ALIGNMENT PROCEDURE FOR CB TRANSCEIVER
MODEL 40 PLUS

TEST EQUIPMENT REQUIRED

All Test equipment should be properly calibrated.

1. Audio Signal Generator, 10Hz - 20kHz
2. VTVM 1mV measurable.
3. DC Ammeter, 2A
4. Regulated Power Supply, dc 0-20V, 2A or higher.
5. Frequency Counter, 0-40MHz, high input impedance type.
6. RF VTVM probe type.
7. Oscilloscope, 30MHz, high input impedance.
8. RF watt meter, thermo-couple type, 50 ohm, 5W.
9. Standard Signal Generator, 100kHz-50MHz, 50 ohm unbalanced.
10. Speaker dummy resistor, 8 ohm, 5W.
11. Circuit Tester, dc, 20kV ohm/V.

TEST CONDITIONS

Test voltage = 13.8Vdc +/-5%, unless otherwise specified.

PLL CIRCUIT ALIGNMENT

a. 10.24MHz Oscillator Check

Connect a frequency counter to IC202, pin 12 and check to see 10.240000MHz +/-100Hz.

When a defective crystal is replaced and if the frequency is higher than by 100Hz, CT1 should be increased. If the frequency is lower, CT1 should be reduced in capacitance.

With a factory supplied crystal a CT1 value of 47 pFd should be sufficient, but on some sets minor value selection may be necessary.

b. VCO Alignment

1. Set the Radio to channel 40 and into the transmit mode (make certain 50 ohm dummy load or wattmeter is connected to the antenna terminal).
2. Connect a circuit tester between TP1 and ground.
3. Adjust L203 to obtain 4.5Vdc.
4. Set the Radio to channel 1 and into the receive mode.

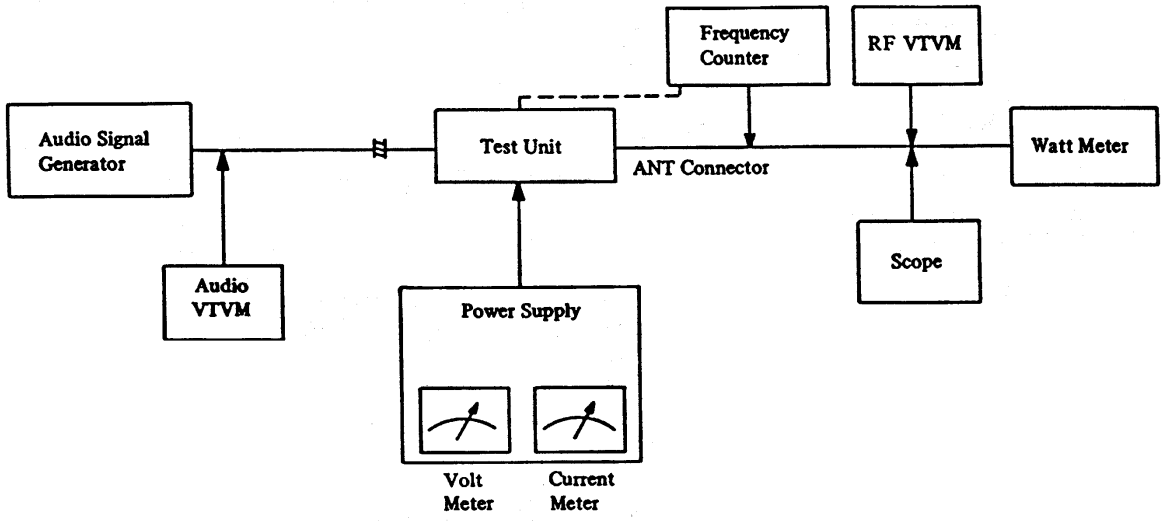
5. Check to see that the TP1 dc voltage drops to a level between 0.6 and 1.0 volts. As long as the dc level stays between 4.5Vdc for transmit on channel 40 and 0.6 to 1.0Vdc for receive on channel 1, the VCO is set properly.

   The magnitude of the TP1 voltage swing is determined by C314 at the factory. The optimum value of C314 was found to be around 82 pFd. C314 with a value larger than 82 pFd will reduce the voltage swing magnitude and vice versa for a smaller value. If the lower value drops only to 1.5Vdc, then a C314 of 82 pFd should be reduced to increase the range. This should not be necessary when factory supplied parts are used for D208 (Varactor Diode) and L203 (VCO Tuning Coil).

