

SERVICE MANUAL SERVICE MANUAL

SERVICE MANUAL 148 GTLDX (EARLY & LATE VERSIONS)

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thanks Homer

for sharing this file

COBRA COMMUNICATIONS
PRODUCTION GROUP
DYNASCAN CORPORATION
6460 W. CORTLAND ST.
CHICAGO, ILLINOIS 60635

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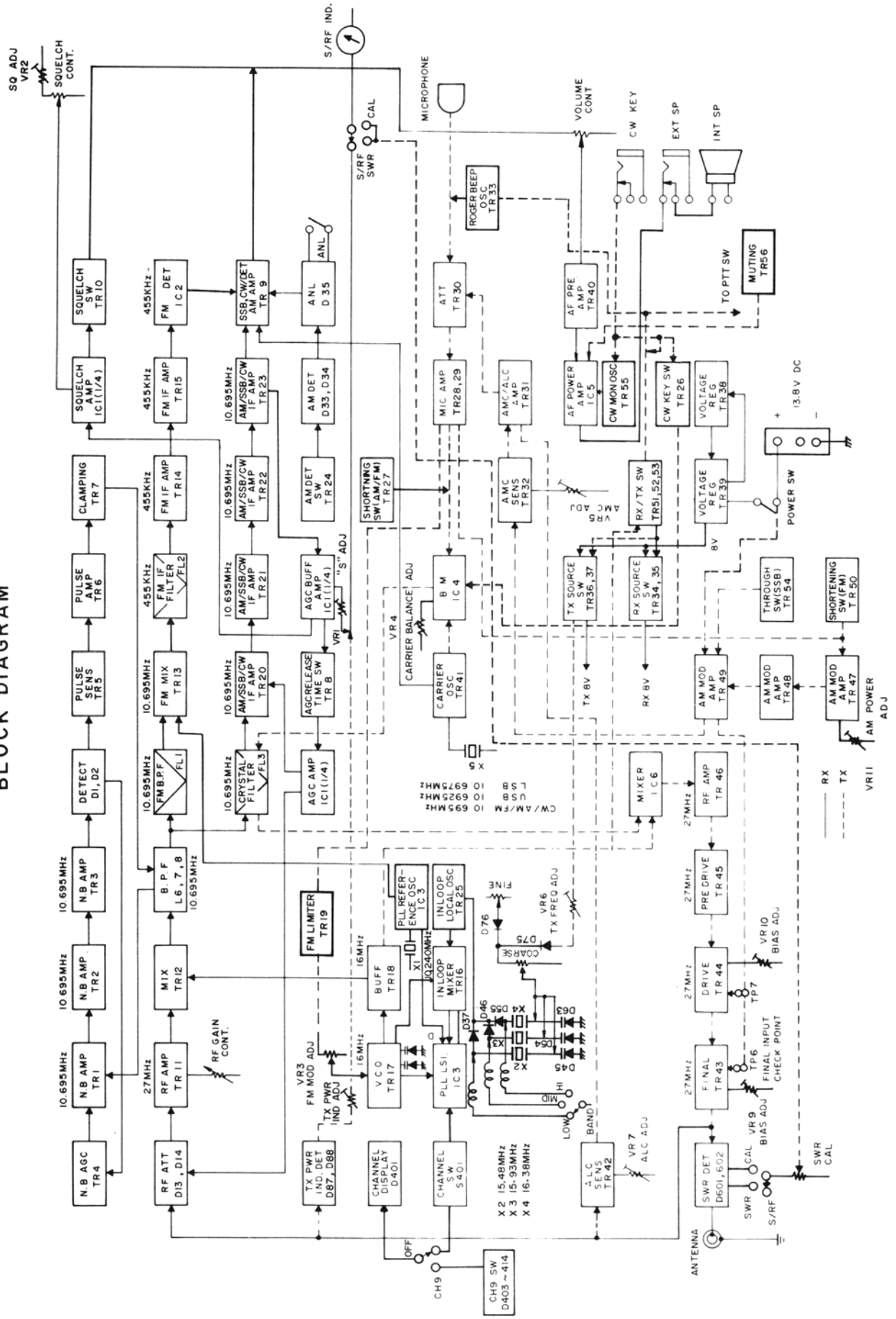
Early Version

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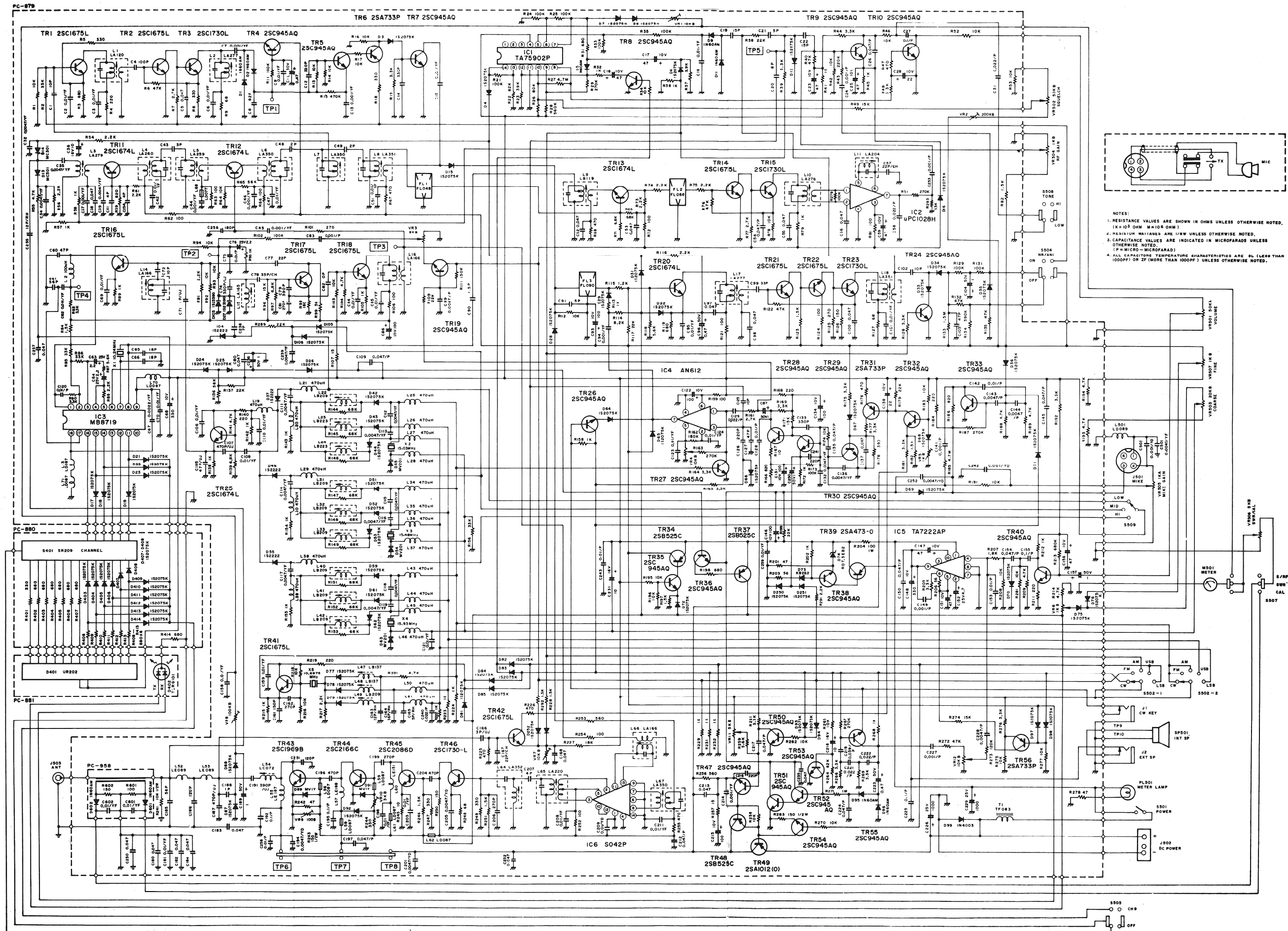
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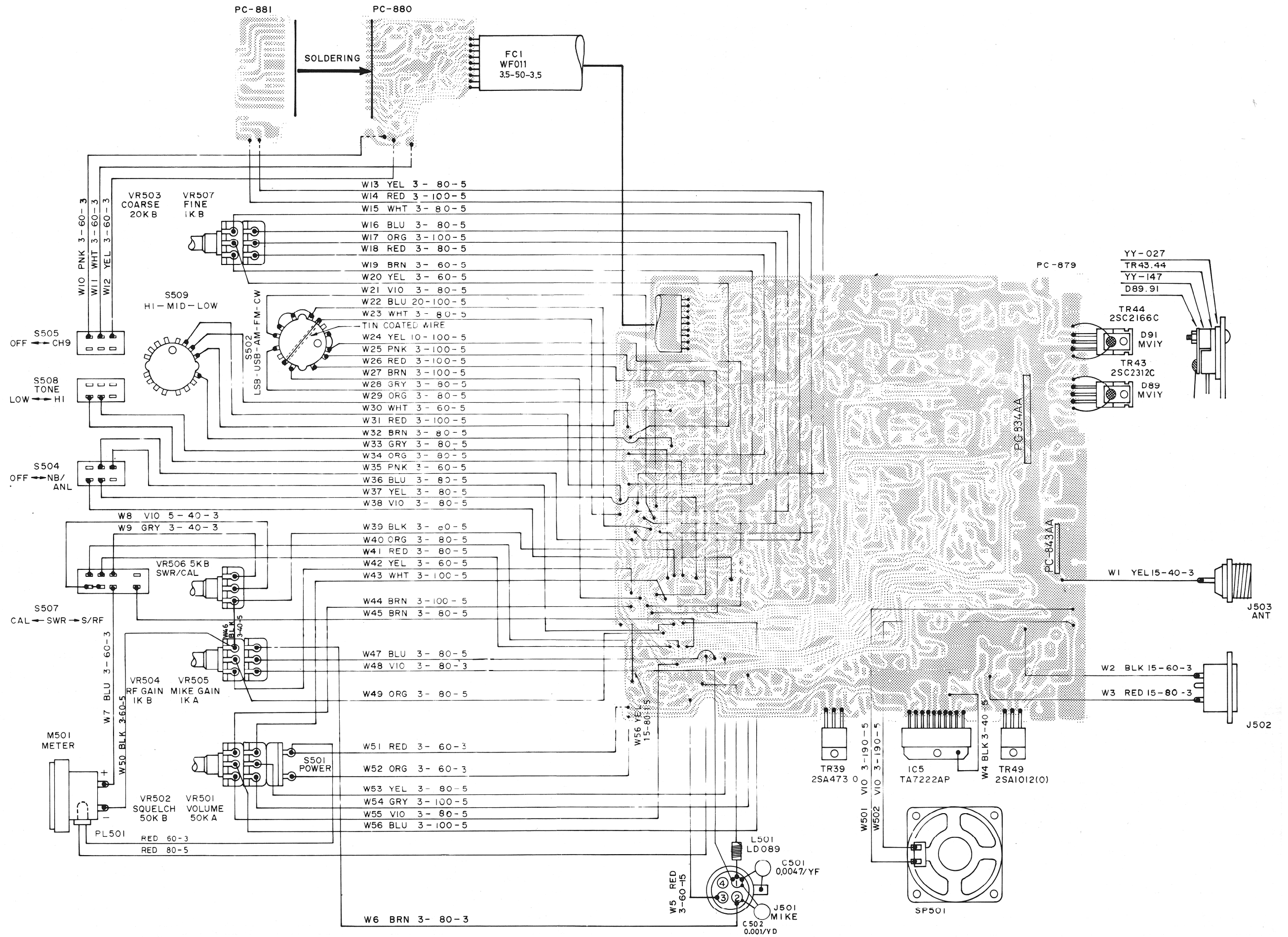
BLOCK DIAGRAM



SCHEMATIC DIAGRAM



WIRING DIAGRAM



CI48GTL DX ALIGNMENT PROCEDURE

ALIGNMENT OF PLL AND CARRIER OSCILLATOR SECTION.

1. Test Equipment Required:

- a) Oscilloscope
- b) DC Voltmeter
- c) Frequency Counter

Effectivity: S/N 03000001-4498
S/N 13000001-1504

EARLY
VERSION

2. Alignment Procedure.

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH :19 RX Mode Mode AM Voice Lock: Center Band: MID	L14	Connect Oscilloscope to TP4 (lead of R83). Adjust for maximum indication on Oscilloscope.
2	Same as above, except: CH : 40	L15	Connect DC Voltmeter to TP2 (lead of R93). Adjust for 5.4V reading on DC Voltmeter.
3	Same as Step 1	L16	Connect Oscilloscope to TP3 (lead of R101). Adjust for maximum indication on Oscilloscope.
4	Same as Step 1	L31	Connect Frequency Counter to TP3 (lead of R101). Adjust for 16.490MHz + or - 20Hz.
5	Same as Step 1 CH : 40 Mode : USB	L32	Adjust for 16.4925MHz + or - 20Hz.
6	Same as Step 1 CH : 40 Mode : LSB	L33	Adjust for 16.4875MHz + or - 20Hz.
7	Same as Step 6, CH : 40 TX Mode	VR6	Adjust for 16.4875MHz + or - 20Hz.
8	Same as Step 1 CH : 40 Band : Low	L22	Adjust for 16.040MHz + or - 20Hz.

Note: Two TP4 are noted on procedure. One is R83 and the other one is R114.

C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
9	Same as Step 8, CH : 40 Mode : USB	L23	Adjust for 16.0425MHz + or - 20Hz.
10	Same as Step 9, CH : 40 Mode : LSB	L24	Adjust for 16.0375MHz + or - 20Hz.
11	Same as Step 1 CH : 40 Band : HI	L40	Adjust for 16.940MHz + or - 20Hz.
12	Same as Step 11 CH : 40 Mode : USB	L41	Adjust for 16.9425MHz + or - 20Hz.
13	Same as Step 12 CH : 40 Mode : LSB	L42	Adjust for 16.9375MHz + or - 20Hz.
14	Same as Step 1 CH : 40 TX Mode	L47	Connect Frequency Counter to TP4 (R114). Adjust for 10.695MHz + or - 5Hz.
15	Same as Step 1 CH : 40 Mode : USB	L48	Connect Frequency Counter to TP5 (lead of R39). Adjust for 10.6925MHz +5Hz - 0Hz.
16	Same as Step 15 CH : 40 Mode : LSB	L49	Adjust for 10.6975MHz +0Hz -5Hz.

Note: Two TP4 are noted on Procedure. One is R83 and the other one is R114.

