SA818 Programming Manual

Standard Uart interface is used to configure the parameter of SA818 Walkie Talkie. The format of UART is 9600, 8, N, 1, which means: Baud = 9600, data bit = 8bit, Parity = None, Stop bit = 1 bit. The interface is TTL or CMOS @3.3V. The parameters which can be configured are: Bandwidth, Tx-frequency, Rx-frequency, SQ, Tx_SubAudio(Tx_CTCSS/ Tx-CDCSS), Rx_SubAudio (Rx_CTCSS/Rx-CDCSS), Volume, Scan frequency, Audio filter, etc. When commands received, the module will verify and reply acknowledge message; User should wait enough time to send the next command until received the acknowledge signal.

1. Instruction Command Format:

All instructions command ended with <CR><LF>, and ASCII is used.

2. Commands List:

There are 5 commands in total to be used, below is the list:

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Command 1: Handshake instruction command
Command 2: Group parameters configuration
Command 3: Scan frequency configuration
Command 4: Volume configuration
Command 5: Audio filter command

3. Instruction Command Description:

3.1）Handshake instruction command

Format：AT+DMOCONNECT <CR><LF>
Reply：+DMOCONNECT:0<CR><LF>

3.2） Group parameters configuration

Format：AT+DMOSETGROUP=BW，TX_F，RX_F，Tx_subaudio，SQ，Rx_subaudio
Sample 1：AT+DMOSETGROUP=0,415.1250,415.1250,0012,4, 0013
Sample 2：AT+DMOSETGROUP=0,415.1250,415.1250,754N,4, 445I

Parameter Description：

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BW：0: 12.5K　1: 25K

TX_F：Tx Frequency value, SU818-U: 400～480MHz,
SU818-V :134～174MHz,

RX_F：Rx Frequency value,SU818-U: 400～480MHz,
SU818-V :134～174MHz,

Tx_subaudio: Tx_CTCSS or TX_CDCSS

Rx_subaudio: Rx_CTCSS or RX_CDCSS.

If 0000 is set, that means subaudio function is disable. No CTCSS and no CDCSS.

The range of Tx_CTCSS and Rx_ctcss is 1—38.

Please find below table for Tx_CDCSS and Rx_CDCSS. The table is only list the code ended with “I”, the code ended with “N” is not shown. Actually the code ended with “N” can be used without any problems.

The code ended with “N” is the complement of the code ended with “I”.

For example:

023I = 11001000000111000110111

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023N=~023I=00110111111000111001000

SQ: 0 ~ 8

0: listen mode

1—8: Different SQ Level.

3.3） Scan frequency configuration

Purpose：Check if the matched signal exist in the specified frequency channel. This command is used for Scanning function. User send different frequency value by this command and wait for the reply of the module, then can find if matched signal exist and decide whether need to turn to next channel.

Format：S+Rx_F

Reply Format：S=X

0—> Signal matched on the frequency channel, 1—> no signal found

example：

S+455.2250

S=0

3.4）Volume Configuration

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Format：AT+DMOSETVOLUME=X

Reply: +DMOSETVOLUME: 0

“X” is the volume level, the range is 1---8.

Example：AT+DMOSETVOLUME=1

3.5） Audio Filet Command

Format: AT+SETFILTER=PRE/DE-EMPH, HIGHPASS, LOWPASS

Reply: +DMOSETFILTER: X

“X”:

0: command succeed,

1: command failed

PRE/DE-EMPH:

1: emphasis bypass

0: emphasis normal

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HIGHPASS:

1: voice_highpass_filter_bypass

0: voice_highpass_filter normal

LOWPASS:

1: voice_lowpass_filter_bypass

0: voice_lowpass_filter normal

For example：

AT+SETFILTER=0, 0, 0

+DMOSETFILTER: 0

Schedule 1: CDCSS coding

	Transform Bit Pattern	Hex Bit

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Code		Pattern
023I	11001000000111000110111	640E37
025I	10101000000111101101011	540F6B
026I	01101000000110111010011	340DD3
031I	10011000000111111000101	4C0FC5
032I	01011000000110101111101	2C0D7D
043I	11000100000101101101101	620B6D
047I	11100100000110111111000	720DF8
051I	10010100000101010011111	4A0A9F
054I	00110100000100101111011	1A097B
065I	10101100000110001011101	560C5D
071I	10011100000110011110011	4E0CF3

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072I	01011100000111001001011	2E0E4B
073I	11011100000101100111010	6E0B3A
074I	00111100000111100010111	1E0F17
114I	00110010000101111010110	190BD6
115I	10110010000111010100111	590EA7
116I	01110010000110000011111	390C1F
125I	10101010000111011110000	550EF0
131I	10011010000111001011110	4D0E5E
132I	01011010000110011100110	2D0CE6
134I	00111010000110110111010	1D0DBA
143I	11000110000101011110110	630AF6
152I	01010110000100110111100	2B09BC

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155I	10110110000110110010001	5B0D91
156I	01110110000111100101001	3B0F29
162I	01001110000100111101011	2709EB
165I	10101110000110111000110	570DC6
172I	01011110000111111010000	2F0FD0
174I	00111110000111010001100	1F0E8C
205I	10100001000110010111011	508CBB
223I	11001001000101110001011	648B8B
226I	01101001000100001101111	34886F
243I	11000101000111011010001	628ED1
244I	00100101000101011111100	128AFC
245I	10100101000111110001101	528F8D

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251I	10010101000111100100011	4A8F23
261I	10001101000111101110100	468F74
263I	11001101000100010111101	6688BD
265I	10101101000100111100001	5689E1
271I	10011101000100101001111	4E894F
306I	01100011000111110011000	318F98
311I	10010011000110110001110	498D8E
315I	10110011000101100011011	598B1B
331I	10011011000101111100010	4D8BE2
343I	11000111000111101001010	638F4A
346I	01100111000110010101110	338CAE
351I	10010111000111010111000	4B8EB8

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364I	001011110001101000001011	178D0B
365I	101011110001000011111010	57887A
371I	100111110001000110101000	4F88D4
411I	100100001001011011101111	484B77
412I	010100001001001110011111	2849CF
413I	110100001001100101111110	684CBE
423I	110010001001100111010001	644CE9
431I	100110001001101000110111	4C4D1B
432I	010110001001111101000111	2C4FA3
445I	101001001001000111011111	5248EF
464I	001011001001011111100101	164BF2
465I	101011001001110100000111	564E83

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466I	011011001001100000111011	364C3B
503I	110000101001011000011110	614B1E
506I	011000101001000011111010	3148FA
516I	011100101001110110000001	394EC1
532I	010110101001110001111000	2D4E38
546I	011001101001011110011100	334BCC
565I	101011101001111000011000	574F18
606I	011000011001100110111101	30CCDD
612I	010100011001100011110011	28CC73
624I	001010011001101011111000	14CD78
627I	111010011001111111000000	74CFC0
631I	100110011001000101001111	4CC8A7

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632I	010110011001010000011111	2CCA1F
654I	001101011001110000011001	1ACE19
662I	010011011001111000010010	26CF12
664I	001011011001110010001110	16CE4E
703I	110000111001110101000010	61CEA2
712I	010100111001101111101000	29CDE8
723I	110010111001000110001110	65C8CE
731I	100110111001001001111100	4DC93C
732I	010110111001011100000100	2DCB84
734I	001110111001010110110000	1DCAD8
743I	110001111001101100010100	63CD94
754I	001101111001111100000010	1BCF82