TRANSMITTER ALIGNMENT

a. Test Set-up

Refer to the diagram shown below:



Transmitter Alignment Set Up

Note:

1. When connecting audio cable to the microphone input circuit, always use shielded cable.

2. When making alignment for RF power output, always use the supplied dc cable.

b. RF Amplifier Stage Alignment

1. Reduce power supply voltage to 9.0V.

2. Set channel selector to 19 and connect the oscilloscope to the antenna connector through a suitable connection pad.

3. Adjust L204, L301, L302, and L303 for maximum amplitude of the scope display.

4. Increase the power supply voltage to 13.8V, and then adjust L306 until the watt meter indicates 3.8W.

5. Measure the transmit power output at all channels, and make sure that the power output difference between any channels is less than 0.3W.

6. Measure the transmit frequency at all channels, and make sure that the frequency is within +/-800Hz from the assigned channel center frequencies.

c. Transmit Frequency Check

1. Set the radio into transmit mode with no modulation.

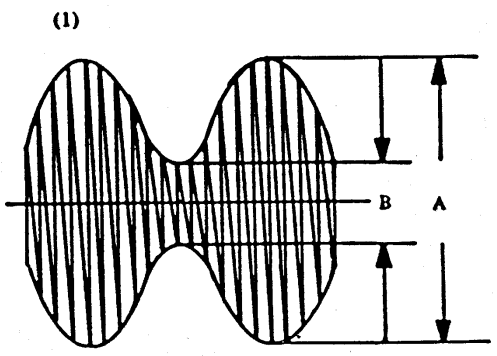
2. Connect the frequency counter to the antenna load or to the tab provided at the watt meter.

   The frequency should be within +/-800Hz from each channel center frequency as tabulated in Table 1.

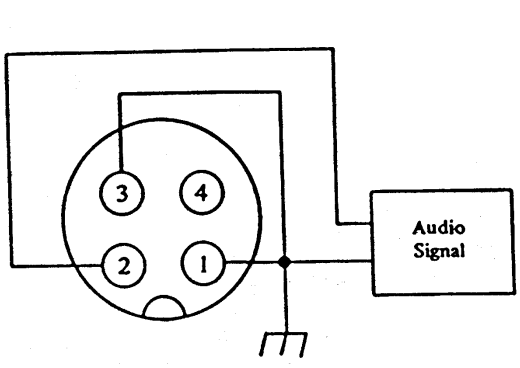
d. Modulation Sensitivity Alignment

1. Set the unit to transmit mode of operation. Feed 1kHz, 30mV signal to the microphone input circuit, and adjust RV104 so that 100% modulation is obtained.

2. To set the transceiver into transmit mode without a microphone, insert the plug, wired as shown below, into the MIC jack on the transceiver. When applying the audio modulation signal to the microphone input circuit, use the same plug.



Modulation ratio = $\frac{A-B}{A+B}$ x 100 (%)



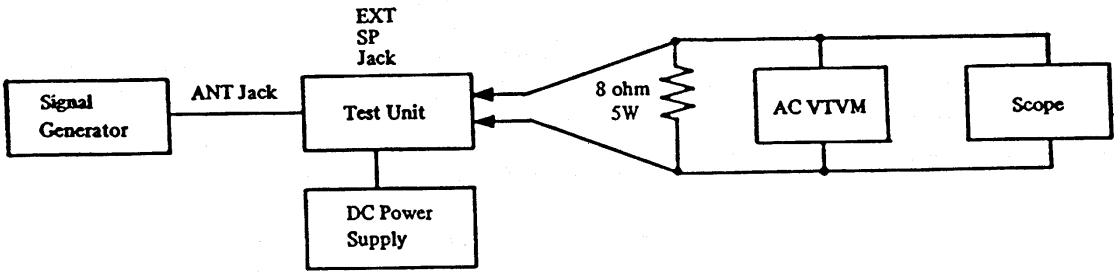
Mic Plug wiring for modulation

3. Next, reduce the signal input level to 3 mV, and make sure that the modulation is higher than 60%.

RECEIVER CIRCUIT ALIGNMENT

a. Test Set-up

Refer to the diagram shown below:



RECEIVER ALIGNMENT SETUP

b. Sensitivity Alignment

1. Set the signal generator to provide 27.185MHz, 1kHz, 30% modulation. Set the channel selector to 19.

2. Adjust L101, L102, L108 and L103 for maximum audio output across the 8 ohm dummy load resistor. This alignment should be performed by gradually decreasing the generator output signal to the minimum level required for tuning to avoid inaccurate alignment due to AGC action.

c. Squelch Circuit Alignment

1. Set a 50 ohm signal generator to generate a signal on channel 19 with an output level of 1000 microvolts, modulated 30% with a 1kHz tone.