C148GLT DX ALIGNMENT PROCEDURE

ALIGNMENT OF RECEIVER PORTION

1. Test Equipment Required

- a) SG, 27MHz Band.
- b) Oscilloscope.
- c) AF VTVM (Across 8oz. speaker).
- d) Deviation Meter.

2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH : 19 Band : Mid AM Mode Tone : HI NB/ANL : OFF AF VR : CW RF Gain: CW Coarse : Center SQ VR : CCW CH 9 SW: OFF		Set the VR settings as noted in left.
2	Same as Step 1	L4	Turn the Core of L4 to the bottom.
3	Same as Step 1	L3, L5, L6 L7, L8, L17, L18 and L4.	Adjust for maximum reading and readjust L4 for maximum reading.
4	Same as Step 1 except: NB/ANL : ON	L1 and L2	Set the SG on Mid, CH18, 27.175MHz (unit is CH19) with no modulation. Connect Oscilloscope to lead of D2 and adjust coils for maximum reading. Then set the level of SG to 5uV, then readjust this step (D2 is TP1).
5	Same as Step 1 except: SQ VR: CW	VR2	Set the SG to Mid, CH19, 27.185MHz, 30% AM modulation with 1000uV. Then turn the VR2, so that the AF signal will appear on Oscilloscope (Tight squelch Adj.).

C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
6	Same as Step 1	VR11	Set the SG output level to 100uV with No-modulation. Then adjust VR1 for S-9 reading on radio's meter.
7	Same as step 1 except: Mode: FM	L9 and L10	Set the SG to 10uV with No-Modulation. Connect Oscilloscope to lead of R279, and adjust coils for maximum reading (Pin 1&2 of IC 2).
8	Same as Step 7	L11	Set the SG to 1mV with 1.5kHz deviation of 1kHz. Adjust L11 for maximum sign-wave output on Oscilloscope.

ALIGNMENT OF TRANSMITTER PORTION.

1. Test Equipment Required

- a) DC Ammeter.
- b) Power meter.
- c) RF VIVM
- d) Oscilloscope.
- e) Deviation Meter.
- f) 50 ohm Dummy Load.
- g) Frequency counter.

2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH : 19 TX Mode Mode : USB Mic Gain: Min.	VR10	Remove PC-843 (PCB) and connect Ammeter to TP8 (+) and TP7 (-). Adjust for 8mA reading.
2	Same as Step 1	VR9	Connect DC Ammeter to TP8 (+) and TP6 (-) and adjust for 100mA reading.

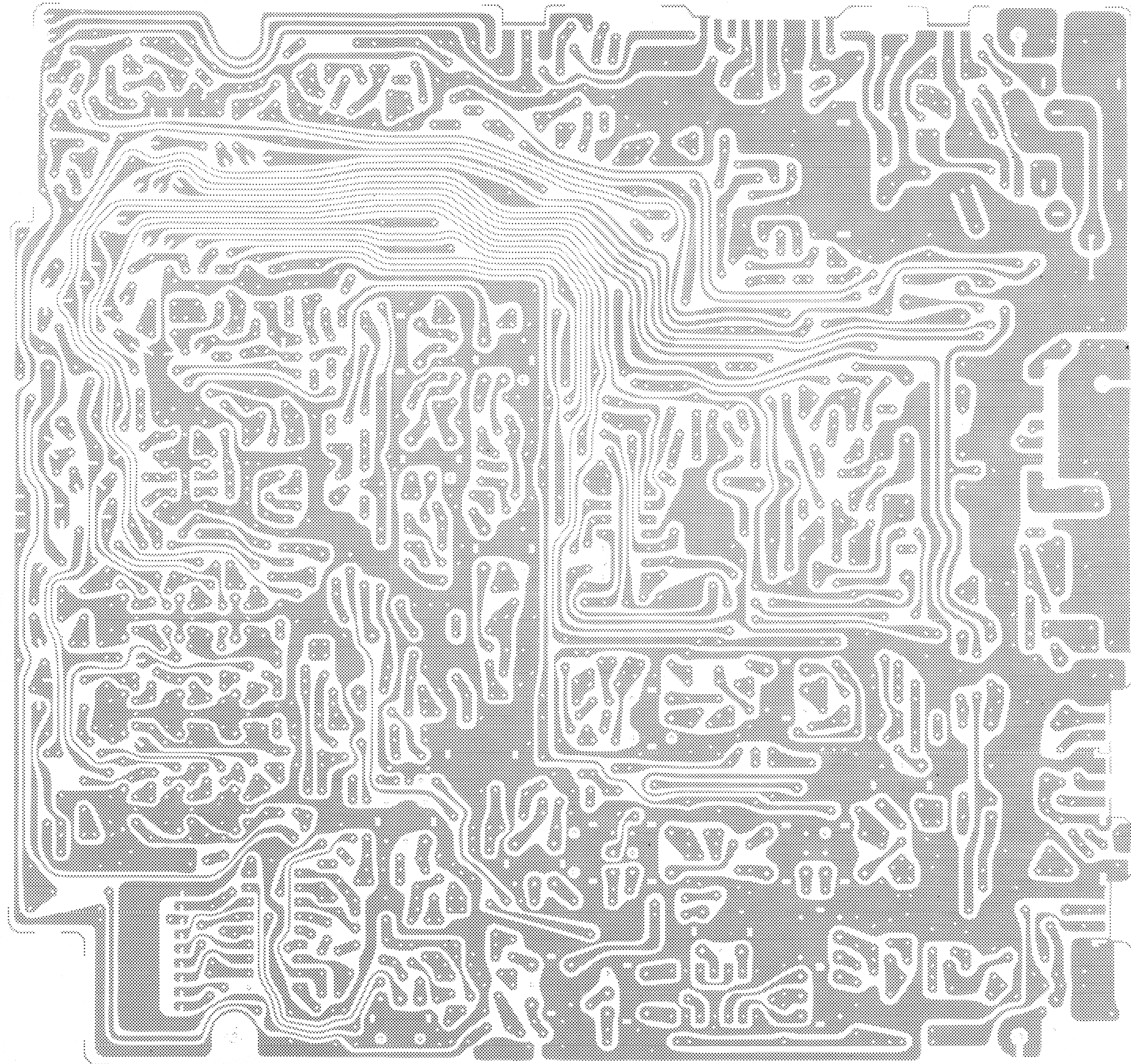
C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
3	Same as Step 1, except: Mic Input: 30mV 1KHz	L65	Restore PC-834. Turn the core to the bottom.
4	Same as Step 3	L64, L66, and L67.	Adjust for maximum reading on RF VTVM (across 50ohm Dummy Load).
5	Same as Step 3	L65	Set the Band: HI, CH 40. And adjust for maximum reading on RF VTVM. Then turn the Band: Low, CH 1. Readjust for equalized output power.
6	Same as Step 1, except: Mode : AM Mic Input 90%	L54	Adjust for maximum reading on RF VTVM (Final Output Adj.).
7	Same as Step 3	VR7	Adjust ALC for 24.5V reading on RF VTVM (12w/50ohm Single tone).
8	Same as Step 1	VR4	Adjust for minimum reading on Oscilloscope for both USB and LSB (minimum carrier Adj.).
9	Same as Step 1, except: Mode : AM	VR11	Adjust for 5.0W reading on RF Power Meter (AM carrier output adj.).
10	Mic Input: 30mV 1KHz	VR8	Set the meter SW to S/RF position. Adjust the VR8 so that the radio's meter reads 5W (between Green zone and Red zone), "S" meter adj.
11	Same as Step 1, except: AM Mode Mic Input: 30mV 1KHz	VR5	Adjust for 90% modulation on Oscilloscope (AM modulation adj.).

C148GTL DX ALIGNMENT PROCEDURE

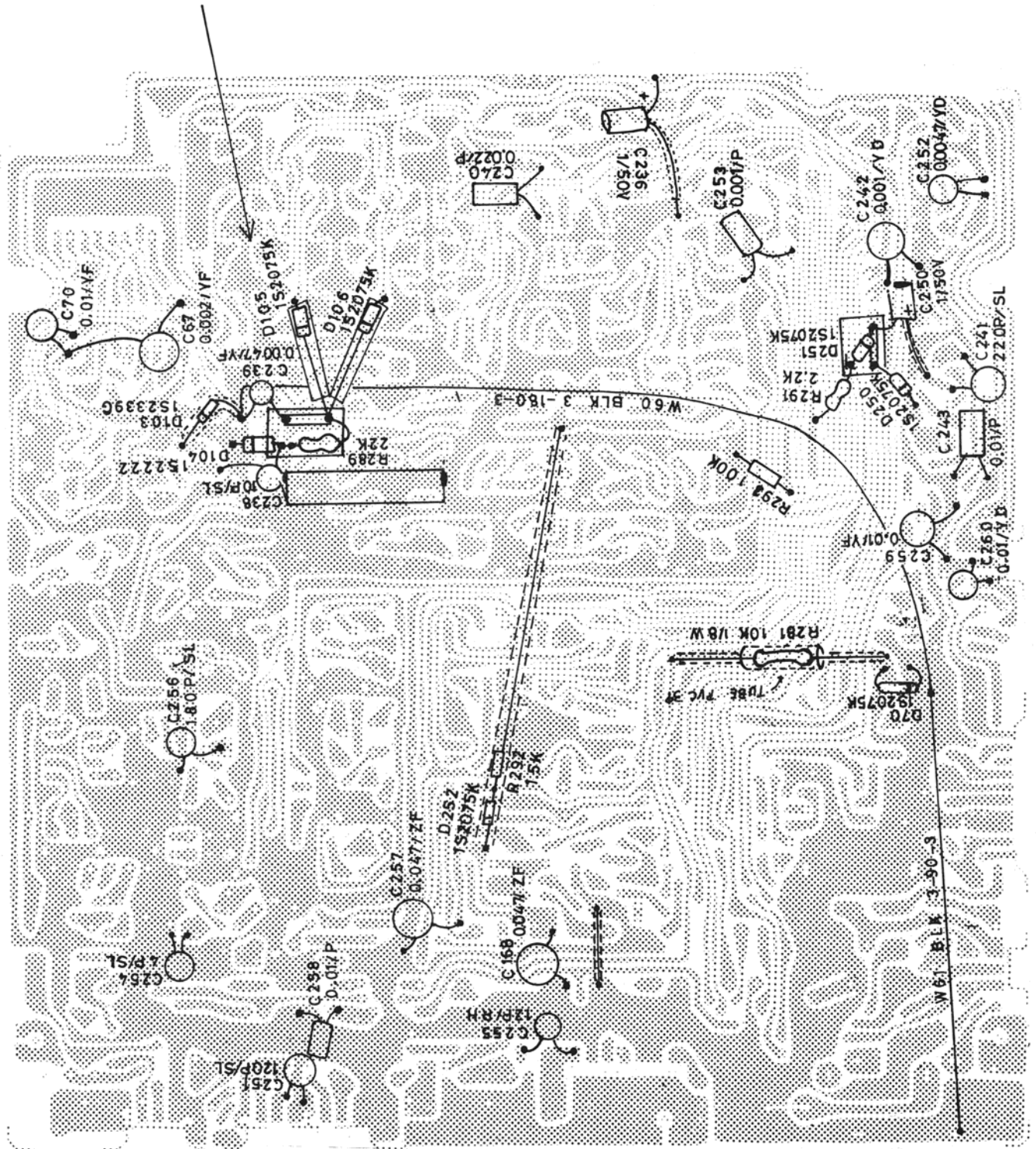
STEP	PRESET TO	ADJUSTMENT	REMARKS
12	Same as Step 1, except: Mode : FM Band : Low 40 Mic Input: 30mV 1kHz	VR3	Adjust for 4.5kHz deviation (FM Deviation Adj.).
13	Same as Step 12 except: Mode : CW	VR12	Adjust 0.2V reading on AF VTVM when CW key is keyed. Side tone adj.
14	Same as Step 1, except: CH 9 CW: CH 9		Check that the output frequency is 27.065 MHz on Frequency Counter.

PARTS LAYOUT (Top View)

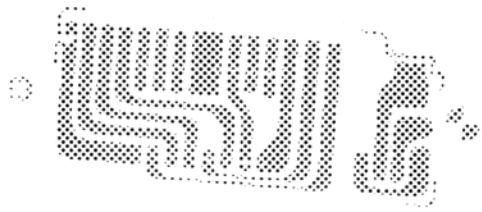
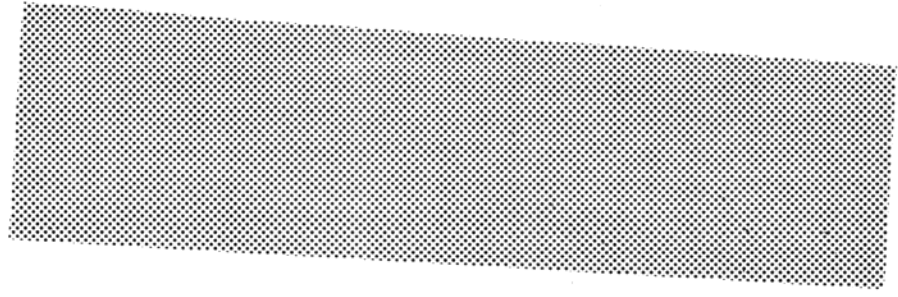
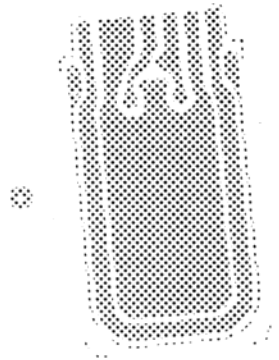
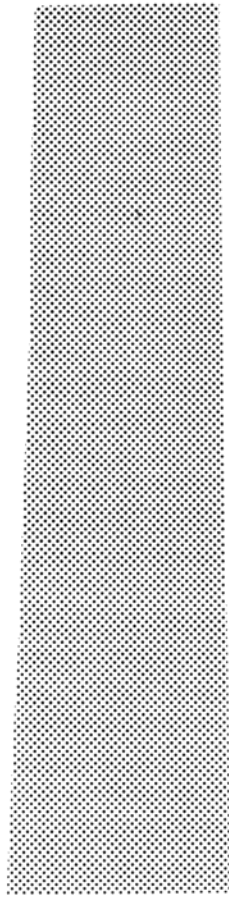
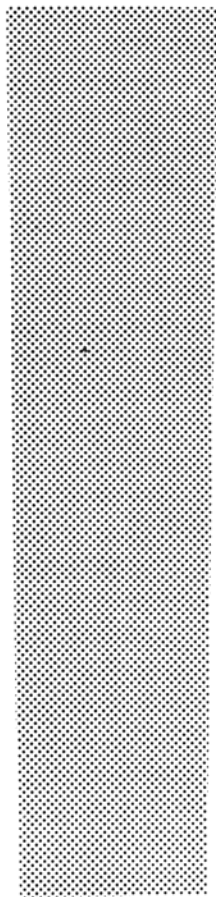