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Appendix: Part of the communication refers to C program.(MCU: PIC1939)

```
//=========================

    RAM DEFINE
    Const                                                    unsigned                                                    char
    CMD_HAND[15]={0x41,0x54,0x2B,0x44,0x4D,0x4F,0x43,0x4F,0x4E,0x4E,0x45,0x43,0x54,0x0d,0x0a};
    unsigned char CMD_SET[15]={0x41,0x54,0x2b,0x44,0x4d,0x4f,0x53,0x45,0x54,0x47,0x52,0x4f,0x55,0x50,0x3d};
    unsigned                                                                                                            char
    CMD_VOLUME[16]={0x41,0x54,0x2B,0x44,0x4D,0x4F,0x53,0x45,0x54,0x56,0x4f,0x4c,0x55,0x4d,0x45,0x3d};
    unsigned char tx_buf[50]={0};
    unsigned char rx_buf[30]={0};
    unsigned char tx_len;
    unsigned char rx_len;
    unsigned char len_txnow;
    unsigned char len_rxnow;
    unsigned char status_cnt = 2;
```


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```
//=====================================================

    void uart_init()
    // MCU UART Initialization (set to standard format)
    {
    SPBRGH = 0;
    SPBRG = 23;
    TXSTA = 0;
    RCSTA = 0x90;
    BAUDCON = 0;
    TXIE = 0;
    RCIE = 0;
    }
//-----------------------------------------------

    void check_uart()
    // send handshake instruction to module regularly to detect the module's connection status
```

```
{
unsigned char i;

if(Flag.in_rx == 1)
{
    rx_cnt --;
    if(rx_cnt == 0)
    {
        Flag.in_rx = 0;
        Flag.in_tx = 0;
        Flag.cn_fail = 1;
        LED_CTCS = LED_OFF;
        Flag.poweron = 1;
        fresh_display();
        return;
    }
}
if((Flag.in_tx == 1)||(Flag.in_rx == 1))    // No interleave sending instruction, to ensure the module properly receiving
```

```
    instruction.
        return;
    send_hand();
    }
//---------------------------------------------

    void uart_trans_check(void)
    // judge the transmitting instructions is complete or not
    {
    if((Flag.in_tx == 1)&&(len_txnow > tx_len)&&(TXIF == 1))
    {
        stop_TX();
    // Send over, close the sending UART function.
        Flag.in_tx = 0;
        Flag.in_rx = 1;
        rx_cnt = 2;
        len_txnow = 0;
        len_rxnow = 0;
        tx_len = 0;
```


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```
    clr_tx_buf();
// Initializes the related registers and flags
    start_RX();
// receiving function is available
}
}
//-----------------------------------------------
void uart_recv_ack(void)
{
if(Flag.in_rx == 0)
    return;
if(len_rxnow == rx_len)
{
    Flag.in_rx = 0;
    if((rx_buf[rx_len-3] == 0x30)&&(rx_buf[rx_len-2] == 0x0d)&&(rx_buf[rx_len-1] == 0x0a))

// judge return instruction
    {
```


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```
        status_cnt = 2;
        Flag.cn_fail = 0;
        LED_CTCS = LED_ON;
        fresh_display();
        stop_RX();
        if((rx_len == 15)&&(Flag.poweron))
        {
            Flag.reset = 1;
            Flag.poweron = 0;
        }
        return;
    }
    else if(Flag.cn_fail == 1)
        return;
    else
    {
        status_cnt -= 1;
        if(status_cnt == 0)
```


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```
// If the Continuous instruction returns null, the module connection failed flag bit
        {
            Flag.cn_fail = 1;
            LED_CTCS = LED_OFF;
            Flag.poweron = 1;
        }
    }
}
}
//-----------------------------------------------
void send_hand()
{
unsigned char i;

for(i=0;i<=14;i++)
    tx_buf[i] = CMD_HAND[i];
// Load the handshake instruction
rx_len = 15;
```