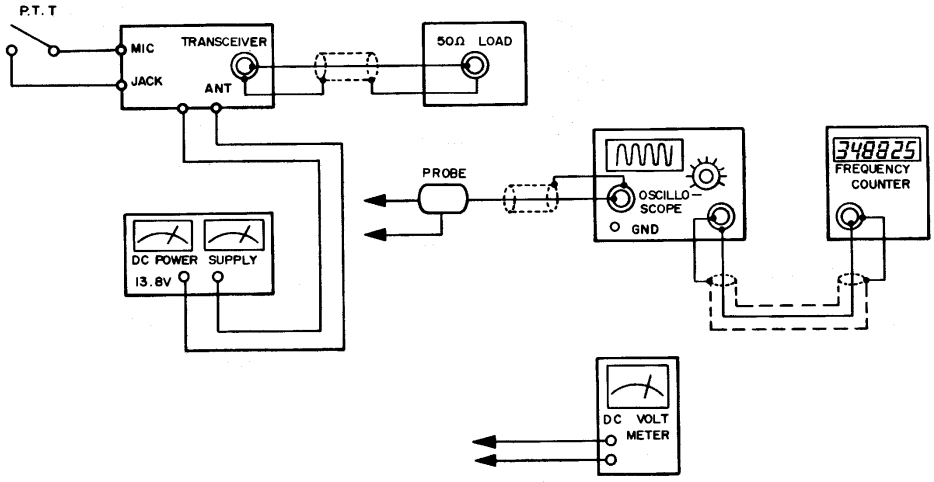
2. Rotate the squelch control in full clockwise direction.

3. Temporarily adjust RV101 for maximum audio output, and note the audio output level. Then adjust RV101 so that the audio output level decreases by 6db.

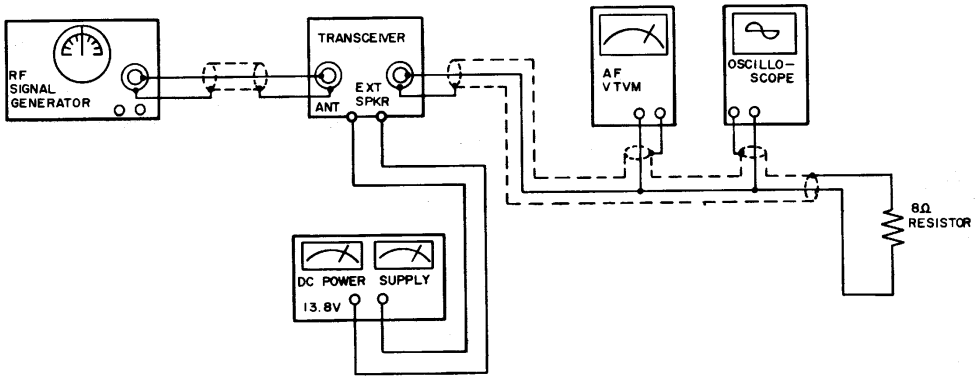
4. Next, reduce the antenna input signal level to between 794 and 447 microvolts. The receiver should squelch. (The audio output level should drop to zero.)