ADDED PARTS - MAIN PCB (Bottom View)

PC-879AB



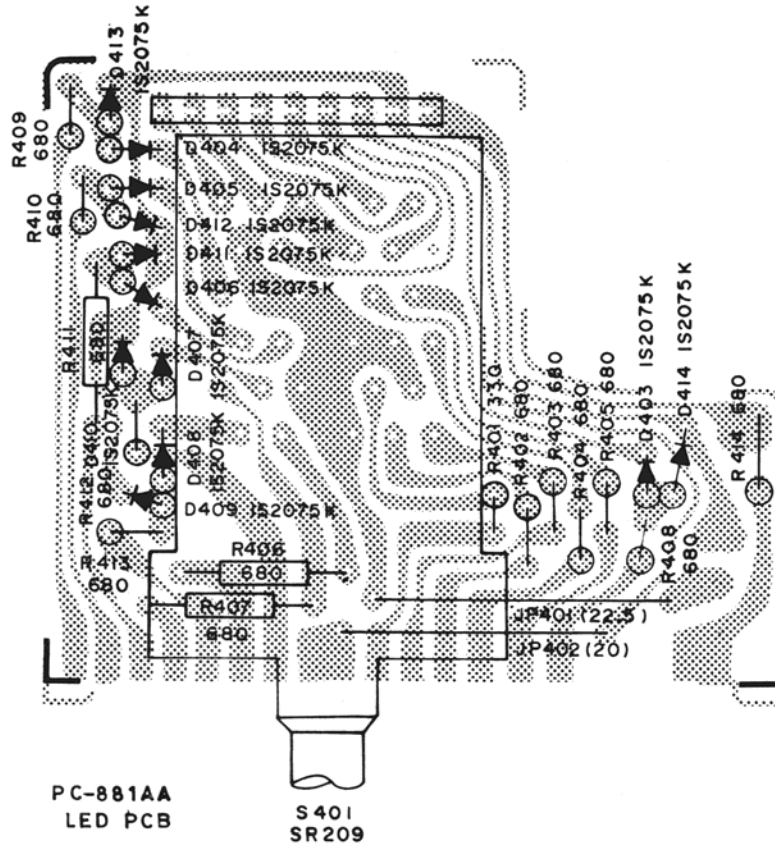
COPPER PATTERN SWR PCB CH SW PCB LED PCB



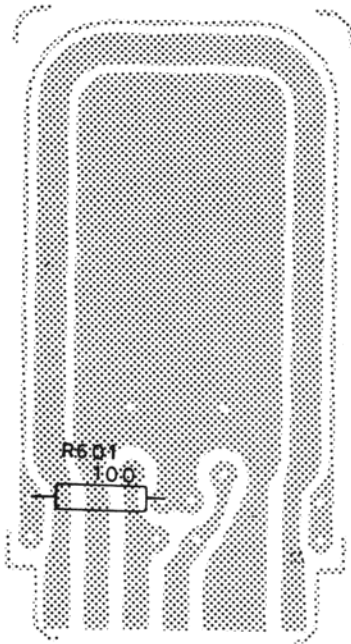
PARTS LAYOUT SUB. ASSY. PCB's (Top View)

E24-3326

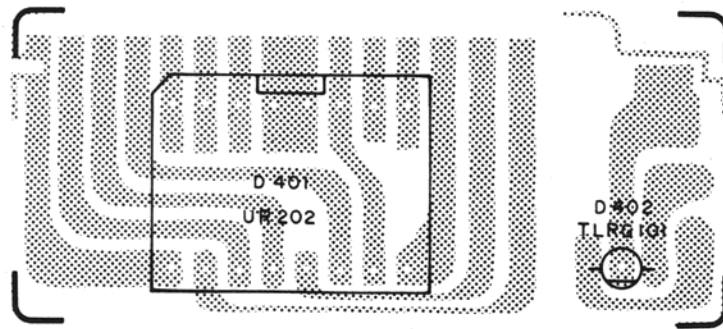
PC-880AA
CH SW PCB



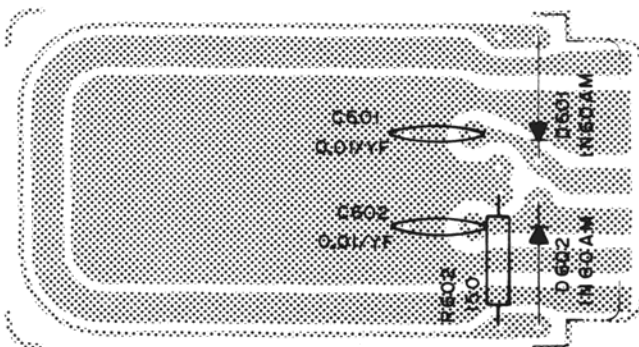
PC 958AA



PC-881AA
LED PCB



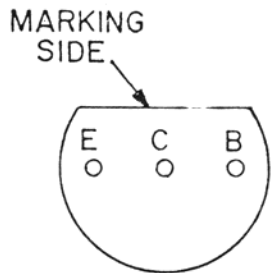
PC-958AA SWR PCB



SEMI CONDUCTOR PIN CONFIGURATION

TRANSISTOR

NOTE: B: BASE
E: EMITTER
C: COLLECTOR



2SC945A-Q
2SC1674L
2SC1675L
2SC1730L
2SA733P

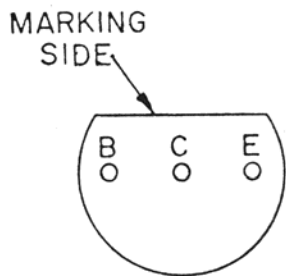


1N60-AM
1SS97
1S2075K
MC-301

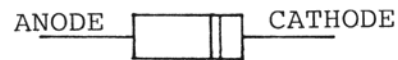
1S2688EB
MV-201

RD75EB2

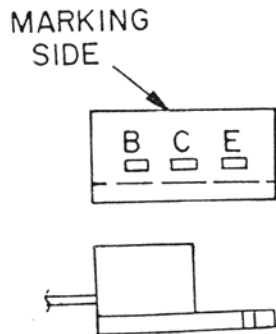
KB262



2SC1312F
2SC2086D
2SB525C

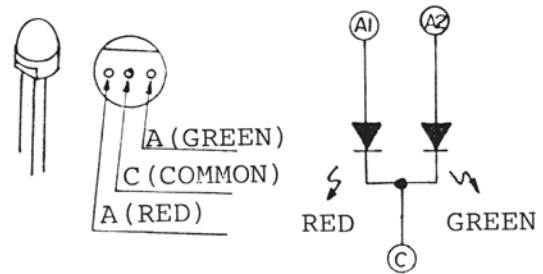


1N4003

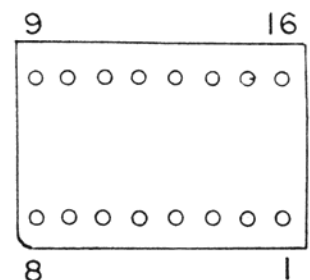
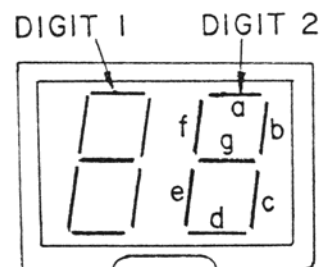
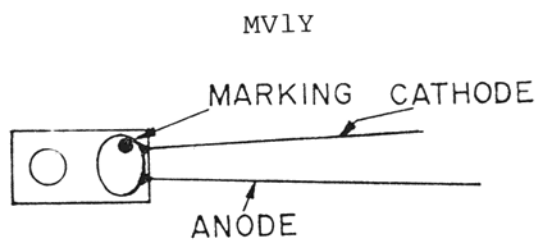


