

Service Manual of Receiver/Scanner J.I.L. SX-400

SX400 RECEIVER: PRE-DELIVERY CHECK/SERVICE PROCEDURE

NOTE: REFER TO MODIFICATION SCHEDULE; CHECK AND CARRY OUT ALL RECOMMENDED MODIFICATIONS.

- 1) Remove top and bottom covers. Remove 2 pairs of screws securing tuner and lift tuner clear of IF pcb, without disconnecting. Remove bottom cover of tuner and check integrity of all the grounding tabs and remake if necessary. Remove top cover of tuner and check integrity of soldering of screening plates. Replace both covers, fitting 4 wire grounding connections through holes in the top cover.
- 2) Locate tuner to permit access to IF pcb, and switch on, allowing a few seconds for the Supercapacitor to charge. Operate RESET.
- 3) Set frequency to 100MHz NFM and measure PLL oscillator frequency (84.3500MHz); adjust if necessary. (TP adjacent to L309/IC305)
- 4) Set SG to 100MHz NFM and check alignment of NFM IF.
- 5) Reset Rx and SG to AM and check alignment of AM IF.
- 6) Reset Rx and SG to NFM, increase SG output to +40dB and check S-meter reads S9+. (Adjust: VR210)
- 7) Set SG to +20dB, and swing SG tuning ± 5 kHz, check Centre Detector operation. (Adjust: VR203 HF, VR205 LF)
- 8) Set SG and Rx to convenient frequency > 300 MHz and swing SG tuning ± 7 kHz, check Centre Detector operation. (Adjust: VR204 HF, VR206 LF)
- 9) Set SG and Rx to 100MHz WFM, adjust IFT208 for minimum voltage at pin 19 of IC205. Swing SG tuning ± 60 kHz, check CD operation. (Adjust: VR211 HF, VR212 LF)
- 10) Set SG and Rx to NFM, set MUTE switch to ON, reduce deviation and check operation of MUTE. Reset MUTE switch to OFF. (Adjust: VR207)
- 11) Check operation of NARROW and WIDE SQUELCH.
- 12) Refit tuner.
- 13) Check PLL crystal frequencies:

500MHz	Rx = 101.32500MHz
88MHz	Rx = 84.35000MHz
140MHz	Rx = 64.35000MHz
50MHz	Rx = 46.35000MHz

Note that the oscillators are readily pulled by slight adjustment of L314/316/318/310 respectively, and that sometimes a careful balance is required between correct frequency and maximum output level. CHECK VERY CAREFULLY BY SLIGHT SWINGING OF THE ABOVE-MENTIONED COILS THAT THE OSCILLATOR IS NOT ON THE POINT OF DROP-OUT. A good RF millivoltmeter is essential for these adjustments.

- 14) Set Rx and SG to 26MHz FM and check alignment of front end. (see also table of VCO voltages.)
- 15) Check sensitivity and VCO voltages at all band-edges:
26, 33.995, 34, 49.995, 50, 67.995, 68, 87.995, 88, 107.995, 108, 139.995, 140, 179.995, 219.99, 220, 299.99, 300, 379.99, 380, 459.99, 460, 520.

Treat with suspicion VCO voltages in excess of 13.5v.

- 16) Check operation of SCAN, SQUELCH 2 and 3 modes.
- 17) Check using off-air signals (FM broadcast and known PMR or similar signal). Enter 2 or 3 test frequencies into memory.
- 18) Switch unit off and put to one side for a few hours. After standing, check memory voltage using Digital voltmeter. Consult Supercapacitor Time/Voltage graph. Confirm that memorised test frequencies are still intact.
- 19) Refit outside covers.
- 20) Check for satisfactory visual condition.

SX-400 TUNER P.C.B. ALIGNMENT PROCEDURES

CONDITIONS: a. SG Dev. 5 KHz (modulation 1 KHz), FM
b. Att. Sw. on the rear panel of SX-400 to be position at 0 db.
c. Digital tester to be connected to SX-400 through VC out (BNC) on the rear panel.

ALIGNMENTS

- #1 block 26.000 - 33.995 MHz
 - a. Align coil L198 at 26.000 MHz for VC voltage 1.0 V.
 - b. Align coils L193, L194, L195, IFT112 in sequence for each peak sensitivity.
- #2 block 34.000 - 49.995 MHz
 - a. Align coils L191 at 34.000 MHz for VC voltage 0.39V.
 - b. Align coils L182, L185, L187, IFT111 in sequence for each peak sensitivity.
- #3 block 50.000 - 67.995 MHz
 - a. Align coils L181 at 50.000 MHz for VC voltage 1.0v.
 - b. Align coils L175, L177, L178, IFT110 in sequence for each peak sensitivity.
- #4 block 68.000 - 87.995 MHz
 - a. Align coils L167 at 68.000 MHz for VC voltage 1.36V.
 - b. Align coils L161, L163, L164, IFT108 in sequence for each peak sensitivity.
- #5 block 88.000 - 107.995 MHz
 - a. Align coil L174 at 88.000 MHz for VC voltage 2.76V.
 - b. Align coils L168, L170, L171, IFT109 in sequence for each peak sensitivity.
- #6 block 108.000 - 139.995 MHz
 - a. Align coil L160 at 108.000 MHz for VC voltage 1.80V.
 - b. Align coils L152, L153, L155, L156, L159, IFT107 in sequence for each peak sensitivity.
- #7 block 140.000 - 179.995 MHz
 - a. Align coil L151 at 140.000 MHz for VC voltage 2.3V.
 - b. Align coils L143, L144, L146, L147, L150, IFT106 in sequence for each peak sensitivity.
- #8 block 180.000 - 219.990 MHz
 - a. Align coil L42 at 180.000 MHz for VC voltage 4.7V.
 - b. Align coils L134, L135, L137, L138, L141, IFT105 in sequence for each peak sensitivity.
- #9 block 220.000 - 299.990 MHz
 - a. Align coil L132 at 220.000 MHz for VC voltage 0.8V.
 - b. Align coils L24, L125, L127, L128, L131, IFT104 in sequence for each peak sensitivity.
- #10 block 300.000 - 379.990 MHz
 - a. Align L123 at 300.000 MHz for VC voltage 0.67V.
 - b. Align coils TC107, TC108, TC109, IFT103 in sequence for each peak sensitivity.
- #11 block 380.000 - 459.990 MHz
 - a. Align coil L116 at 380.000 MHz for VC voltage 3.55V.
 - b. Align coils TC104, TC105, TC106, IFT102 in sequence for each peak sensitivity.
- #12 block 460.000 - 520.000 MHz
 - a. Align coil L108 at 460.000 MHz for VC voltage 0.6V.
 - b. Align coils TC101, TC102, TC103, IFT101 in sequence for each peak sensitivity.