5. Reduce the antenna signal input level to zero, and adjust the SQ control until the noise output just disappears.

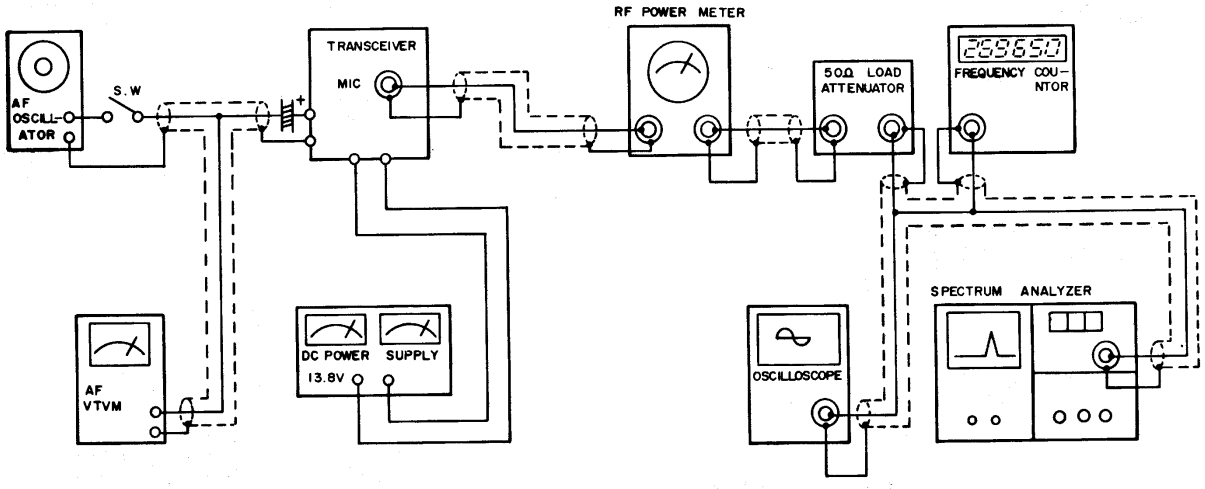
PLL AND CARRIER SECTION



RECEIVER SECTION



TRANSMITTER SECTION



FREQUENCY CHART (Table 1)

CH NO	CHANNEL FREQ(MHz)	CRYSTAL OSC	VCO TX	VCO RX
1	26.965	10.24	16.725	16.27
2	26.975	"	16.735	16.28
3	26.985	"	16.745	16.29
4	27.005	"	16.765	16.31
5	27.015	"	16.775	16.32
6	27.025	"	16.785	16.33
7	27.035	"	16.795	16.34
8	27.055	"	16.815	16.36
9	27.065	"	16.825	16.37
10	27.075	"	16.835	16.38
11	27.085	"	16.845	16.39
12	27.105	"	16.865	16.41
13	27.115	"	16.875	16.42
14	27.125	"	16.885	16.43
15	27.135	"	16.895	16.44
16	27.155	"	16.915	16.46
17	26.165	"	16.925	16.47
18	27.175	"	16.935	16.48
19	27.185	"	16.945	16.49
20	27.205	"	16.965	16.51
21	27.215	"	16.975	16.52
22	27.225	"	16.985	16.53
23	27.255	"	17.015	16.56
24	27.235	"	16.995	16.54
25	27.245	"	17.005	16.55
26	27.265	"	17.025	16.57
27	27.275	"	17.035	16.58
28	27.285	"	17.045	16.59
29	27.295	"	17.055	16.60
30	27.305	"	17.065	16.61
31	27.315	"	17.075	16.62
32	27.325	"	17.085	16.63
33	27.335	"	17.095	16.64
34	27.345	"	17.105	16.65
35	27.355	"	17.115	16.66
36	27.365	"	17.125	16.67
37	27.375	"	17.135	16.68
38	27.385	"	17.145	16.69
39	27.395	"	17.155	16.70
40	27.405	"	17.165	16.71

Voltage Chart

CONDITIONS MEASURED ON CH19
NO SIGNAL
NO MODULATION

INTEGRATED CIRCUITS

IC NO	IC PIN	R X	T X
IC 201	1	0.19	0.21
	2	0.20	0.21
	3	2.30	2.34
	4	5.90	6.00
	5	1.90	1.90
	6	1.86	1.86
	7	1.27	3.72
	8	4.78	4.81
	9	6.27	6.31
	10	0.06	0.07
	11	0.06	0.07
	12	6.26	6.30
	13	0	0
	14	0	0
	15	6.26	6.29
	16	0.06	0.06
	17	7.91	7.90
	18	0.02	0.02
	19	5.81	5.81

IC NO	IC PIN	R X	T X
IC 201	20	4.81	4.82
	21	0	0
	22	0	0
	23	0	0
	24	1.26	7.81
	25	3.0	3.0
	26	3.12	3.12
	27	5.20	5.20
	28	3.12	3.03
IC202	1	6.29	6.31
	2	0.06	0.07
	3	0.06	0.07
	4	6.27	6.30
	5	6.27	6.29
	6	0.06	0.06
	7	0.01	0.01
	8	0.01	0.02
	9	0.01	0.02
	10	1.77	2.87