2SC1969B
2SC2166C
2SA4730
2SA10120

TLRG-101

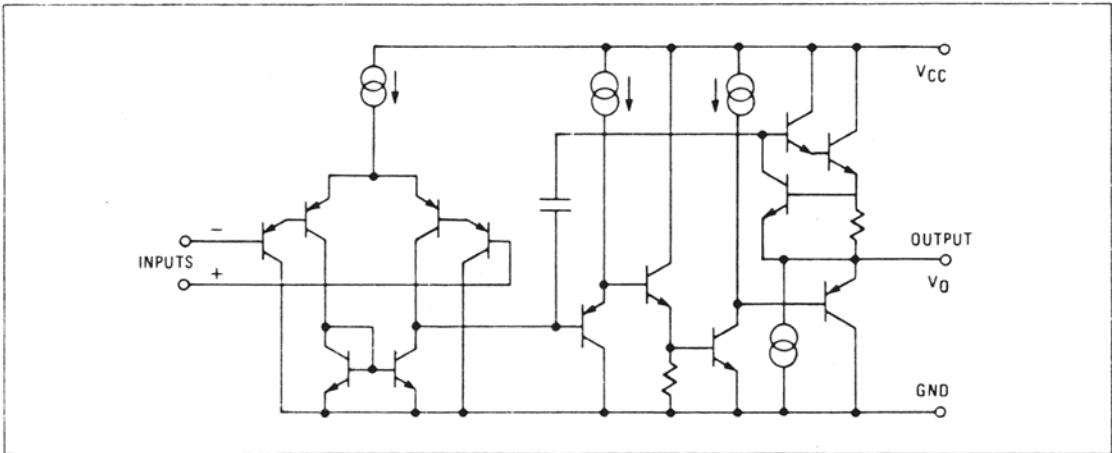


UR-202

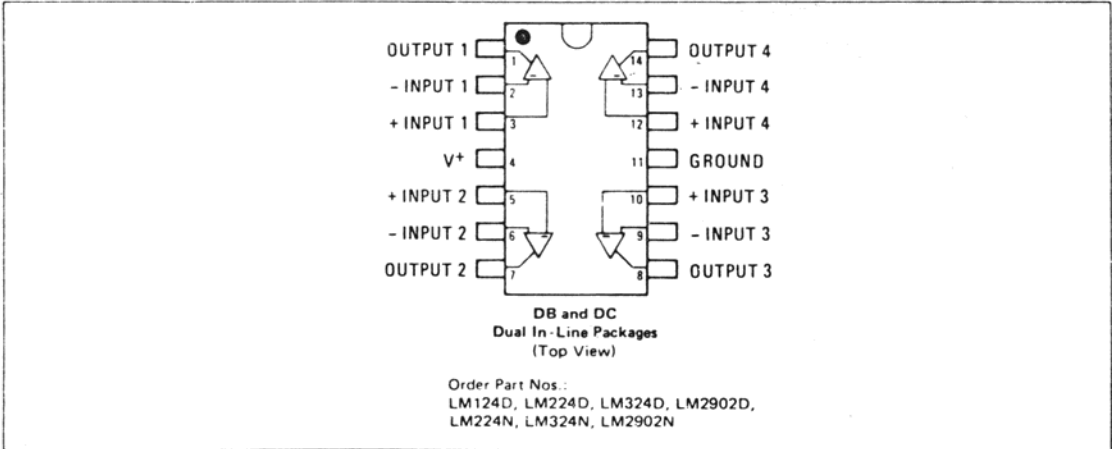


INTERNAL DIAGRAM - IC's

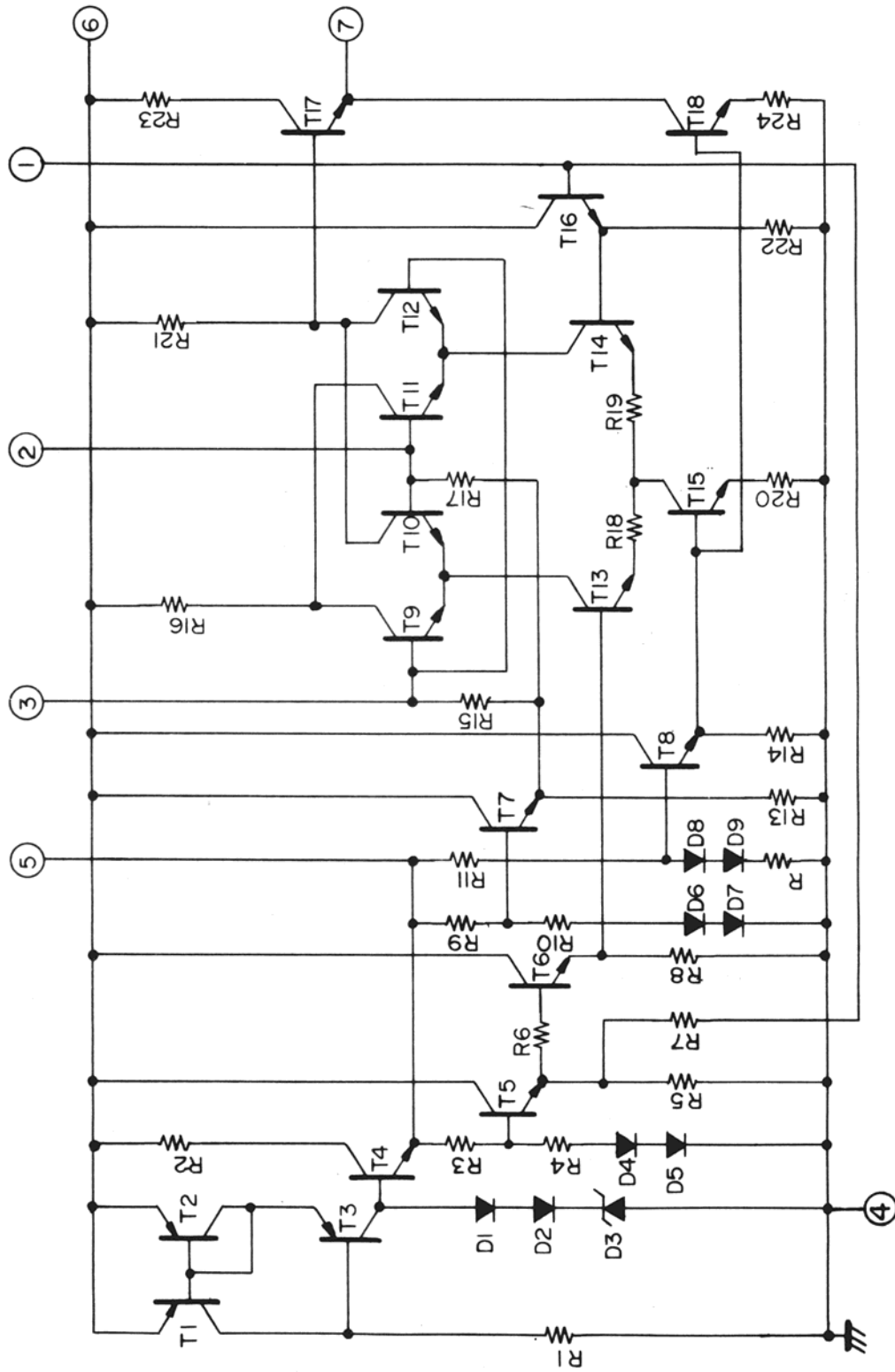
SCHEMATIC DIAGRAM



CONNECTION INFORMATION

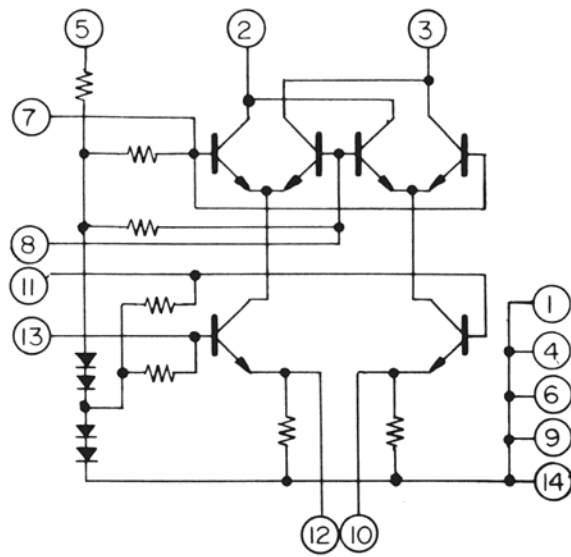


INTERNAL DIAGRAM - IC's



INTERNAL DIAGRAM - IC's

S042P



VOLTAGE CHART

148GTL-DX Early Version

TR	Mode	Base	Collector	Emitter	Mode	Base	Collector	Emitter	Mode	Base	Collector	Emitter
TR 1	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 2	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 3	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 4	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 5	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 6	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 7	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 8	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 9	RX	CW	1.3	5.0				0.7				0
		FM	1.3	5.0				0.7				0
		AM	1.3	5.0				0.7				0
		USB	1.3	5.0				0.7				0
		LSB	1.3	5.0				0.7				0
TR 10	RX	CW	0	0				0				0
		FM	0	0				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 11	RX	CW	2.1	7.8				1.4				0
		FM	2.1	7.8				1.4				0
		AM	2.1	7.8				1.4				0
		USB	2.1	7.8				1.4				0
		LSB	2.1	7.8				1.4				0
TR 12	RX	CW	1.0	7.9				0.3				0
		FM	1.0	7.9				0.3				0
		AM	1.0	7.9				0.3				0
		USB	1.0	7.9				0.3				0
		LSB	1.0	7.9				0.3				0
TR 13	RX	CW	0	0				0				0
		FM	0.7	7.7				0.1				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 14	RX	CW	0	0				0				0
		FM	0.7	2.4				0				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 15	RX	CW	0	0				0				0
		FM	2.4	8.1				1.7				0
		AM	0	0				0				0
		USB	0	0				0				0
		LSB	0	0				0				0
TR 16	RX	CW	1.4	4.5				1.2				0
		FM	1.4	4.5				1.2				0
		AM	1.4	4.5				1.2				0
		USB	1.4	4.5				1.2				0
		LSB	1.4	4.5				1.2				0

VOLTAGE CHART

TR	Mode	Base	Collector	Emitter
TR 24	RX	CW	1.0	0
		FM	0	0
		AM	0.7	0
		USB	0	0
		LSB	1.0	0
		TX	0	0
		CW	0	0
		FM	0.7	0
		AM	0	0
		LSB	0	0
TR 25	RX	CW	3.8	3.1
		FM	3.8	3.1
		AM	3.8	3.1
		USB	3.8	3.1
		LSB	3.8	3.1
		TX	3.8	3.1
		CW	3.8	3.1
		FM	3.8	3.1
		AM	3.8	3.1
		LSB	3.8	3.1
TR 26	RX	CW	8.2	7.8
		FM	0	0.2
		AM	0	0.2
		USB	0	0.2
		LSB	0	0.2
		TX	8.2	7.6
		CW	0	0
		FM	0	0
		AM	0	0
		LSB	0	0
TR 27	RX	CW	0.7	0
		FM	0.7	0
		AM	0.7	0
		USB	0	0
		LSB	3.0	0
		TX	0.7	0
		CW	0.7	0
		FM	0.7	0
		AM	0.7	0
		LSB	0	0

TR	Mode	Base	Collector	Emitter
TR 20	RX	CW	1.6	0.9
		FM	1.6	0.9
		AM	1.6	0.9
		USB	1.6	0.9
		LSB	1.6	0.9
		TX	2.3	7.4
		CW	2.3	7.4
		FM	2.3	7.4
		AM	2.3	7.4
		LSB	2.3	7.4
TR 21	RX	CW	0.7	0
		FM	0.7	0
		AM	0.7	0
		USB	0.7	0
		LSB	0.7	0
		TX	0	0
		CW	0	0
		FM	0	0
		AM	0	0
		LSB	0	0
TR 22	RX	CW	3.6	3.0
		FM	3.6	3.0
		AM	3.6	3.0
		USB	3.6	3.0
		LSB	3.6	3.0
		TX	0.1	0
		CW	0.1	0
		FM	0.1	0
		AM	0.1	0
		LSB	0.1	0
TR 23	RX	CW	3.0	2.3
		FM	3.0	2.3
		AM	3.0	2.3
		USB	3.0	2.3
		LSB	3.0	2.3
		TX	0	0
		CW	0	0
		FM	0	0
		AM	0	0
		LSB	0	0

TR	Mode	Base	Collector	Emitter
TR 18	RX	CW	2.3	1.9
		L FM	2.3	1.9
		O AM	2.3	1.9
		W USB	2.3	1.9
		LSB	2.3	1.9
		CW	2.3	1.9
		M FM	2.3	1.9
		I AM	2.3	1.9
		D USB	2.3	1.9
		LSB	2.3	1.9
		CW	2.5	1.9
		H FM	2.3	1.9
		I AM	2.3	1.9
		USB	2.3	1.9
		LSB	2.3	1.9
		TX	2.2	1.9
		L FM	2.4	1.8
		O AM	2.4	1.8
		W USB	2.2	1.9
		LSB	2.2	1.9
		CW	2.5	1.9
		M FM	2.4	1.8
		I AM	2.4	1.8
		D USB	2.5	1.9
		LSB	2.5	1.9
		CW	2.5	1.9
		H FM	2.4	1.8
		I AM	2.4	1.8
		USB	2.5	1.9
		LSB	2.5	1.9
TR 19	RX	CW	0	0
		FM	6.5	5.9
		AM	0	0
		USB	0	0
		LSB	0	0
		TX	0	0
		CW	0	0
		FM	6.4	6.0
		AM	0	0
		LSB	0	0

TR	Mode	Base	Collector	Emitter	
TR 16	TX	CW	1.4	1.2	
		L FM	1.3	1.2	
		O AM	1.3	1.2	
		W USB	1.4	1.2	
		LSB	1.4	1.2	
		CW	1.4	1.1	
		M FM	1.3	1.1	
		I AM	1.3	1.1	
		D USB	1.4	1.1	
		LSB	1.4	1.1	
		CW	1.4	1.1	
		H FM	1.4	1.1	
		I AM	1.4	1.1	
		USB	1.4	1.1	
		LSB	1.4	1.1	
	TR 17	RX	CW	2.1	1.5
			L FM	2.1	1.5
			O AM	2.1	1.5
			W USB	2.1	1.5
			LSB	2.1	1.5
		CW	2.1	1.5	
		M FM	2.1	1.5	
		I AM	2.1	1.5	
		D USB	2.1	1.5	
		LSB	2.1	1.5	
		CW	2.1	1.5	
		H FM	2.1	1.5	
		I AM	2.1	1.5	
		USB	2.1	1.5	
		LSB	2.1	1.5	
	TR 15	TX	CW	2.1	1.5
			L FM	2.1	1.4
			O AM	2.1	1.4
			W USB	2.1	1.5
			LSB	2.1	1.5
		CW	2.1	1.5	
		M FM	2.1	1.4	
		I AM	2.1	1.4	
		D USB	2.1	1.5	
		LSB	2.1	1.5	
		CW	2.1	1.5	
		H FM	2.1	1.4	
		I AM	2.1	1.4	
		USB	2.1	1.5	
		LSB	2.1	1.5	

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TR	Mode	Base	Collector	Emitter	
TR 28	RX CW	1.7	3.6	1.1	
	RX FM	1.7	3.6	1.1	
	RX AM	1.7	3.6	1.1	
	RX USB	1.7	3.6	1.1	
	RX LSB	1.7	3.6	1.1	
	TX	CW	1.7	3.6	1.1
		FM	1.6	3.6	1.1
		AM	1.6	3.6	1.1
		USB	1.7	3.6	1.1
		LSB	1.7	3.6	1.1
TR 29	RX CW	1.0	1.7	0.4	
	RX FM	1.0	1.7	0.4	
	RX AM	1.0	1.7	0.4	
	RX USB	1.0	1.7	0.4	
	RX LSB	1.0	1.7	0.4	
	TX	CW	1.0	1.7	0.4
		FM	1.0	1.6	0.4
		AM	1.0	1.6	0.4
		USB	1.0	1.7	0.4
		LSB	1.0	1.7	0.4
TR 30	RX CW	0.6	0	0	
	RX FM	0.6	0	0	
	RX AM	0.6	0	0	
	RX USB	0.6	0	0	
	RX LSB	0.6	0	0	
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 31	RX CW	8.3	0.7	8.3	
	RX FM	8.3	0.7	8.3	
	RX AM	8.3	0.7	8.3	
	RX USB	8.3	0.7	8.3	
	RX LSB	8.3	0.7	8.3	
	TX	CW	8.3	0.7	8.3
		FM	8.1	0	8.1
		AM	8.1	0	8.1
		USB	8.3	0	8.3
		LSB	8.3	0	8.3
TR 32	RX CW	1.1	8.3	4.1	
	RX FM	1.1	8.3	4.1	
	RX AM	1.1	8.3	4.1	
	RX USB	1.1	8.3	4.3	
	RX LSB	1.1	8.3	4.3	
	TX	CW	1.1	8.3	3.9
		FM	1.1	8.1	3.5
		AM	1.1	8.1	3.5
		USB	1.1	8.3	4.3
		LSB	1.1	8.3	4.3
TR 33	RX CW	0.7	1.5	0	
	RX FM	0.7	1.5	0	
	RX AM	0.7	1.5	0	
	RX USB	0.7	1.5	0	
	RX LSB	0.7	1.5	0	
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 34	RX CW	7.6	8.2	8.3	
	RX FM	7.6	8.2	8.3	
	RX AM	7.6	8.2	8.3	
	RX USB	7.6	8.2	8.3	
	RX LSB	7.6	8.2	8.3	
	TX	CW	7.7	0.1	8.3
		FM	7.6	0	8.0
		AM	7.6	0	8.0
		USB	7.7	0.1	8.3
		LSB	7.7	0.1	8.3
TR 35	RX CW	4.1	7.6	3.5	
	RX FM	4.1	7.6	3.5	
	RX AM	4.1	7.6	3.5	
	RX USB	4.1	7.6	3.5	
	RX LSB	4.1	7.6	3.5	
	TX	CW	4.2	7.7	7.5
		FM	4.1	7.6	7.4
		AM	4.1	7.6	7.4
		USB	4.2	7.7	7.5
		LSB	4.2	7.7	7.5
TR 36	RX CW	5.5	7.8	7.5	
	RX FM	5.5	7.8	7.5	
	RX AM	5.5	7.8	7.5	
	RX USB	5.5	7.8	7.5	
	RX LSB	5.5	7.8	7.5	
	TX	CW	1.4	0.8	0.7
		FM	1.4	0.8	0.7
		AM	1.4	0.8	0.7
		USB	1.4	0.8	0.7
		LSB	1.4	0.8	0.7
TR 37	RX CW	7.8	0	8.2	
	RX FM	7.8	0	8.2	
	RX AM	7.8	0	8.2	
	RX USB	7.8	0	8.2	
	RX LSB	7.8	0	8.2	
	TX	CW	7.5	8.2	8.2
		FM	7.5	8.2	8.2
		AM	7.5	8.2	8.2
		USB	7.5	8.2	8.2
		LSB	7.5	8.2	8.2
TR 38	RX CW	1.6	13.0	1.0	
	RX FM	1.6	13.0	1.0	
	RX AM	1.6	13.0	1.0	
	RX USB	1.6	13.0	1.0	
	RX LSB	1.6	13.0	1.0	
	TX	CW	1.6	12.8	1.0
		FM	1.6	12.8	1.0
		AM	1.6	12.8	1.0
		USB	1.6	12.8	1.0
		LSB	1.6	12.8	1.0
TR 39	RX CW	13.0	8.3	13.8	
	RX FM	13.0	8.3	13.8	
	RX AM	13.0	8.3	13.8	
	RX USB	13.0	8.3	13.8	
	RX LSB	13.0	8.3	13.8	
	TX	CW	12.8	8.3	13.7
		FM	12.8	8.3	13.0
		AM	12.8	8.3	13.0
		USB	12.8	8.3	13.7
		LSB	12.8	8.3	13.7
TR 40	RX CW	0.9	3.2	0.3	
	RX FM	0.9	3.2	0.3	
	RX AM	0.9	3.2	0.3	
	RX USB	0.9	3.2	0.3	
	RX LSB	0.9	3.2	0.3	
	TX	CW	0.9	3.2	0.3
		FM	0.9	3.2	0.3
		AM	0.9	3.2	0.3
		USB	0.9	3.2	0.3
		LSB	0.9	3.2	0.3
TR 41	RX CW	3.1	6.9	2.6	
	RX FM	0	0	0	
	RX AM	0	0	0	
	RX USB	3.1	6.9	2.6	
	RX LSB	3.1	6.9	2.6	
	TX	CW	3.1	6.9	2.6
		FM	3.1	6.6	2.6
		AM	3.1	6.6	2.6
		USB	3.1	6.9	2.6
		LSB	3.1	6.9	2.6
TR 42	RX CW	0	0.8	7.0	
	RX FM	0	0.8	5.1	
	RX AM	0	0.8	5.7	
	RX USB	0	0.8	7.0	
	RX LSB	0	0.8	7.0	
	TX	CW	0	0.8	7.0
		FM	0	0.8	4.5
		AM	0	0.8	4.7
		USB	0	0.8	7.0
		LSB	0	0.8	7.0
TR 43	RX CW	0	13.2	0	
	RX FM	0	13.2	0	
	RX AM	0	13.2	0	
	RX USB	0	13.8	0	
	RX LSB	0	13.8	0	
	TX	CW	0.7	12.4	0
		FM	2.8	10.2	0
		AM	2.8	10.2	0
		USB	0.7	13.7	0
		LSB	0.7	13.7	0