CHANNEL STEP

RECEIVABLE FREQUENCIES AND DISPLAY OF THREE (3) DIGITS AFTER DECIMAL OF EACH CHANNEL STEP.

5 KHz STEP		6.25 KHz STEP		10 KHz STEP		12.5 KHz STEP	
FREQ. (KHz)	DISPLAY	FREQ. (KHz)	DISPLAY	FREQ. (KHz)	DISPLAY	FREQ. (KHz)	DISPLAY
0	000	0	000	0	000	0	000
5	050	6.25	062	10	100	12.5	125
10	100	12.5	125	20	200	25	250
15	150	18.75	187	30	300	37.5	375
20	200	25	250	40	400	50	500
25	250	31.25	312	50	500	62.5	625
30	300	37.5	375	60	600	75	750
35	350	43.75	437	70	700	87.5	875
40	400	50	500	80	800		
45	450	56.25	562	90	900		
50	500	62.5	625				
55	550	68.75	687				
60	600	75	750				
65	650	81.25	812				
70	700	87.5	875				
75	750	93.75	937				
80	800						
85	850						
90	900						
95	950						
20 channels/100 KHz		16 channels/100 KHz		10 channels/100 KHz		8 channels/100 KHz	

** Channel Step: 5 or 6.25 KHz -- Band No. 1 thru. 7

10 or 12.5 KHz -- Band No. 8 thru. 12

** Channel step settings are changed, be sure to push CHANNEL RESET SWITCH.

** If frequencies other than above table are tried to be selected, nearest frequencies will be received and displayed in accordance with the channel step setting.

FREQUENCY AND VCO VOLTAGE OF EACH BAND (CHANNEL SPACE: 5 KHz/10 KHz)

BAND	FREQUENCY (MHz)	FREQ. OF LOCAL OSC. (MHz)	FREQ. OF VCO (MHz)	FREQ. OF SUB LOCAL OSC (MHz)	INPUT OF PRE- SCALER (MHz)	VCO VOLTAGE (V)
1	26 33.995	15.3 23.295	15.3 23.295		15.3 23.295	1.0 12.36
2	34 49.995	23.3 39.295	23.3 39.295		23.3 39.295	0.395 11.05
3	50 67.995	60.7 78.695	60.7 78.695	46.3	14.4 32.395	1.0 9.77
4	68 87.995	57.3 77.295	57.3 77.295	46.3	11 30.995	1.36 10.25
5	88 107.995	98.7 118.695	98.7 118.695	84.35	14.35 34.345	2.45 10.35
6	108 139.995	118.7 150.695	59.35 75.3475	46.3	13.05 29.0475	1.8 11.6
7	140 179.995	150.7 190.695	75.35 95.3475	64.35	11 30.9975	1.2 7.8
8	180 219.990	190.7 230.690	95.35 115.456	84.35	11 30.995	4.7 11.5
9	220 299.990	230.7 310.690	57.675 77.6725	46.3	11.375 31.3725	0.8 13.0+0.5
10	300 379.990	310.7 390.690	77.675 97.6725	64.35	13.325 33.3225	0.67 10.5
11	380 459.990	390.7 470.690	97.675 117.6725	84.35	13.325 33.3225	3.55 13.65
12	460 520	449.3 509.3	112.325 127.325	101.325	11 26	0.6 11.95