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```
tx_len = 15;
// Write handshake instruction to send and receive data bytes
len_txnow = 0;
Flag.in_tx = 1;
clr_rx_buf();
// Clear the receive buffer
start_TX();
// send UART function is available
}
//-----------------------------------------------
void send_set()
{
unsigned char i;

for(i=0;i<=14;i++)
    tx_buf[i] = CMD_SET[i];
tx_buf[15] = ASCII(Flag.gbw);
tx_buf[16] = ASCII_comma;
```


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```
ASCII_TFV();
tx_buf[25] = ASCII_comma;
ASCII_RFV();
tx_buf[34] = ASCII_comma;
tx_buf[35] = ASCII(Tx_ctcs_3);
tx_buf[36] = ASCII(Tx_ctcs_2);
tx_buf[37] = ASCII(Tx_ctcs_1);
tx_buf[38] = ASCII(Tx_ctcs_0);
tx_buf[37] = ASCII_comma;
tx_buf[38] = ASCII(sq);
tx_buf[39] = ASCII_comma;
tx_buf[40] = ASCII(Rx_ctcs_3);
tx_buf[41] = ASCII(Rx_ctcs_2);
tx_buf[42] = ASCII(Rx_ctcs_1);
tx_buf[43] = ASCII(Rx_ctcs_0);
// Instruction of sending data are ASCII
tx_buf[44] = 0x0d;
tx_buf[45] = 0x0a;
```


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```
// Send instructions all ends with a carriage return line feed（0X0D,0X0A）
rx_len = 16;
tx_len = 46;
// Write handshake instruction to send and receive data bytes
len_txnow = 0;
Flag.in_tx = 1;
clr_rx_buf();
start_TX();
}
//-----------------------------------------------
void send_vol()
{
unsigned char i;

for(i=0;i<=15;i++)
    tx_buf[i] = CMD_VOLUME[i];
// load volume instruction
tx_buf[16] = ASCII(vol);
```


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```
tx_buf[17] = 0x0d;
tx_buf[18] = 0x0a;
rx_len = 17;
tx_len = 19;
// write number of bytes to set the volume orders to send and receive data
len_txnow = 0;
Flag.in_tx = 1;
clr_rx_buf();
start_TX();
}
//-----------------------------------------------
void clr_tx_buf()
// Clear the send buffer
{
unsigned char i;

for(i=0;i<=39;i++)
    tx_buf[i]=0;
```


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```
}
//---------------------------------------------
void clr_rx_buf()
// Clear the receive buffer
{
unsigned char i;

for(i=0;i<=18;i++)
    rx_buf[i] = 0;
}
//---------------------------------------------
void start_TX()
// to make it can send UART
{
TXEN = 1;
TXIE = 1;
}
//---------------------------------------------
```

```
void stop_TX()
// close UARTsending
{
TXEN = 0;
TXIE = 0;
}
//---------------------------------------------
void start_RX()
// to make it can receive UART
{
CREN = 1;
RCIE = 1;
}
//---------------------------------------------
void stop_RX()
// close UART receiving
{
CREN = 0;
```


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```
RCIE = 0;
}
//-----------------------------------------------
void interrupt ISR_timer(void)
// interrupt handling
{
unsigned char int_temp;

if(TXIF)
{
    if(Flag.in_tx == 0)
        stop_TX();
// Not in delivery status, interrupted by mistake
    else if(len_txnow <= tx_len)
    {
        TXREG = tx_buf[len_txnow];
// update sending data
        len_txnow ++;
```


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```
    }
    else
        TXIE = 0;
// send over
}

if(RCIF)
{
    NOP();
    if(Flag.in_rx)
    {
        rx_buf[len_rxnow] = RCREG;
// write the returned dato to receive buffer
        if((len_rxnow++) == (rx_len+1))
            stop_RX();
    }
    else
// Not in receiving state, interrupted by mistake, invalid return values
```


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```
    {
        stop_RX();
        int_temp = RCREG;
    }
}
}
```