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TR	Mode		Base	Collector	Emitter	
	RX	TX				
TR 44	CW		0	13.2	0	
	FM		0	13.2	0	
	AM		0	13.2	0	
	USB		0	13.8	0	
	LSB		0	13.8	0	
	TX	CW	0.6	12.4	12.4	0
TR 45	FM		0.5	10.2	0	
	AM		0.5	10.2	0	
	USB		0.6	13.7	0	
	LSB		0.6	13.7	0	
	TX	CW	1.4	8.1	8.1	0.8
	FM		1.3	7.8	7.8	0.8
TR 46	AM		1.4	8.1	0.8	
	USB		1.4	8.1	0.8	
	LSB		1.4	8.1	0.8	
	TX	CW	1.4	6.6	6.6	0.7
	FM		1.4	6.5	6.5	0.7
	AM		1.4	6.6	6.6	0.7
TR 47	USB		1.4	6.6	0.7	
	LSB		1.4	6.6	0.7	
	TX	CW	6.1	13.2	13.2	
	FM		6.1	13.2	13.2	
	AM		6.1	13.2	13.2	
	USB		6.1	13.8	13.8	
TR 48	LSB		6.1	13.8	13.8	
	TX	CW	6.1	12.4	12.4	
	FM		6.1	11.5	11.3	
	AM		6.1	11.5	11.3	
	USB		6.1	13.7	13.7	
	LSB		6.1	13.7	13.7	

TR	Mode		Base	Collector	Emitter
	RX	TX			
TR 49	CW		13.3	13.2	13.3
	FM		13.3	13.2	13.3
	AM		13.3	13.2	13.3
	USB		13.1	13.8	13.8
	LSB		13.1	13.8	13.8
	TX	CW	13.1	12.4	13.7
TR 50	FM		11.8	11.3	13.2
	AM		11.8	11.3	13.2
	USB		13.0	13.7	13.7
	LSB		13.0	13.7	13.7
	TX	CW	0.7	0	0
	FM		0.6	0	0
TR 51	AM		0	0	0
	USB		0.6	0	0
	LSB		0.6	0	0
	TX	CW	0.7	0	0
	FM		0.6	0	0
	AM		0	0	0
TR 52	USB		0.6	0	0
	LSB		0.6	0	0
	TX	CW	12.4	12.4	13.1
	FM		11.3	11.3	11.8
	AM		11.3	11.3	11.8
	USB		13.7	13.7	13.0
TR 53	LSB		13.7	13.7	13.0
	TX	CW	0	0	0
	FM		0	0	0
	AM		0	0	0
	USB		0	0	0
	LSB		0	0	0
TR 54	TX	CW	0	0	0
	FM		0	0	0
	AM		0	0	0
	USB		6.5	13.1	5.8
	LSB		6.5	13.1	5.8
	TX	CW	0	13.1	0
TR 55	FM		0	11.8	0
	AM		0	11.8	0
	USB		6.5	13.0	5.8
	LSB		6.5	13.0	5.8
	TX	CW	8.0	8.2	8.2
	FM		0	0	0
TR 56	AM		0	0	0
	USB		0	0	0
	LSB		0	0	0
	TX	CW	8.0	8.2	8.2
	FM		0	0	0
	AM		0	0	0

TR	Mode		Base	Collector	Emitter
	RX	TX			
TR 52	CW		0	7.5	0
	FM		0	7.5	0
	AM		0	7.5	0
	USB		0	7.5	0
	LSB		0	7.5	0
	TX	CW	0	0.7	0.7
TR 53	FM		0	0.7	0
	AM		0	0.7	0
	USB		0	0.7	0
	LSB		0	0.7	0
	TX	CW	0	0	0
	FM		0	0	0
TR 54	AM		0	0	0
	USB		6.5	13.1	5.8
	LSB		6.5	13.1	5.8
	TX	CW	0	13.1	0
	FM		0	11.8	0
	AM		0	11.8	0
TR 55	USB		6.5	13.0	5.8
	LSB		6.5	13.0	5.8
	TX	CW	8.0	8.2	8.2
	FM		0	0	0
	AM		0	0	0
	USB		0	0	0
TR 56	LSB		0	0	0
	TX	CW	7.7	1.1	0.2
	FM		4.0	4.6	4.6
	AM		4.0	4.6	4.6
	USB		4.0	4.6	4.6
	LSB		4.0	4.6	4.6

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Mode		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
IC 1	RX	CW	-	-	8.3	0	0	0	0	2.8	1.4	0	0.3	0.3	0.6						
		FM	-	-	8.3	0.1	0.1	0.2	0	2.8	1.4	0	0.3	0.3	0.6						
		AM	-	-	8.3	0	0	0	0	2.8	1.4	0	0.3	0.3	0.6						
		USB	-	-	8.3	0	0	0	0	2.8	1.4	0	0.3	0.3	0.6						
		LSB	-	-	8.3	0	0	0	0	2.8	1.4	0	0.3	0.3	0.6						
		SQ (CW)	-	-	-	-	-	-	-	6.9	4.0	-	-	-	-	-	-	-	-	-	
	TX	CW	-	-	8.3	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
		FM	-	-	8.0	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
		AM	-	-	8.0	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
		USB	-	-	8.3	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
		LSB	-	-	8.0	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
IC 2	RX	CW	0	0	1.9	0	0.6	0.6	0	0	0	0	0	0	0	0	0	0	0	0	
		FM	1.3	1.3	7.1	0	3.2	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0
		AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		USB	0	0	1.9	0	0.6	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
		LSB	0	0	1.9	0	0.6	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
	TX	CW	0	0	1.9	0	0.6	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
		FM	1.3	1.4	6.8	0	3.3	3.3	4.3	0	0	0	0	0	0	0	0	0	0	0	0
		AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		USB	0	0	1.9	0	0.6	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
		LSB	0	0	1.9	0	0.6	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
IC 3	RX	CW	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		L FM	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		O AM	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		W USB	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		LSB	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
	TX	CW	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		M FM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		I AM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		D USB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		LSB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
IC 3 (cont.)	RX	CW	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		H FM	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		I AM	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		USB	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		LSB	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
	TX	CW	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		L FM	3.0	4.5	5.9	3.3	3.3	8.0	4.5	4.9	7.8	-	8.0	0	0	7.9	0.5	7.9	3.8	0	
		O AM	3.0	4.5	5.9	3.3	3.3	8.0	4.5	4.9	7.8	-	8.0	0	0	7.9	0.5	7.9	3.8	0	
		W USB	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		LSB	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
IC 4	RX	CW	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		M FM	4.2	4.2	4.2	3.7	3.7	8.0	4.5	4.9	7.9	-	8.0	0	0	8.0	0.5	7.9	3.8	0	
		I AM	4.2	4.2	4.2	3.7	3.7	8.0	4.5	4.9	7.9	-	8.0	0	0	8.0	0.5	7.9	3.8	0	
		D USB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		LSB	4.2	4.2	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
	TX	CW	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		H FM	3.4	4.4	5.4	3.5	3.6	8.1	4.5	4.9	8.0	-	8.1	0	0	8.1	0.5	8.0	3.8	0	
		I AM	3.4	4.4	5.4	3.5	3.6	8.1	4.5	4.9	8.0	-	8.1	0	0	8.1	0.5	8.0	3.8	0	
		USB	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		LSB	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	

VOLTAGE CHART

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
IC 5	RX	CW	13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		FM	13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		AM	13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		USB	13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		LSB	13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
	TX	CW	13.7	6.6	0	0	1.1	1.1	0	0	6.9	13.0				
		FM	13.4	6.0	0	0.4	1.8	1.8	0	0	0	10.9				
		AM	13.4	6.0	0	0.4	1.8	1.8	0	0	0	10.9				
		USB	13.7	6.6	0	0.3	1.8	1.8	0	0	0	11.4				
		LSB	13.7	6.6	0	0.3	1.8	1.8	0	0	0	11.4				
IC 6	RX	CW	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0	
		FM	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0	
		AM	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0	
		USB	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0	
		LSB	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0	
	TX	CW	0	7.8	7.8	0	7.9	0	2.8	2.8	0	1.3	1.3	1.3	1.3	0
		FM	0	7.8	7.8	0	7.8	0	2.7	2.7	0	1.3	1.3	1.3	1.3	0
		AM	0	7.8	7.8	0	7.8	0	2.7	2.7	0	1.3	1.3	1.3	1.3	0
		USB	0	7.8	7.8	0	7.9	0	2.8	2.8	0	1.3	1.3	1.3	1.3	0
		LSB	0	7.8	7.8	0	7.9	0	2.8	2.8	0	1.3	1.3	1.3	1.3	0

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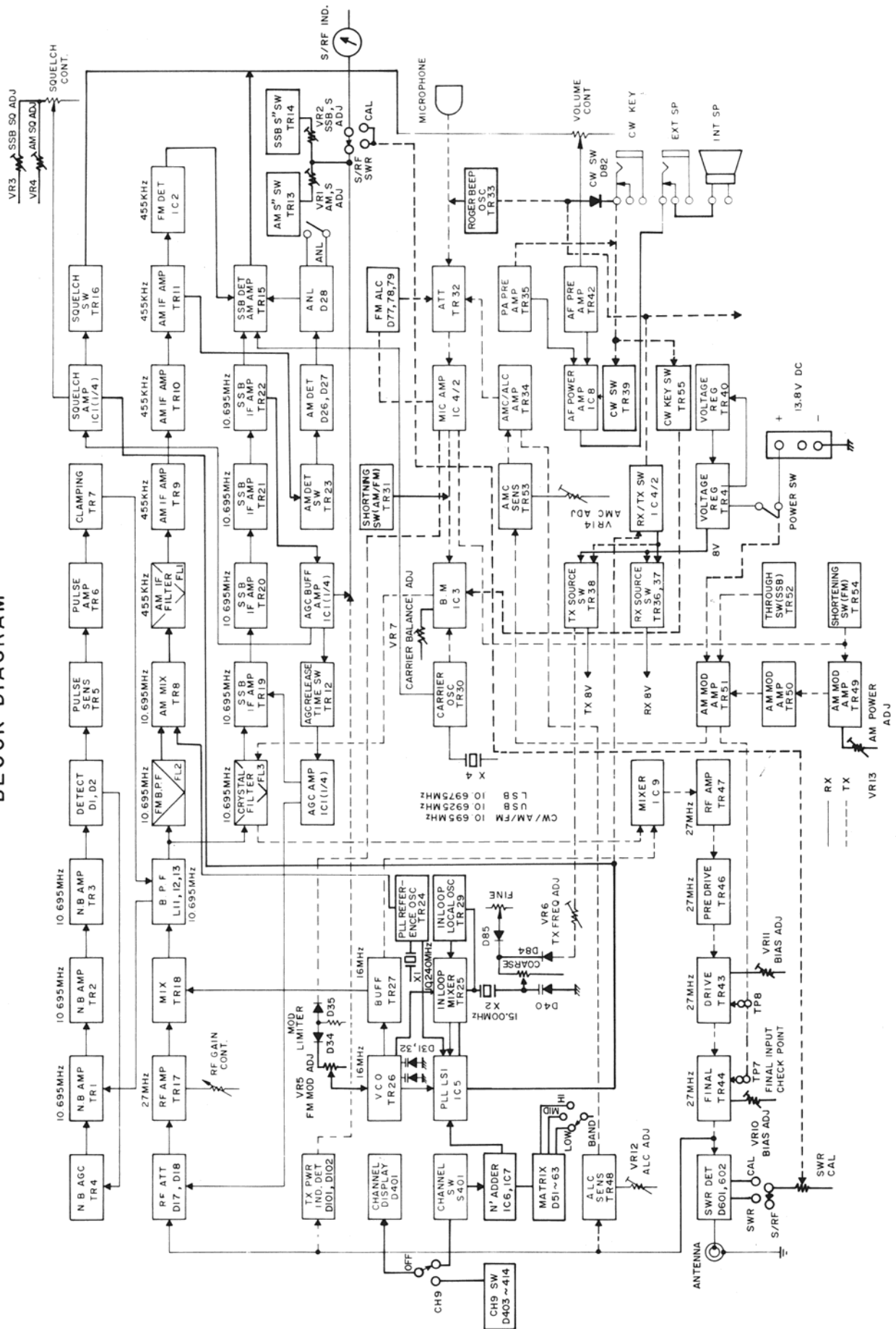
Early Version