301 D7508AC-35 (in operation)

In #	FUNCTION	I/O		
1	Count Clock	OUT	2.4V 32.768 KHz (pin for test)	
2	MUTE	OUT	OFF - Low ON - High	
2	AM/FM	OUT	AM - Low FM - High	
4	D-1	OUT	OFF - LOW ON - High (Pulse)	* DIGIT 1 for Display
5	STROBE 1	OUT	Normal - Low Output - High (one shot pulse of approx. 10 uS)	* to uPD4094BC
6	K-I	IN	Normal - Low Row I of Keymatrix is pushed - pulse of a-i IN	* Keymatrix I
7	K-II	IN	Normal - Low Row II of Keymatrix is pushed - pulse of a-i IN	* Keymatrix II
8	K-III	IN	Normal - Low Row III of Keymatrix is pushed - pulse of a-i IN	* Keymatrix III
9	K-IV	IN	Normal - Low Row IV of Keymatrix is pushed - pulse of a-i IN	* Keymatrix IV
10	D-10	OUT	H (5V) L (-22.5V/-16V DIMMER - ON) Pulse	* Digit 10 for display
11	D-9	OUT	H (5V) L (-22.5V/-16V DIMMER - ON) Pulse	* Digit 8 for display
12	D-8	OUT	H (5V) L (-22.5V/-16V DIMMER - ON) Pulse	* Digit 9 for display
14	STROBE 2	OUT	Normal - Low ON - High (Pulse)	* Digit 7 for display
15	BAND 2 H/L	OUT	26 - 33.995/40-520 - Low 34-39.995 - High	* to UPD2833C
16	KEYMATRIX	OUT	OFF - Low ON - High (Pulse)	
17	D-2	OUT	OFF - Low ON - High (Pulse)	* Digit 2 for display
18	RESET	IN	Normal - Low Reset Sw. is pushed - High	
19	SYSTEM CLOCK	IN	2.4V Approx. 190 KHz (test pin unavailable)	
20	+B	IN	5.1V	
21	SYSTEM CLOCK	OUT	2.2V Approx. 190 KHz (test pin)	
22	K-V	IN	Normal - Low Row V of Keymatrix is pushed - pulse of a-i IN	* Keymatrix V
23	STEP	IN	5/10 KHz - Low 6.25/12.5 KHz - High	
24	CLOCK	OUT	Normal - High Output - Low (Pulse)	
25	DATA	OUT	Normal - Low Output - High (Pulse)	
26	STOP/START	IN	STOP - High START - Low	
27	D-6	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Digit 6 for display
28	D-5	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Digit 5 for display
29	D-4	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Digit 4 for display
30	D-3	OUT	H (5V) L (-22.5V/-16V) DIMMER ON) Pulse	* Digit 3 for display
31	S.K - e	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment e for display/keymatrix
32	S.K. - f	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment f for display/keymatrix
33	S.K - g	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment g for display/keymatrix
34	S.K - h	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment h for display/keymatrix
35	S.K - a	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment a for display/keymatrix
36	S.K - b	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment b for display/keymatrix
37	S.K - c	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment c for display/keymatrix
38	S.K - d	OUT	H (5V) L (-22.5V/-16V DIMMER ON) Pulse	* Segment d for display/keymatrix
39	GDN		0V	
40	32.768 KHz	IN	2.0V 32.6	

IC301 (STAND-BY)

Pin #	Voltage	Pin #	
1	2.5V 32.768 KHz	40	2.0V 32.768 KHz
2	L	39	L
3	1	38	L
4	L	37	L
5	L	36	L
6	L	35	L
7	Pulse, Twice/sec.	34	Pulse, Twice/sec.
8	L	33	L
9	L	32	L
10	L	31	L
11	L	30	L
12	L	29	L
13	L	28	L
14	L	27	L
15	L	26	L
16	L	25	L
17	L	24	L
18	L	23	L
19	5.2	22	L
20	5.2	21	5.2

When power is not supplied either or both through power or/and memory lead(s) of power supply unit, OR when power switch is turned off, CPU beomes "STAND-BY" condition.

TR340, TR341

TR340 2SA1175			TR341 2SA1175		
B	5	4.3 pulse	B	5	4.3V pulse
C	5	-22/-16V pulse	C	5	-22/-16V pulse
E	5.1V		4	5.1V	

External Interface Connector

D-1 -- D-10 -- Output for DIGIT for display
 KSa - h -- Output for Segment for display/Key matrix
 k.i ----- Output for Keymatrix
 K-I -- K-V -- Input for Keymatrix
 NARROW H/WIDE H -- Changeable when H is input
 CLOCK-STROBE-1/ DATA -- When shift register is externally connected, output of
 12 bands available.

CN114 OUTPUT

Pin #	I/O	
1	OUT	CLOCK Pulse
2	OUT	5/10 KHz step- LOW, 6/25/12.5 KHz step - OPEN
3	IN	NARROW - High
4	IN	Wide - High
5	OUT	L-1 Pulse
6	OUT	Narrow - Open, Wide - Low
7	OUT	D-7 Pulse
8	OUT	D-2 Pulse
9	OUT	D-9 Pulse
10	OUT	D-8 Pulse
11	IN	K. IV Pulse
12	OUT	D-10 Pulse
13	IN	K.II Pulse
14	IN	K.III Pulse
15	IN	K.V Pulse
16	IN	K.I Pulse
17	OUT	AM - Open, FM-Low
18	OUT	STROBE 1 Pulse
19	OUT	K.S.d Pulse
20	OUT	K.i Pulse
21	OUT	K.S.b Pulse
22	OUT	K.S.c Pulse
23	OUT	K.S.h Pulse
24	OUT	K.S.a Pulse
25	OUT	K.S.f Pulse
26	OUT	K.S.g Pulse
27	OUT	D-3 Pulse
28	OUT	K.S.e Pulse
29	OUT	D-5 Pulse
30	OUT	D-4 Pulse
31	OUT	STOP - Low, Start - Open
32	OUT	D-6 Pulse
33		GND
34	OUT	DATA Pulse

