freq.	RX Freq.	RXVCO Freq.
1	2474.700	824.9000	2402.300	797.2000	21	2477.700	825.9000	2405.300	798.2000
2	2474.850	824.9500	2402.450	797.2500	22	2477.850	825.9500	2405.450	798.2500
3	2475.000	825.0000	2402.600	797.3000	23	2478.000	826.0000	2405.600	798.3000
4	2475.150	825.0500	2402.750	797.3500	24	2478.150	826.0500	2405.750	798.3500
5	2475.300	825.1000	2402.900	797.4000	25	2478.300	825.5000	2405.900	798.4000
6	2475.450	825.1500	2403.050	797.4500	26	2478.450	825.5500	2406.050	798.4500
7	2475.600	825.2000	2403.200	797.5000	27	2478.600	825.6000	2406.200	798.5000
8	2475.750	825.2500	2403.350	797.5500	28	2478.750	825.6500	2406.350	798.5500
9	2475.900	825.3000	2403.500	797.6000	29	2478.900	825.7000	2406.500	798.6000
10	2476.050	825.3500	2403.650	797.6500	30	2479.050	825.7500	2406.650	798.6500
11	2476.200	825.4000	2403.800	797.7000	31	2479.200	825.8000	2406.800	798.7000
12	2476.350	825.4500	2403.950	797.7500	32	2479.350	825.8500	2406.950	798.7500
13	2476.500	825.5000	2404.100	797.8000	33	2479.500	825.9000	2407.100	798.8000
14	2476.650	825.5500	2404.250	797.8500	34	2479.650	825.9500	2407.250	798.8500
15	2476.800	825.6000	2404.400	797.9000	35	2479.800	826.0000	2407.400	798.9000
16	2476.950	825.6500	2404.550	797.9500	36	2479.950	826.0500	2407.550	798.9500
17	2477.100	825.7000	2404.700	798.0000	37	2480.100	826.1000	2407.700	799.0000
18	2477.250	825.7500	2404.850	798.0500	38	2480.250	826.1500	2407.850	799.0500
19	2477.400	825.8000	2405.000	798.1000	39	2480.400	826.2000	2408.000	799.1000
20	2477.550	825.8500	2405.150	798.1500	40	2480.550	826.2500	2408.150	799.1500

Base Unit Frequency Allocation

Channel No.	Tx Freq.	TXVCO Freq.	RX Freq.	RXVCO Freq.	Channel No.	Tx Freq.	TXVCO Freq.	RX Freq.	RXVCO Freq.
1	2402.300	800.7667	2474.700	828.4667	21	2405.300	801.7667	2477.700	829.4667
2	2402.450	800.8167	2474.850	828.5167	22	2405.450	801.8167	2477.850	829.5167
3	2402.600	800.8667	2475.000	828.5667	23	2405.600	801.8667	2478.000	829.5667
4	2402.750	800.9167	2475.150	828.6167	24	2405.750	801.9167	2478.150	829.6167
5	2402.900	800.9667	2475.300	828.6667	25	2405.900	801.9667	2478.300	829.6667
6	2403.050	801.0167	2475.450	828.7167	26	2406.050	802.0167	2478.450	829.7167
7	2403.200	801.0667	2475.600	828.7667	27	2406.200	802.0667	2478.600	829.7667
8	2403.350	801.1167	2475.750	828.8167	28	2406.350	802.1167	2478.750	829.8167
9	2403.500	801.1667	2475.900	828.8667	29	2406.500	802.1667	2478.900	829.8667
10	2403.650	801.2167	2476.050	828.9167	30	2406.650	802.2167	2479.050	829.9167
11	2403.800	801.2667	2476.200	828.9667	31	2406.800	802.2667	2479.200	829.9667
12	2403.950	801.3167	2476.350	829.0167	32	2406.950	802.3167	2479.350	830.0167
13	2404.100	801.3667	2476.500	829.0667	33	2407.100	802.3667	2479.500	830.0667
14	2404.250	801.4167	2476.650	829.1167	34	2407.250	802.4167	2479.650	830.1167
15	2404.400	801.4667	2476.800	829.1667	35	2407.400	802.4667	2479.800	830.1667
16	2404.550	801.5167	2476.950	829.2167	36	2407.550	802.5167	2479.950	830.2167
17	2404.700	801.5667	2477.100	829.2667	37	2407.700	802.5667	2480.100	830.2667
18	2404.850	801.6167	2477.250	829.3167	38	2407.850	802.6167	2480.250	830.3167
19	2405.000	801.6667	2477.400	829.3667	39	2408.000	802.6667	2480.400	830.3667
20	2405.150	801.7167	2477.550	829.4167	40	2408.150	802.7167	2480.550	830.4167