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4-5	Schematic Diagram
6-7	Wiring Diagram
8-13	Alignment Procedure
14-15	Parts Layout Top View
16-17	Copper Pattern Main PCB Bottom View
18	Added Parts Main PCB Bottom View
19	Copper Pattern SWR PCB CH SW PCB LED PCB
20	Parts Layout Sub. Assy PCB's Top View
21	Semi Conductor Pin Configuration
22-25	Internal Diagrams ICs
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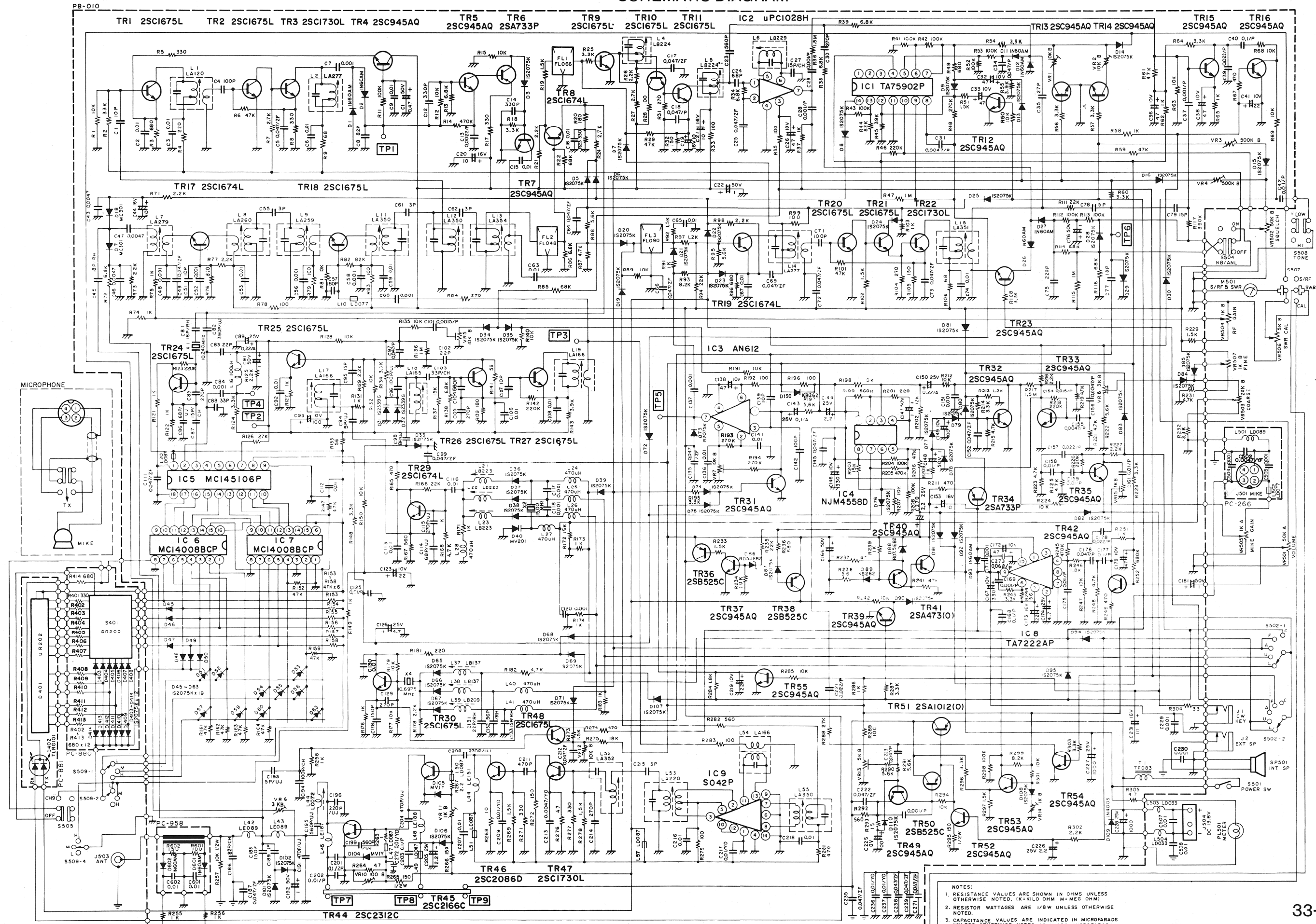
Late Version

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BLOCK DIAGRAM



SCHEMATIC DIAGRAM



NOTES:
 1. RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED. (K=KILO OHM, M=MEG OHM)
 2. RESISTOR WATTAGES ARE 1/8W UNLESS OTHERWISE NOTED.
 3. CAPACITANCE VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE NOTED. (P=MICRO-MICROFARAD)
 4. ALL CAPACITORS TEMPERATURE CHARACTERISTICS ARE 5% (LESS THAN 100PF) OR 1% (MORE THAN 100PF) UNLESS OTHERWISE NOTED.

C148GTL DX ALIGNMENT PROCEDURE

LATE
VERSION

Alignment of PLL Portion.

1. Test Equipment Required

- a) Oscilloscope (0-5MHz).
- b) DC Voltmeter (10 Volts Max., 100k ohm/Volt).
- c) Frequency Counter.

2. Alignment Procedure.

STEP	PRESET TO	CONNECTIONS	ADJUSTMENT	PROCEDURE
1	RX. Mode. Band SW: Mid CH :19 Mode :AM	Connect Oscilloscope to TP-4 (lead of R124).	L17	Adjust for Max. reading.
2	Same as Step 1, except CH: 40	Connect DC Voltmeter to TP-2 (Lead of R126).	L18	Adjust for 5.4 Volts reading.
3	Same as Step 1.	Connect Oscilloscope to TP-3 (Lead of R84).	L19	Adjust for Max. reading.
4	Same as Step 1.	Same as Step 3	L21	Adjust for 16.490MHz.
5	Same as Step 1, except Mode SW:USB	Same as Step 3	L22	Adjust for 16.4925MHz.
6	Same as Step 1, except Mode SW:USB	Same as Step 3.	L23	Adjust for 16.4875MHz.
7	Same as Step 6, except Band SW:Mid	Same as Step 3.	VR6	Adjust for 16.4875MHz.
8	Same as Step 1, except Mode SW:CW	Connect Oscilloscope to TP-6 (Lead of R60)	L37	Adjust for 10.695MHz.
9	Same as Step 8, except Mode SW:USB	Same as Step 8	L38	Adjust for 10.6925MHz.
10	Same as Step 8, except Mode SW:LSB	Same as Step 8	L39	Adjust for 10.6975MHz.

C148GIL DX ALIGNMENT PROCEDURE

Alignment of Transmitter Section

1. Test Equipment Required

- a) VTVM (Full scale; IV DC with RF Probe).
- b) RF Output Power Meter.
- c) Spectrum Analyzer.
- d) Frequency Counter (0-30MHz).
- e) DC Power Supply (13.8V, 2Amp.).
- f) 50 ohm load and Attenuator.
- g) Oscilloscope (0-30MHz).
- h) AF Oscillator.
- i) DC Ammeter.

2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	PROCEDURE
1	TX. Mode. Band SW: Mid CH : 19 Mode : USB Mic. VR: CW CH9 : OFF Coarse : Center	VR11	Remove PC-834 (PCB) and connect DC Ammeter to TP9(+) and TP8(-). Adjust for 50mA reading.
2	Same as Step 1.	VR10	Connect DC Ammeter to TP9(+) and TP7(-) and adjust for 50mA reading.
3	Same as Step 1, except Mic input 30mV.	VR12 L53	Restore PC-834. Turn VR12 to Mac. CW. and turn the core of L53 to the obttom.
4	Same as Step 3.	L52, 54, 55	Adjust for Max. reading on RF VTVM.
5	Same as Step 3.	L53	Set the Band: HI, CH40. And adjust for Max. reading on RF VTVM, then turn the Band: LOW, CH 1, readjust for minimum difference in output power.
6	Same as Step 1, except; Mode : AM Mic input 90% mod	L44	Adjust for Max. reading on RF VTVM.

C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
7	Same as Step 3.	VR12	Adjust for 24.5V reading on RF VTVM.
8	Same as Step 1.	VR 7	Adjust for Min. reading on Spectrum Analyzer for both USB and LSB.
9	Same as Step 1, except: Mode :AM	VR13	Adjust for 5.0W reading on RF Power Meter.
10	Same as Step 9.	VR 8	Set the meter SW to S.RF position. Adjust the VR 8, so that the radio's meter reads 5W (Between Green zone and Red zone).
11	Same as Step 9, except Mic input 30mV.	VR14	Adjust 90% modulation on Oscilloscope
12	Same as Step 1, except: Mode SW: FM Band : 40 Mic input 30mV	VR 5	Adjust for 5kHz deviation.
13	Same as Step 12, except: Mode : CW	VR15	Adjust 0.2V reading on AF VTVM when CW key is keyed.
14	Same as Step 1, except: CH9 SW : CH9		Check that the output frequency is 27.065MHz.

CL48GITL DX ALIGNMENT PROCEDURE

Alignment of Transmitter Section

1. Test Equipment Required

- a) VTVM (Full scale; IV DC with RF Probe).
- b) RF Output Power Meter.
- c) Spectrum Analyzer.
- d) Frequency Counter (0-30MHz).
- e) DC Power Supply (13.8V, 2Amp.).
- f) 50 ohm load and Attenuator.
- g) Oscilloscope (0-30MHz).
- h) AF Oscillator.
- i) DC Ammeter.

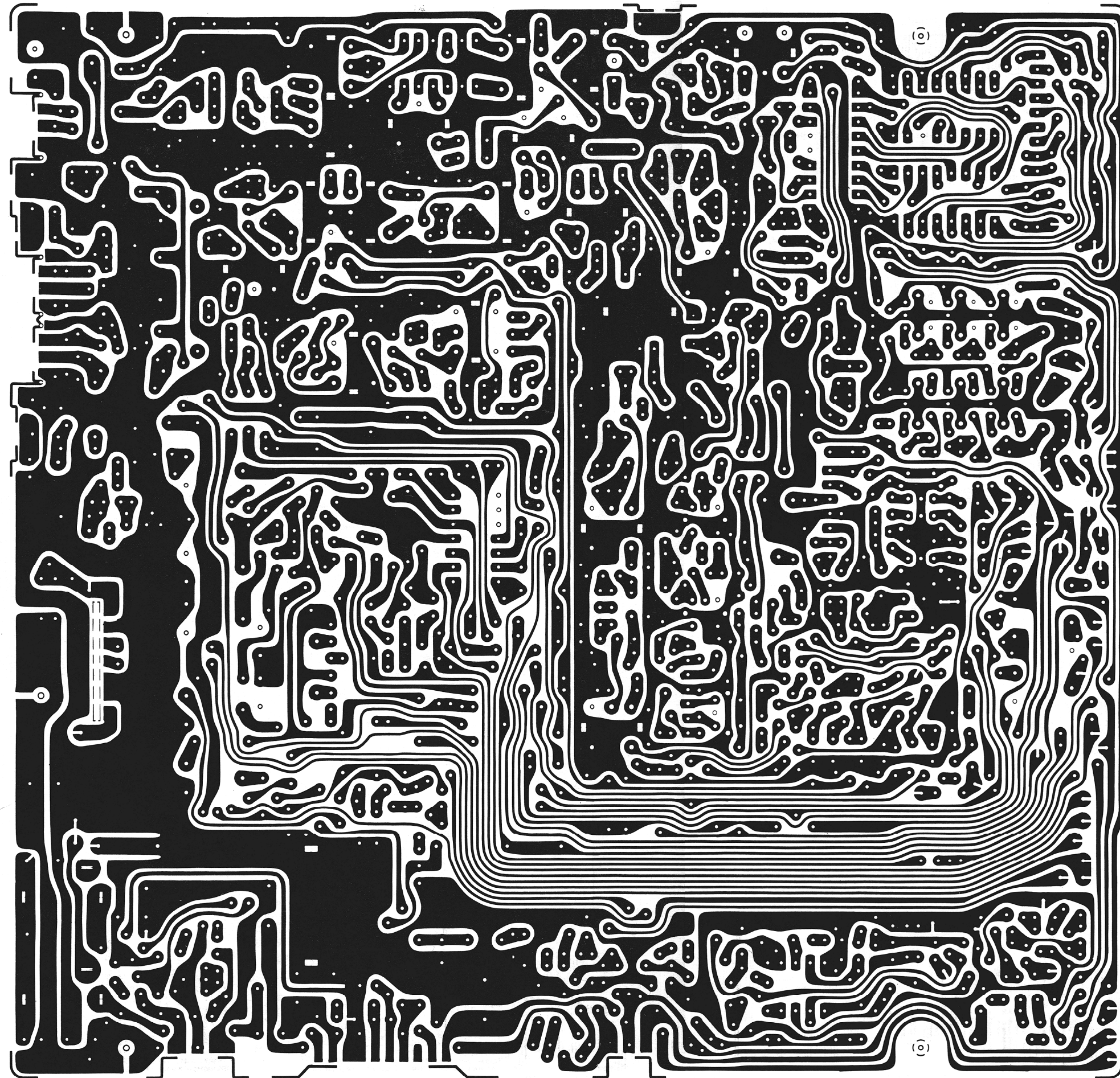
2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	PROCEDURE
1	TX. Mode. Band SW: Mid CH : 19 Mode : USB Mic. VR: CW CH9 : OFF Coarse : Center	VR11	Remove PC-834 (PCB) and connect DC Ammeter to TP9(+) and TP8(-). Adjust for 50mA reading.
2	Same as Step 1.	VR10	Connect DC Ammeter to TP9(+) and TP7(-) and adjust for 50mA reading.
3	Same as Step 1, except Mic input 30mV.	VR12 L53	Restore PC-834. Turn VR12 to Mac. CW. and turn the core of L53 to the obttom.
4	Same as Step 3.	L52, 54, 55	Adjust for Max. reading on RF VTVM.
5	Same as Step 3.	L53	Set the Band: HI, CH40. And adjust for Max. reading on RF VTVM, then turn the Band: LOW, CH 1, readjust for minimum difference in output power.
6	Same as Step 1, except; Mode : AM Mic input 90% mod	L44	Adjust for Max. reading on RF VTVM.