SHIFT REGISTERS

IC #	PIN #	FUNCTION	IN/ OUT	1	2	3	4	5	6	7	8	9	10	11	12
IC 303	1	STROBE	IN	Normal - L INPUT ACTIVE - H One-shot Pulse from No. 5 pin of IC 301											
	2	DATA	IN	Normal - L INPUT ACTIVE - H Pulse Train from No. 25 pin of IC 301											
	3	CLOCK	IN	Normal - H INPUT ACTIVE - L Pulse Train from No. 24 pin of IC 301											
	4	BAND 1	OUT	H	L	L	L	L	L	L	L	L	L	L	L
	5	BAND 2	OUT	L	H	L	L	L	L	L	L	L	L	L	L
	6	BAND 3	OUT	L	L	H	L	L	L	L	L	L	L	L	L
	7	BAND 4	OUT	L	L	L	H	L	L	L	L	L	L	L	L
	8	GND		0 V											
	9	SERIAL OUT	OUT	Normal - H OUTPUT ACTIVE - L Pulse Train to No. 2 pin of IC 304											
	10	SERIAL OUT	OUT	NC											
	11	BAND 8	OUT	L	L	L	L	L	L	L	H	L	L	L	L
	12	BAND 7	OUT	L	L	L	L	L	L	H	L	L	L	L	L
	13	BAND 6	OUT	L	L	L	L	L	H	L	L	L	L	L	L
	14	BAND 5	OUT	L	L	L	L	H	L	L	L	L	L	L	L
	15	OUTPUT ENABLE	IN	H											
	16	+B		5.0 V											
IC 304	1	STROBE	IN	Normal - H INPUT ACTIVE - H One-shot Pulse from No. 5 pin of IC 301											
	2	DATA	IN	Normal - H INPUT ACTIVE - L Pulse Train from No. 9 pin of IC 303											
	3	CLOCK	IN	Normal - H INPUT ACTIVE - L Pulse Train from No. 24 pin of IC 301											
	4	BAND 9	OUT	L	L	L	L	L	L	L	L	H	L	L	L
	5	BAND 10	OUT	L	L	L	L	L	L	L	L	L	H	L	L
	6	BAND 11	OUT	L	L	L	L	L	L	L	L	L	L	H	L
	7	BAND 12	OUT	L	L	L	L	L	L	L	L	L	L	L	H
	8	GND		0 V											
	9	SERIAL OUT	OUT	NC											
	10	SERIAL OUT	OUT	NC											
	11	BAND 1-7/8-12	OUT	L	L	L	L	L	L	L	H	H	H	H	H
	12	84.35 MHz	OUT	H	H	H	H	L	H	H	L	H	H	L	H
	13	64.35 MHz	OUT	H	H	H	H	H	H	L	H	H	L	H	H
	14	46.30 MHz	OUT	H	H	L	L	H	L	H	H	L	H	H	H
	15	OUTPUT ENABLE	IN	H											
	16	+B		5.0 V											

BAND	1			2			3			5			5			6			7			8			9			10			11			12		
TR	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E			
DIODE																																				
TR316	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR317	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR318	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR319	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR320	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR321	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR322	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR323	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0	0	9.2	0			
TR324	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0	0	9.2	0			
TR325	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	0	9.2	0			
TR326	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0	9.2	0	
TR327	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	0	9.2	0	.64	.02	0
TR312	5.0	0	5.0	5.0	0	5.0	4.3	5.0	5.0	4.3	5.0	5.0	5.0	0	5.0	5.0	5.0	0	5.0	5.0	0	5.0	4.3	5.0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	5.0	5.0	5.0	
TR313	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	4.3	5.0	5.0	5.0	0	5.0	5.0	0	5.0	4.3	5.0	5.0	5.0	0	5.0	5.0	5.0	
TR314	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	4.3	5.0	5.0	5.0	0	5.0	5.0	0	5.0	4.3	5.0	5.0	5.0	0	5.0	5.0	0	5.0	4.3	5.0	5.0	5.0	5.0	
TR315	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	9.2	0	5.0	4.3	5.0	5.0
TR311	0	0	0	0	0	0	1.5	4.9	1.0	1.5	4.0	1.0	0	0	0	1.5	4.9	1.0	0	0	0	0	0	0	0	1.5	4.9	1.0	0	0	0	0	0	0	0	
TR310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TR309	0	0	0	0	0	0	0	0	0	0	0	0	1.5	4.8	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
DIODE	A	C		A	C		A	C		A	C		A	C		A	C		A	C		A	C		A	C		A	C		A	C		A	C	
D312	0	0	0	0	0	2.0	1.2	2.0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	0	1.2	
D311	0	0	0	0	0	0	1.2	0	1.2	0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	0	1.2	
D310	0	0	0	0	0	0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	2.0	1.2	0	1.2	0	1.2	
D309	0	0	0	0	0	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	0	1.2	2.0	1.2	0	1.2	

TR306 - TR307 (1 KHz)

CN305	TR307 2SC2785			TR306 2SC2785			CN310
Pin 6	B	C	E	B	C	E	Pin 2
L	0	4.9	.6	.6	2.5	0	0V Approx. 1.1 KHz Osc.
H	5.6	4.8	4.4	.67	.02	0	0V

STOP START

	CN305	IC301	TR338		CN114
	Pin 4	Pin 26	2SC2785	Pin 26	Pin 31
STOP	H	H	.64 0 0	H	L
START	L	L	0 OPEN 0	L	Open

REGULATORS

AVR		IN	GND	OUT
301	78L05	13.5	0	5.0
302	78M04	13.0	0	5.1
303	78L05	13.7	0.64	5.7
304	78L15	22.1	1.3	16.3

DC-DC CONVERTER

TR333	B	C	E
2SD471	-1.4	13.0	0

cn106

DIMMER	1	2	3	4	5
ON	-22.7	-15.8	-15.8	-10.4	-9.5
OFF	-22.7	-20.9	-22.7	-17.2	-16.5

STAND-BY

		TR342			TR343			IC301	
POWER	MEMO	B	C	E	B	C	E	7	34
ON	ON	5.7	0	Pu1	5.0	0	Pu1	0	Pu1
ON	OFF	0	Pu2	Pu2	5.0	0	Pu2	Pu2	Pu2
OFF	ON	5.7	0	Pu2	0	Pu2	Pu2	Pu2	Pu2
OFF	OFF	0	Pu2	Pu2	0	Pu2	Pu2	Pu2	Pu2

* Pu1 -- Pulse for (h) Segment display and Key Matrix (h) display
 * Pu2 -- Pulse, twice a second

POWER - ON DELAY

	TR501			TR502		
POWER	B	C	E	B	C	E
OFF	0	0	0	0	0	0
ON	.04	3.5	0	.59	.04	0

IC305 SO42P MIXER

Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14
V	0	5.0	2.3	0	5.0	0	2.7	2.7	0	.56	1.3	.55	1.3	0