IC NO	IC PIN	R X	T X
IC 202	11	3.20	2.99
	12	3.75	3.72
	13	0	0
	14	1.31	4.56
	15	1.63	1.50
	16	1.63	1.50
	17	1.36	3.09
	18	7.53	7.52
	19	3.24	3.04
	20	7.20	0.66
IC 203	1	2.65	2.61
	2	1.91	1.94
	3	1.36	1.36
	4	1.77	2.61
	5	0	0
	6	1.26	7.41
	7	2.12	2.05
	8	5.46	5.88
	9	1.26	7.41

IC NO	PIN NO	R X	T X
IC 204	1	0	0
	2	10.59	0.07
	3	10.59	0.07
	4	10.64	0.07
	5	10.72	0.07
	6	11.08	0.07
	7	12.68	11.40
	8	0	1.7
IC 205	1	12.75	11.89
	2	0	0
	3	7.92	7.91
IC206	1	13.70	13.32
	2	12.56	12.19
	3	3.92	3.82
	4	8.05	7.85
	5	1.43	1.39
	6	3.25	3.13
	7	3.41	3.31
	8	1.18	1.22
	9	0	0
	10	6.82	6.63

CONDITIONS MEASURED ON CH19
NO SIGNAL
NO MODULATION

FET

FET NO	Q102		Q103	
Position				
FET PIN	R X	T X	R X	T X
GATE 1	0	0	0	0
GATE 2	0.34	0.03	0.34	0.03
DRAIN	6.20	8.17	6.20	8.17
SOURCE	0	0	0	0
FET NO	Q104		Q108	
Position			NB OFF/ON	
FET PIN	R X	T X	R X	T X
GATE	0	0	0	-0.09
			0	-0.09
DRAIN	2.20	11.51	0	0
			6.13	6.21
SOURCE	12.01	2.20	0	0
			1.71	1.63