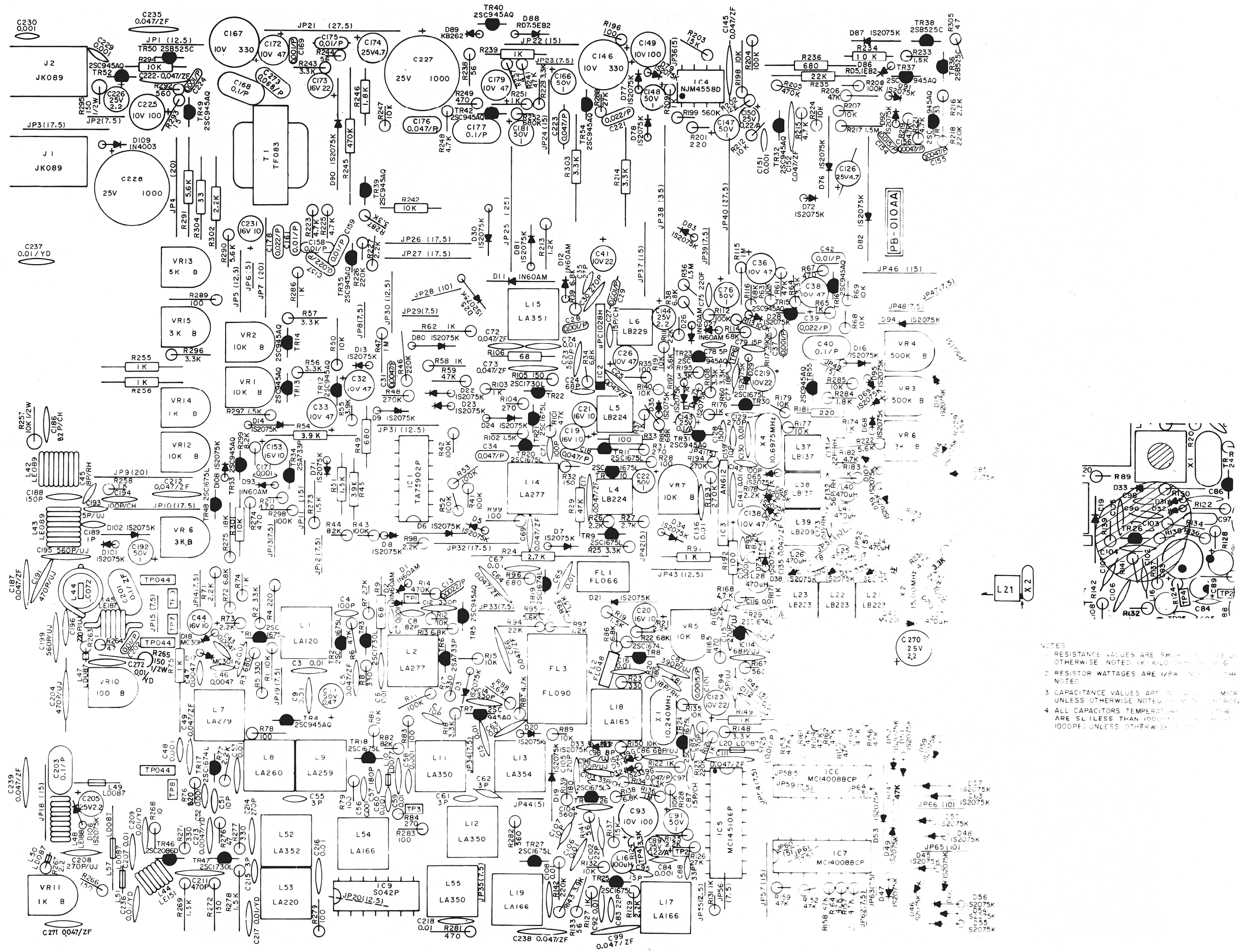
C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
6	Same as Step 1.	VR4 for AM/FM VR3 for SSB/CW	Set the SG to 40CH, 27.405MHz, 30% AM modulation with 1000uV. Then turn the VR4, so that the AF signal will appear on Oscilloscope. Repeat it for SSB/CW Mode with VR3.
7	Same as Step 1.	VR1 for AM/FM VR2 for SSB/CW	Set the SG to 40CH, 27.405MHz with No-modulation. Level of SG is 100uV. Then adjust VR1 for S-9 reading on radio's meter for AM mode. Repeat it for SSB/CW mode with VR2.
8	Same as Step 1, Mode : FM	L6	Set the SG to 1mv with 1.5kHz deviation of 1kHz. Adjust L6 for Max. signwave output on Oscilloscope.

COPPER PATTERN - MAIN PCB

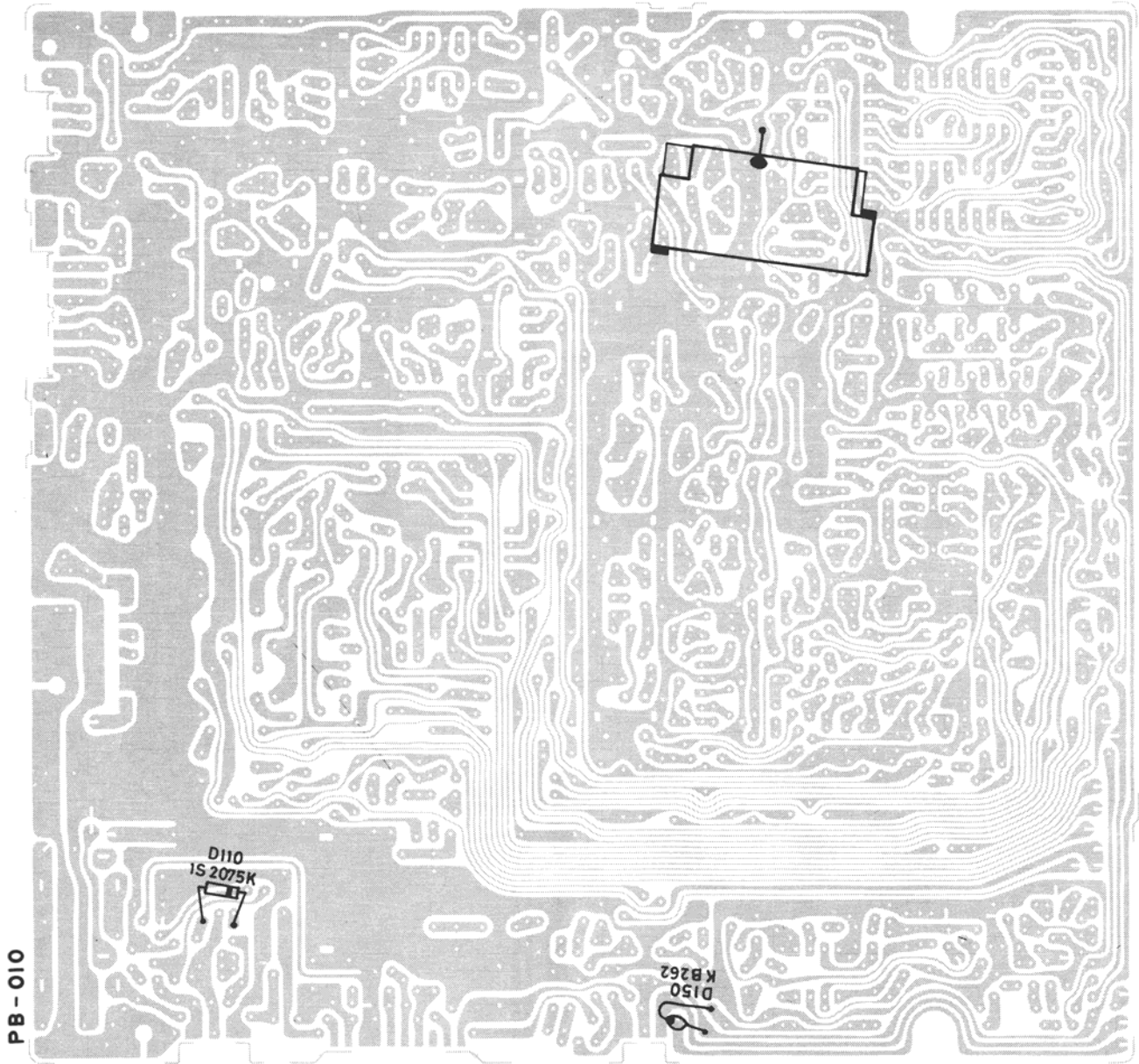


PARTS LAYOUT - MAIN PCB (Top View)



- NOTES
1. RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED. (K=KILO OHMS, M=MEG OHMS)
 2. RESISTOR WATTAGES ARE 1/8W UNLESS OTHERWISE NOTED.
 3. CAPACITANCE VALUES ARE IN MICRO FARADS UNLESS OTHERWISE NOTED. (M=MICRO FARAD)
 4. ALL CAPACITORS TEMPERATURE COEFFICIENTS ARE SL (LESS THAN 100PPM) UNLESS OTHERWISE NOTED.

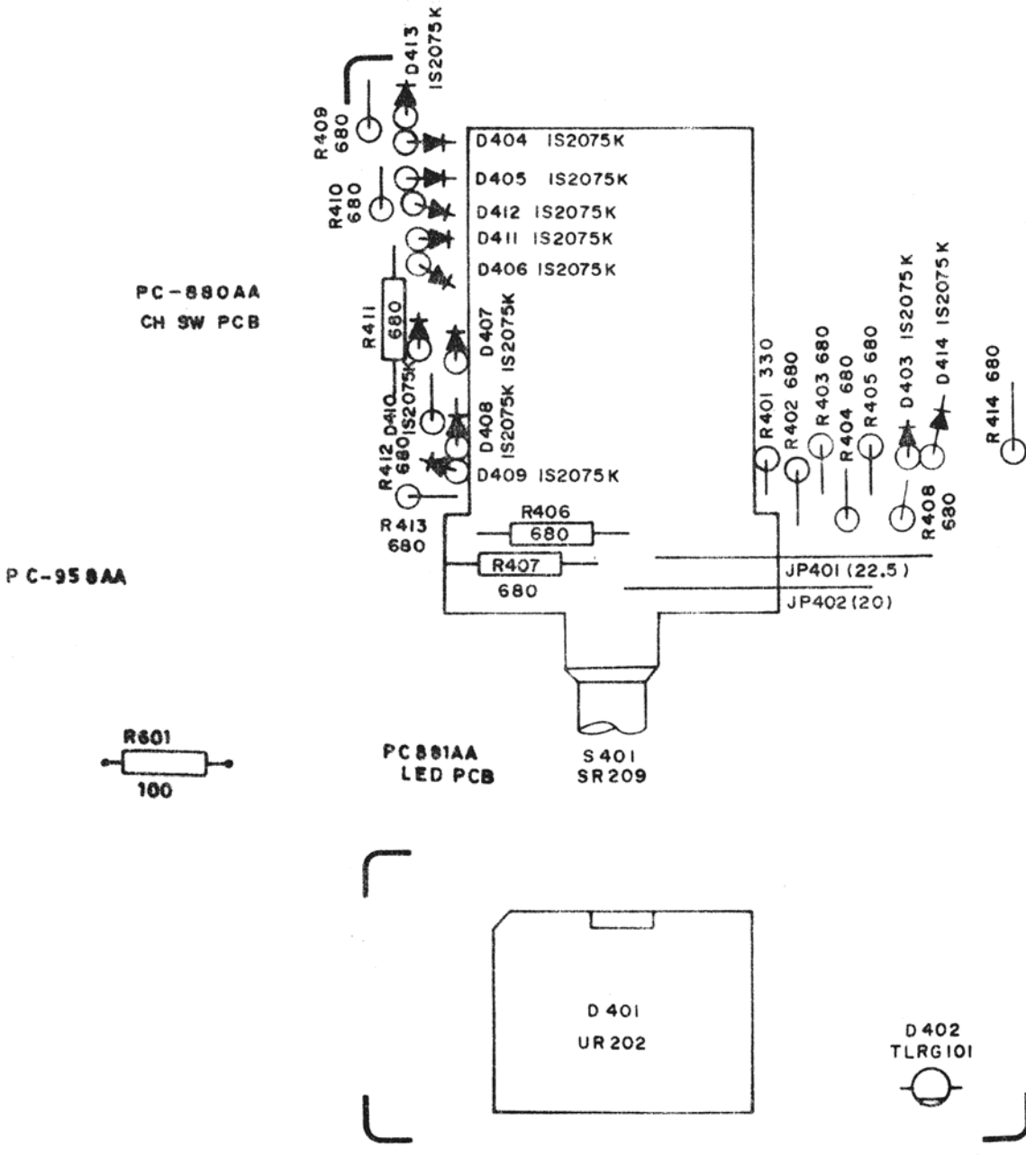
ADDED PARTS - MAIN PCB



PB-010

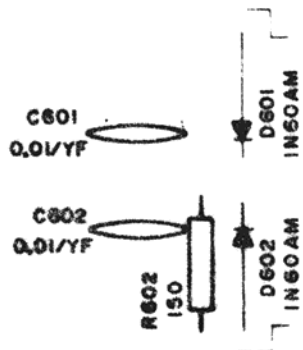
NP PB 010 R 01

PARTS LAYOUT SUB. ASSY. PCB'S

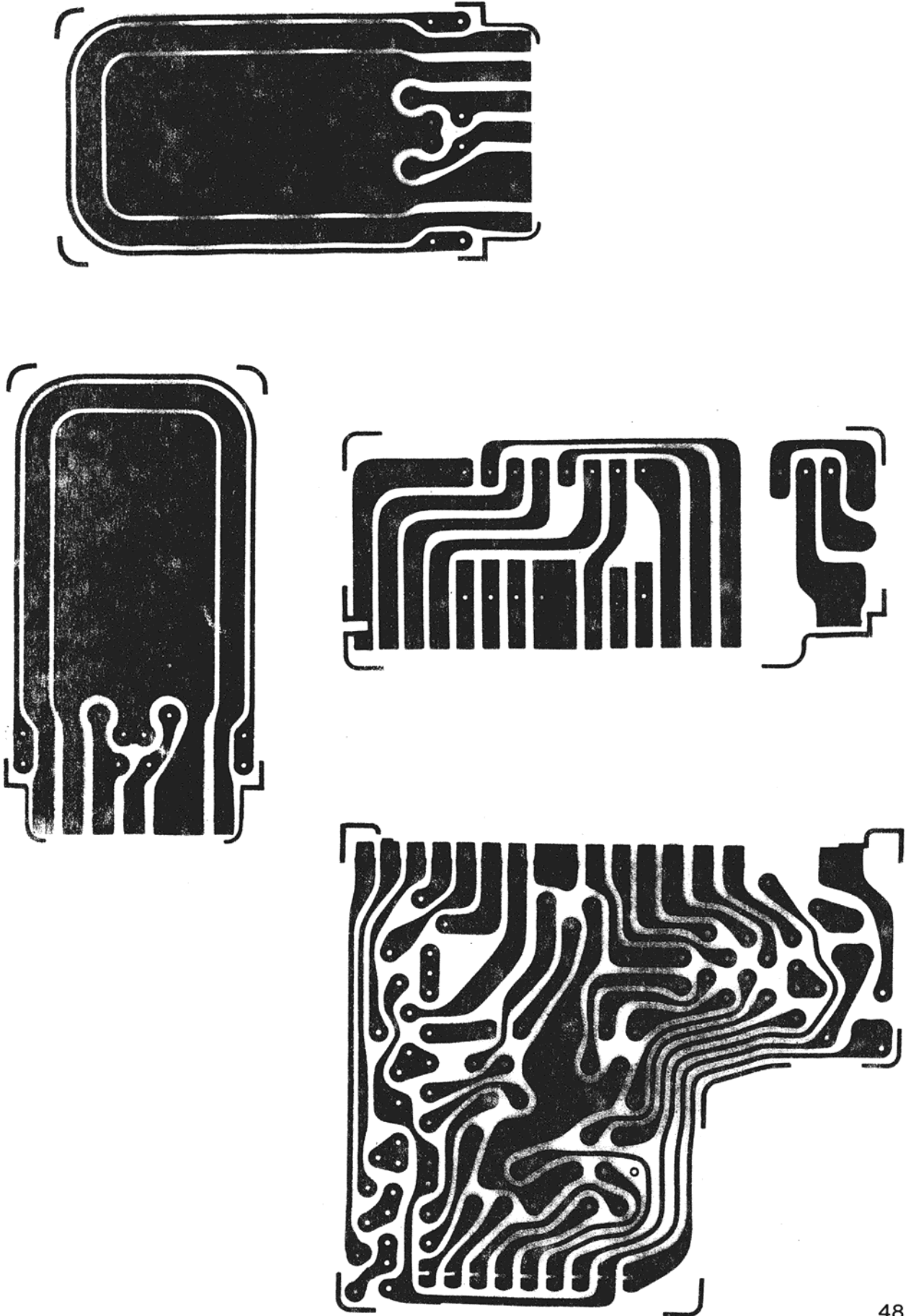


E24-3724

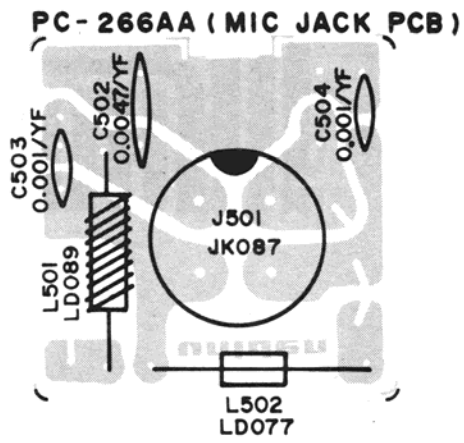
PC-958AA SWR PCB



COPPER PATTERN SUB. ASSY. PCB's



PARTS LAYOUT - MIC JACK



SEMI CONDUCTOR PIN CONFIGURATION



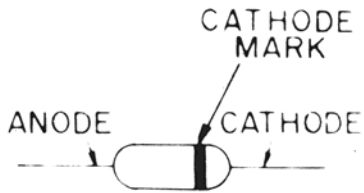
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2SC945A-Q
2SC1674-L
2SC1675-L
2SC1730-L