PULL UP AMP

TR344	B	C	E
2SC2785	.64	4.0	0

IC306 555C PRESCALER

	1	2	3	4	5	6	7	8
	5.0	4.3	0	0	3.6	5.0	0	0

IC308 CA3140E

	1	2	3	4	5	6	7..	8
	NC	3.5	3.5	0	NC	VT	16.8	NC

** 2 - Refer to VCO Voltage Table for Input Frequency.
 5 - Output demultiplied
 6 - Pulse Input from uPD2833C

*** 6 (VT) VCO Voltage - Refer to VCO Voltage Table

IC307

uPD2833C

PIN	FUNCTION	I/O	TO
1	STROBE	IN	IC301 14 pin Normal - L INPUT - H (Approx. 100 uS One-shot pulse)
2	1/1024	IN	IC307 15 pin 2.5 / 3.125 KHz 2.5V
3	P-OUT	OUT	IC307 8 pin Pulse 5V
4	P-IN	IN	IC306 5 pin 2.5V
5	PSC		Pulse 4.8V
6	DATA	IN	IC301 25 pin Normal - L Input - H (Pulse)
7	CLOCK	IN	IC301 24 pin Normal - H Input - L (Pulse)
8	V	OUT	IC306 6 pin Pulse 5.0V
9	GND		0 V
10	NC		5.0V
11	EO	OUT	3.5V
12	EOD	OUT	5.0V
13	NC		0 V
14	NC		2.5V
15	1/1024	OUT	IC307 2 pin 2.5 / 3.125 KHz 2.5V
16	NC		2.5V
17	R-IN	IN +	2.56 / 3.2 MHz 2.6V
18	V DD		5.1V

SWITCHING AM/NFM/WFM

IC#	217	212	211	TR227	TR245	TR247	TR246	D222	D223	D224
	4001	4001	4093	2SC2785	2SC2785	2SC2785	2SC-2785	IS953	IS953	IS953
	456	13	8	B C E	B C E	B C E	B C E	A C	A C	A C
AM	H L	L	L	0 * 0	0 2.2 0	0 2.2 0	.63 .01 0	2.3 2.2	2.3 2.2	2.3 1.8
NFM	LHL	L	L	0 * 0	0 2.2 0	.62 2.2 0	0 2.2 0	2.3 2.2	2.3 1.8	2.3 2.2
WFM	LLH	H	H	.66 0 0	.66 .01 0	0 .01 0	0 2.2 0	2.3 1.8	2.3 2.2	2.3 2.2

* Depends on Narrow Squelch (Output of IC207 1 pin).

SWITCHING OF STOP MODE SW.

	IC216	IC214
	4025	4011
	1 3	1.2 3
STOP 1	H L	L H
STOP 2	L L	L H
STOP 3	L H	H L

VOLTAGES OF PLL PCB CONNECTORS

CN 301	
1	D-6
2	D-5
3	D-4
4	D-3
5	S.K.-e
6	S.K.-f
7	S.K.-g
8	S.K.-h
9	S.K.-a
10	S.K.-b
11	S.K.-c
12	S.K.-d
13	K-i

CN 303	
1	0
2	13.8

CN 312	
1	0
2	13.8
3	13.8

CN 302	
1	K-V
2	K-I
3	K-II
4	K-III
5	K-IV
6	D-10
7	D-9
8	D-8
9	D-7
10	D-2
11	D-1

CN 304	
1	
2	13.8

CN 315	
1	13.8
2	13.8
3	13.8

CN 309	
1	5V
2	5V
3	Reset Push - H
4	FM-H, AM-L
5	WIDE - 0.15, NARROW - 3.6
6	WIDE - 3.9, NARROW - 0.75
7	FM - 0.15, AM 5.0
8	AM - 0.71, FM 3.5
9	WIDE Key pushed on FM mode - H
10	Narrow Key pushed on FM mode - H

CN 305	
1	NAR. FM - H, WIDE FM - L, AM -L
2	NAR. FM - L, WIDE FM - H, AM- L
3	MUTE ON - H, OFF - L
4	STOP - H, START - L
5	BAND 1 - 7 - L, 8 - 12 - H
6	1 KHz Osc. ON - L, OFF - H
7	13.8v

CN 307	
1	Band 1 - H, Other bands - L
2	Band 2 - H, Other bands - L
3	Band 3 - H, Other bands - L
4	Band 4 - H, Other bands - L
5	Band 5 - H, other bands - L
6	Band 6 - H, Other bands - L
7	Band 7 - H, Other bands - L
8	Band 8 - H, Other bands - L
9	Band 9 - H, Other bands - L
10	Band 10 - H, Other bands - L
11	Band 11 - H, Other bands - L
12	Band 12 - H, Other bands - L
13	STEP 5/10K - H, 6.25/12.5 K - L

CN310	
1	0
2	0

CN 308	
1	Band 1 - 0.02, other bands 9.2
2	Band 2 - 0.02, other bands 9.2
3	Band 3 - 0.02, other bands 9.2
4	Band 4 - 0.02, other bands 9.2
5	Band 5 - 0.02, other bands 9.2
6	Band 6 - 0.02, other bands 9.2
7	Band 7 - 0.02, other bands 9.2
8	Band 8 - 0.02, other bands 9.2
9	Band 9 - 0.02, other bands 9.2
10	Band 10 - 0.02, other bands 9.2
11	Band 11 - 0.02, other bands 9.2
12	Band 12 - 0.02, other bands 9.2

I NARROW

TR201 2SC2787			TR202 2SC2878			IC201 BA401					IC202 BA401					IC203 BA401					IC204 uPC577H							TR214 2SC2785		
B	C	E	B	C	E	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	6	7	B	C	E
.8	7.9	1.1	.78	7.6	.13	1.4	1.4	0	6.6	8.0	1.4	1.4	0	6.6	8.0	1.4	1.4	0	6.7	8.0	5.2	1.8	1.8	0	6.7	2.4	6.7	1.6	8.0	1.0