Voltage Chart

CONDITIONS MEASURED ON CH19
NO SIGNAL
NO MODULATION

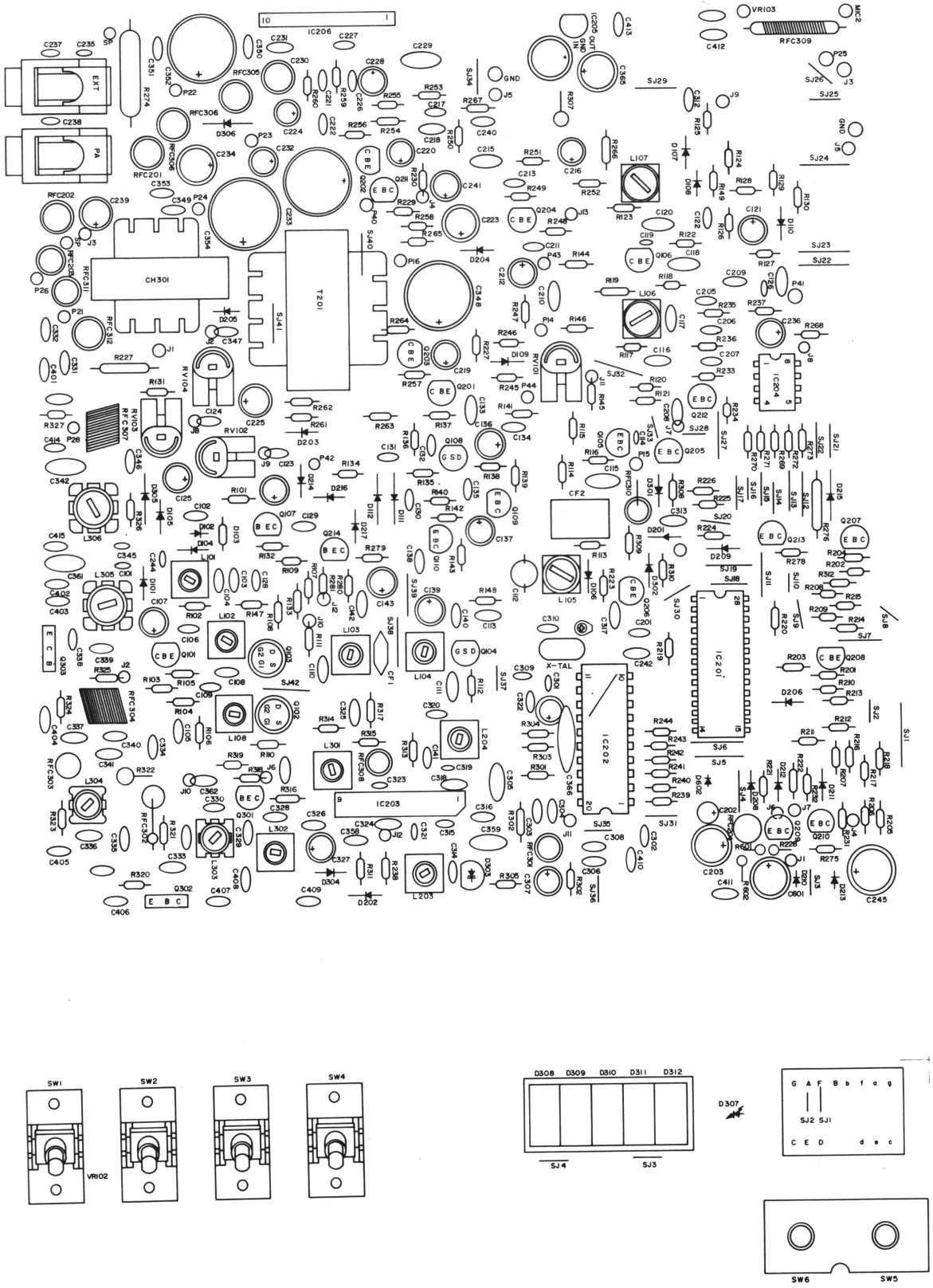
TRANSISTOR

TR NO	Q101		Q105		Q106		Q107		Q109		Q110		Q201		Q202	
Position							NB OFF / ON						SQ MIN / MAX			
TR PIN	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X
B	0.53	0.38	1.23	0.14	1.24	0.12	0.74	0.71	0	0	0	0.02	0	0	0	0
							0.74	0.71	7.24	7.24	0	0.03	0.66	0.17	0.75	0
E	1.24	0.16	0.55	0	0.57	0	0	0	0	0	0	0	0	0	0	0
							0	0	7.87	7.86	0	0	0	0	0	0
C	11.87	11.37	10.58	11.86	11.85	11.86	6.21	6.35	0	0	0	0	0.68	0.68	0	0
							6.21	6.35	1.68	1.80	0	0	0	0.7	0	0

TR NO	Q203		Q204		Q205		Q206		Q207		Q208		Q209		Q210	
Position	SQ MIN/MAX															
TR Pin	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X
B	0.68	0.68	11.47	1.75	7.90	0.77	7.92	7.14	7.84	7.82	7.86	7.84	5.46	5.46	7.91	7.90
	0.35	0.7														
E	0	0	11.91	1.10	7.21	0.67	7.91	7.90	8.09	8.07	8.09	8.07	4.85	4.86	7.91	7.90
	0	0														
C	0.05	0.06	12.41	7.34	7.92	7.90	1.24	7.81	2.27	2.36	2.24	2.31	13.15	12.98	0	0
	3.02	0.06														

TR NO	Q211		Q212		Q213		Q214		Q301		Q302		Q303	
Position					PASW OFF/ON									
TR Pin	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X	R X	T X
B	0	0	0.38	0.38	6.45	6.55	0.74	0.13	0.27	0.28	0	-0.03	0	-0.04
					4.83	4.84								
E	0	0	0	0	3.03	3.05	0	0	0	0	0	0	0	0
					5.48	5.48								
C	0	0.04	7.76	7.75	0	0	0.13	2.24	12.40	12.37	13.52	9.83	13.60	11.88
					5.47	5.46								

Top View


IC206
IC205
IC201
IC202
IC203
IC204
CH301
T201
EXT
PA
SP
VR103
MIC2
RFC309
VR102
SW1
SW2
SW3
SW4
SW5
SW6
D308
D309
D310
D311
D312
D307
G A F B b f a g
C E D d e c
SJ2 SJ1
SJ4
SJ3

Top View