55 OUT

AGC

AM

TR223 2SK193		
B	C	D
7.2	0	0

	TR203 2SC2785			TR204 2SC2785		
INPUT	B	C	E	B	C	F
-20 dB	2.4	5.2	1.7	.62	.03	0
60 dB	2.4	5.2	1.7	.59	.57	0

TR205 2SC2787			TR206 2SC2787			TR213 2SC2785		
B	C	E	B	C	E	B	C	F
.78	7.9	.13	2.0	7.8	1.3	1.6	8.0	1.1

ARROW SQUELCH

NARROW SQ VOL POSITION	26 MHz FM 3 KHz Mod. Input Level	TR208 2SC2787			TR209 2SC2789			TR210 2SC2787			IC206 1251D					IC215 4584		IC212 4001	
		B	C	E	B	C	E	B	C	E	4	5	6	7	8	1	2	2	2
LEFT	-20 dB	3.2	7.9	2.5	.7	1.1	0	4.7	5.1	4.0	0	.31	0	6.8	8.0	H	L	L	L
RIGHT	-20 dB	3.2	7.9	2.5	.7	1.1	0	4.6	5.1	4.0	0	.31	.11	6.8	8.0	L	H	H	H
RIGHT	60 dB	3.2	7.9	2.5	.7	1.1	0	4.6	5.1	4.0	0	.31	.11	6.8	8.0	H	L	L	L

Functions of pins of IC206

- 4 GND
- 5 Reference Voltage
- 6 Comparison Voltage
- 7 Output of Comparator
- 8 V_{dd}

M WIDE

TR224 2SC2787			TR225 2SC2787			IC205 1245V														TR228 2SC2785							
B	C	E	B	C	E	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	B	C	E
1.8	6.9	1.1	1.8	6.9	1.1	8.0	NC	.18	5.8	5.8	2.4	2.6	2.4	0	0	3.3	5.1	3.3	5.2	4.4	.97		3.7	5.1	1.6	5.8	1.0

NARROW CENTER DETECTOR

		TR219 2SA1175			TR216 2SC2785			TR218 2SC2785			TR220 2SC2785			TR221 2SC2785			IC208 uPC1251D								IC211 4093			IC212 4001	
		B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	1	2	3	4	5	6	7	8	5	6	4	1	
26 MHz	+4 KHz	4.4	5.0	5.1	.67	0	0	.10	1.8	0	.68	0	0	.10	2.9	0	0	3.01	2.97	0	3.01	1.86	4.0	5.1	4.0	0	H	H	
FM	CENTER	4.4	5.0	5.1	.67	0	0	.10	1.8	0	.68	0	0	.10	2.9	0	4.0	2.39	2.97	0	2.39	1.86	4.0	5.1	4.0	4.0	L	L	
NARROW	-4 KHz	4.4	5.0	5.1	.67	0	0	.10	1.8	0	.68	0	0	.10	2.9	0	4.0	1.79	2.97	0	1.79	1.86	0	5.1	0	4.0	H	H	
180 MHz	+7 KHz	4.7	0	5.1	0	1.7	0	.67	0	0	0	3.2	0	.67	0	0	4.0	1.63	3.21	0	1.63	1.69	0	5.1	0	4.0	H	H	
FM	CENTER	4.7	0	5.1	0	1.7	0	.67	0	0	0	3.2	0	.67	0	0	4.0	2.45	3.21	0	2.44	1.69	4.0	5.1	4.0	4.0	L	L	
NARROW	-7 KHz	4.7	0	5.1	0	1.7	0	.67	0	0	0	3.2	0	.67	0	0	0	3.23	3.21	0	3.23	1.69	4.0	5.1	4.0	0	H	H	

WIDE CENTER DETECTOR

	IC207 1251n								IC211 4093			IC212 4001
	1	2	3	4	5	6	7	8	1	2	3	5
+60 KHz	0	3.42	3.37	0	3.92	3.37	6.6	7.9	.03	5.6	H	H
CENTER	6.6	3.42	3.6	0	3.92	3.6	6.6	7.9	5.6	5.6	L	L
-60 KHz	6.6	3.42	3.9	0	3.92	3.89	0	7.9	5.6	.03	H	H

Voltages of the pins of which numbers are circled shall be aligned using semi-fixed resistors. Voltages are aligned each set and not always corresponding to the table. Pay attention to the movement trend of voltage when frequencies are moved + side or - side from center and to the variation of output of voltage comparator (Pins 1 and 7).

10.7 MHz OUT

TR222 2SK193		
G	S	D
0	0	7.2

WIDE SQUELCH

WIDE SQUELCH POSITION	26 MHz 30 KHz Mod. INPUT LEVEL	IC205 1245V	IC206 1251D					IC211 4093
		3	1	2	3	4	8	9
LEFT	-20 dB	.28	6.8	0	.28	0	8.0	H
Right	-20 dB	.28	0	1.33	.28	0	8.0	L
Right	60 dB	4.26	6.8	1.33	4.26	0	8.0	H

WIDE SIGNAL CANCEL

26 MHz	IC209												IC211
FM 60 dB	uPC451C												4093
Mod. Level	4	8	9	10	11	12	13	14					12
0 KHz	5.1	2.5	2.5	2.5	0	.010	.020	0					0
20 KHz	5.1	2.5	2.5	2.5	0	.022	.020	3.8					3.8

AUDIO SQUELCH

26 MHz 60 dB Mod. Level	TR215 2SC2785			IC209 451C								IC215 4584		IC216 4025		IC214 4011	
	B	C	E	1	2	3	4	5	6	7	11	3	4	2	4	6	
0.5 KHz	1.6	5.8	.95	3.9	.012	.01	5.1	2.5	2.5	2.5	0	3.9	L	L	L	L	
1 KHz	1.6	5.8	.95	0	.095	.01	5.1	2.5	2.5	2.5	0	L	H	H	H	H	

AUDIO AMP

TR231 2SC2785			IC210 uPC2002V				
B	C	E	1	2	3	4	5
1.6	8.0	1.0	.72	.72	.01	6.4	13.7

AVR201 78M05			TR232 2SC2785			TR233 2SC882			TR234 2SC2785		
IN	CND	OUT	B	C	E	B	C	E	B	C	E
13.7	0	5.1	6.6	9.9	6.0	9.3	13.7	8.6	9.9	13.7	9.3

** When mute switch is OFF,
#6 pin of IC214 is always

NO SIGNAL INPUT

	B			AGC (DIOAD)			RF AMP				AGC (RF AMP)			MIXER			LOCAL OSC.			MULTIPLIER			BUFFER		
	B	C	E	B	C	E	G2	G1	S	D	B	C	E	B	C	E	B	C	C	B	C	E	D	S	C
1	TR139	2SA1175		TR192	2SC2785		TR164	3SK74			TR165	2SC2785E		TR166	2SC2786M		TR167	2SC2786M					TR168	2SK193K	
26-33.995	8.4	9.1	9.2	3.9	9.1	3.3	4.0	0	.61	9.1	.03	4.0	0	1.6	9.1	.91	2.9	8.9	2.2				2.1	0	0
2	TR194	2SA1175		TR191	2SC2785		TR159	3SK74			TR160	2SC2785E		TR161	2SC2786M		TR112	2SC2786M					TR153	2SK193K	
34-49.995	8.4	9.1	9.2	4.0	9.1	3.4	4.1	0	.61	9.1	.03	4.1	0	1.5	9.1	.81	2.9	8.8	2.2				2.1	0	0
3	TR195	2SC1175		TR190	2SC2785		TR154	3SK74			TR155	2SC2785E		TR156	2SC2786M		TR112	2SC2786M					TR163	2SK193K	
50-67.995	8.4	9.1	9.2	4.0	9.1	3.4	4.1	0	.61	8.8	.03	4.1	9	1.5	9.1	1.4	5.4	8.6	4.1				4.5	0	0
4	TR1100	2SA1175		TR188	2SC2785		TR144	3SK74			TR145	2SC2785E		TR146	2SC2786M		TR157	2SC2786M					TR158	2SK193K	
68-87.995	8.4	9.1	9.2	3.9	9.1	3.3	4.0	0	.6	8.8	.03	4.0	0	1.5	9.1	.84	5.5	8.6	4.9				5.0	0	0
5	TR196	2SA1175		TR189	2SC2785		TR149	3SK74			TR150	2SC2785E		TR151	2SC2786M		TR152	2SC2786M					TR153	2SK193K	
88-107.995	8.4	9.1	9.2	4.0	9.1	3.4	4.0	0	.62	8.8	.03	4.1	0	1.5	9.1	1.6	5.0	8.3	4.8				4.6	0	0
6	TR199	2SA1175		TR187	2SC2785		TR138	3SK88			TR139	2SC2785E		TR140	2SC1730L		TR141	2SC2786M		TR142	2SC2786M		TR143	2SK193K	
108-139.995	8.4	9.1	9.2	4.0	9.1	3.5	1.4	0	0	9.1	.03	4.2	0	1.4	9.1	.73	5.6	8.6	4.9	0	--.2	0	5.5	0	0
7	TR198	2SA1175		TR186	2SC2785		TR132	3SK88			TR133	2SC2785E		TR143	2SC1730L		TR135	2SC2786M		TR136	2SC1730L		TR137	2SK193K	
140-179.995	8.4	9.1	9.2	4.0	9.1	3.4	4.1	0	0	9.1	.03	4.1	0	1.5	9.1	.76	3.0	8.9	2.3	0	-.1	0	5.6	0	0
8	TR197	2SA1175		TR185	2SC2785		TR126	3SK88			TR127	2SC2785E		TR128	2SC1730L		TR129	2SC2786M		TR130	2SC1730L		TR131	2SK193K	
180-219.99	8.4	9.1	9.2	4.0	9.1	3.4	4.1	0	0	9.1	.03	4.1	0	1.4	9.1	.72	5.6	8.6	4.8	0	-.5	0	5.6	0	0
9	TR1104	2SA1175		TR184	2SC2785		TR120	3SK88			TR121	2SC2785E		TR122	2SC1730L		TR123	2SC2786M		TR124	2SC1730L		TR125	2SK193K	
220-299.99	8.4	9.1	9.2	3.8	9.1	3.2	4.0	0	0	9.1	.03	4.0	0	1.5	9.1	.80	5.4	8.6	4.8	.32	3.5	0	5.4	0	0
10	TR1103	2SA1175		TR183	2SC2785		TR114	2SC1070(2)			TR115	2SC2785E		TR116	2SC1730L		TR117	2SC2786M		TR118	2SC1730L		TR119	2SK193K	
300-379.99	8.4	9.1	9.2	1.9	9.1	1.3	1.9	1.2	1.9	9.0	.03	1.9	0	1.5	9.1	.82	5.7	8.6	4.8	.31	3.7	0	5.3	0	0
11	TR1102	2SA1175		TR182	2SC2785		TR107	2SC1070(2)			TR108	2SC2785E		TR109	2SC1730L		TR110	2SC2786M		TR111	2SC1730L		TR112	2SK193K	
380-459.99	8.4	9.1	9.2	1.8	9.1	1.3	1.9	1.1	1.9	9.1	.03	1.9	0	1.5	9.1	.76	5.6	8.6	4.8	.11	4.2	0	5.5	0	0
12	TR1101	2SA1175		TR181	2SC2785		TR101	2SC1070(2)			TR102	2SC2785E		TR103	2SC1730L		TR104	2SC2786M		TR105	2SC1730L		TR106	2SK193K	
460-520	8.4	9.1	9.2	1.9	9.1	1.3	1.9	1.2	1.9	9.1	.03	1.9	0	1.4	9.1	.75	5.2	8.6	4.8	-.56	-.6	0	5.4	0	0

INPUT 60 dB 3 KHz Mod.

	AGC (DIOD)			RF AMP				AGC (RF AMP)		
	B	C	E	G2	G1	S	D	B	C	E
				B	E	B	C			
1	TR192	2SC2785		TR164	3SK74			TR165	2SC2785	
26-33.995	1.8	9.1	1.4	1.8	0	.53	9.1	.56	1.8	0
2	TR191	2SC2785		TR159	3SK74			TR160	2SC2785	
34-49.995	1.9	9.1	1.4	1.8	0	.54	9.1	.57	1.8	0
3	TR190	2SC2785		TR154	3SK74			TR155	2SC2785	
50-67.995	1.9	1.9	1.5	1.9	0	.54	8.8	.56	1.9	0
4	TR188	2SC2785		TR144	3SK74			TR145	2SC2785	
68-87.995	1.9	9.1	1.5	1.9	0	.55	8.9	.56	1.9	0
5	TR189	2SC2785		TR149	3SK74			TR150	2SC2785	
88-107.995	2.1	9.1	1.6	2.1	0	.55	8.9	.56	2.1	0
6	TR187	2SC2785		TR138	3SK88			TR139	2SC2785	
108-139.995	2.1	9.1	1.6	2.1	0	0	9.1	.57	2.1	0
7	TR186	2SC2785		TR132	3SK88			TR133	2SC2785	
140-179.995	1.8	9.1	1.4	1.8	0	0	9.1	.57	1.9	0
8	TR185	2SC2785		TR126	3SK88			TR127	2SC2785	
180-219.99	2.1	9.1	1.7	2.1	0	0	9.1	.56	2.1	0
9	TR184	2SC2785		TR120	3SK88			TR121	2SC2785	
220-299.99	1.0	9.1	.55	1.0	0	0	9.9	.57	1.0	0
10	TR183	2SC2785		TR114	2SC1070(2)			TR115	2SC2785	
300-379.99	.78	9.1	.42	.77	.10	.76	9.1	.62	.84	0
11	TR182	2SC2785		TR107	2SC1070(2)			TR108	2SC2785	
380-459.99	1.0	9.1	.54	.99	.27	.99	9.1	.61	1.0	0
12	TR181	2SC2785		TR101	2SC1070(2)			TR102	2SC2785	
460-520	1.0	9.1	.56	.99	.26	.99	9.1	.61	1.0	0

REGULATOR

AVR101	78L09	
IN	GND	OUT
13.7	0	9.2

Voltages of other items, +B, MIXER, LOCAL OSC., MULTIPLIER, BUFFER are the same as those of "NO SIGNAL INPUT"

+B of other than 1-12 bands is always 0 volt.

RECORDING LEVEL AMP. (.UG TERMINAL)

TR254	B	C	E
2SC2785	1.7	4.4	1.1

BAND-PASS FILTER

TR255	B	C	E
2SC2785	4.2	8.1	3.6

MUTING

	TR230 2SC2785			TR247 2SC2785		
	B	C	E	B	C	E
MUTE OFF	.03	4.4	0	.61	0	0
MUTE ON	.60	.03	0	.04	0	0

WIDE SIGNAL CANCELLER

	IC209	TR253 2SC2785			TR252 2SC2785			IC211
	14	B	C	E	B	C	E	4093
NO SIGNAL INPUT	3.8	.03	4.4	0	.61	0	0	0
MOD. OVER 7 KHz	0	.60	.03	0	.04	0	0	0
MOD. UNDER 7 KHz	3.8	.60	.03	0	.04	3.8	0	3.8

VOLTAGES OF IF PCB CONNECTORS

SP	
1	0
2	0

AUDIO IN	
1	0
2	0
3	0

REC	
1	0
2	0

AUX	
WITH SIGNAL	SHORT
W/O SIGNAL	OPEN

DELAY	
STOP	L
START	H

1. 3			
STOP	STOP	STOP	
1	2	3	
1	H	L	L
3	L	L	H

MUTE		
	ON	OFF
1	*	*
2	*	H

*
With Mo. - H
W/O Mod. - L

RESUME	
1	Key-Push -- H
2	H

SQ VR	
1	0
2	0

WIDE SQ	
1	0
2	Fully c.c.w - 0, Fully c.w. - 0.96

ANL		
	ON	OFF
1	-.65	-.70
2	-1.0	-.70

METER	
1	W/o Signal - 0V 20 dB Input 0.1V
2	0

SX400 MODIFICATION TO AUDIO RESPONSE

Band Pass Filter PCB

1. Remove C 2175 (Brown .047 mfd) completely.
2. Lift positive leg of C 2170 (50v. 1 mfd) and extend with short wire 2½" long, and then connect to red lead of screened cable (AM-FM narrow out) on the large pad in corner of PCB.

Main IF PCB

1. Remove C 297 (.047 mfd) completely.
2. Remove R 281 (2.2K) and replace with solid link.
3. Change C 269 (.047 mfd) to an electrolytic any value 2.2 to 10 mfd with + positive connection to emitter.
4. Remove C 2176 which is located approx. in middle of underside of IF Board.
5. Remove C 239 (Electrolytic 0.1 uf) and change to any value 2.2 to 10 mfd.
6. Remove R 244 (1K) and replace with link.

This completes the modification.