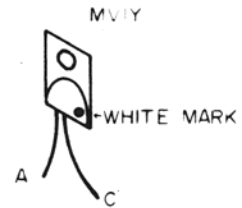
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2SA1012-0
2SC2166-C
2SC2312-C



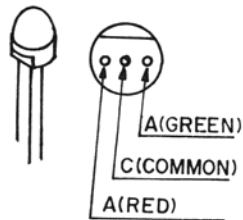
2SB525-C
2SC2086-D



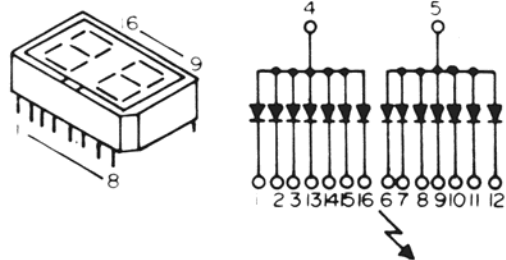
1N60-AM
MC-301
1N4003
MV-201
1S2339G
RD5.1EB2
RD7.5EB2
KB262
1S2075K



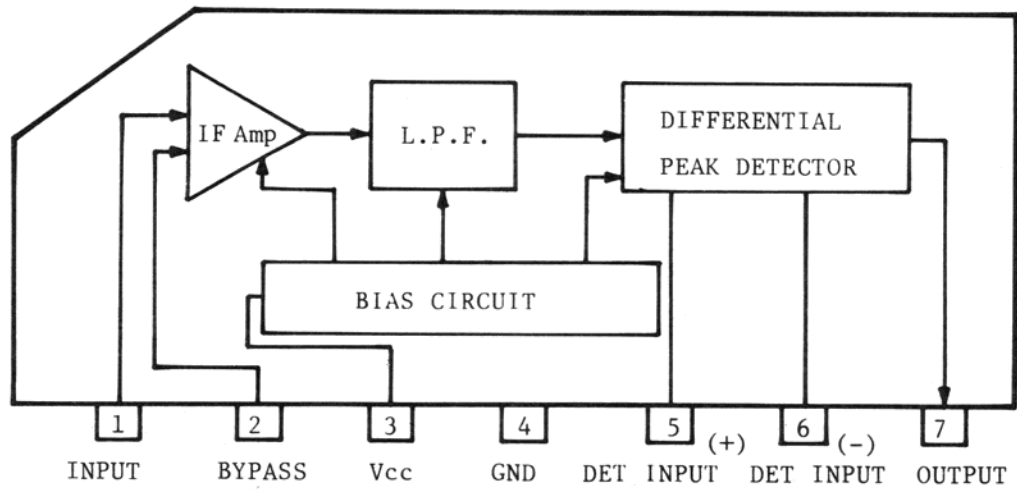
TLRG 101



UR202



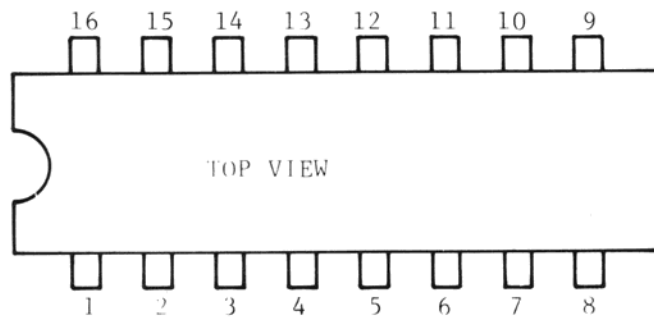
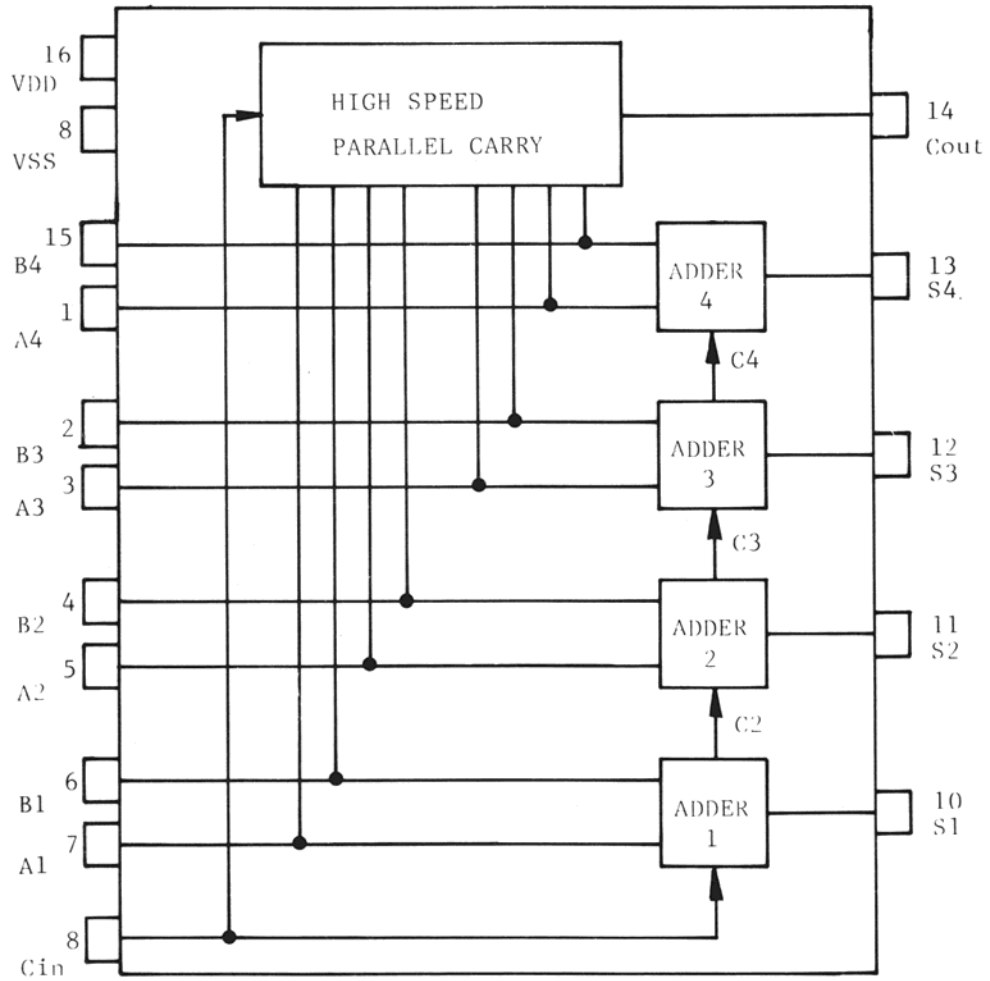
INTERNAL DIAGRAM - IC's



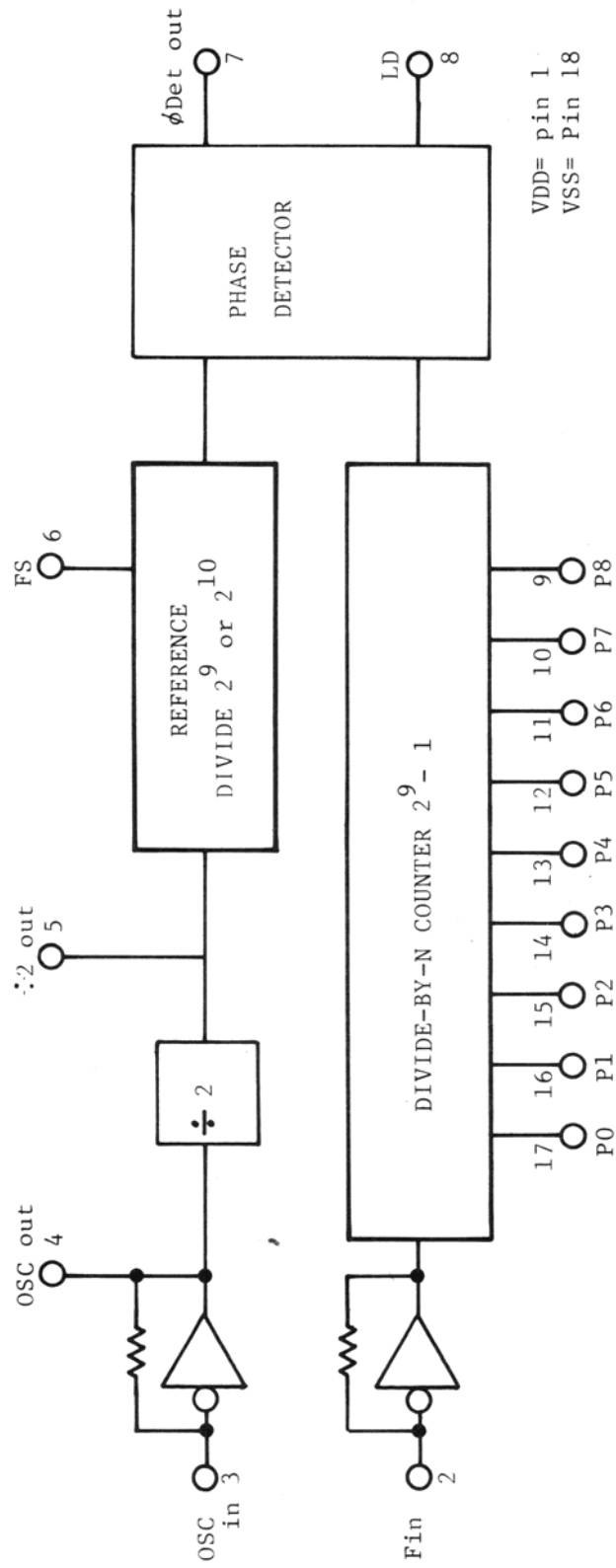
uPC1028H

INTERNAL DIAGRAM IC's

MC14008B

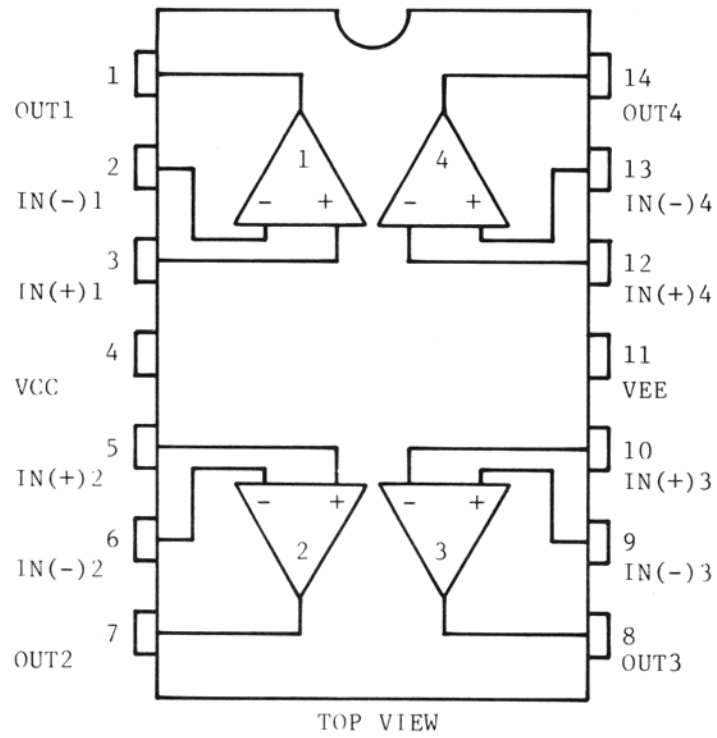


INTERNAL DIAGRAM IC's



MC145106

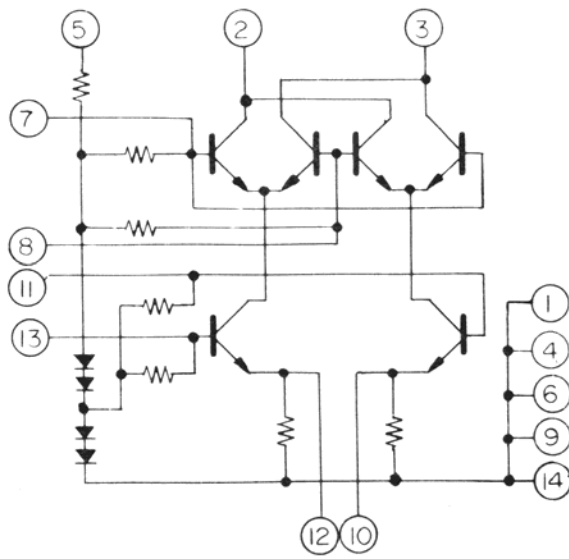
INTERNAL DIAGRAM IC's



TA75902P

INTERNAL DIAGRAM IC's

S042P



VOLTAGE CHART

148CTL-DX Late Version

TR	Mode	Base	Collector	Emitter
TR 1	RX CW	0	0	0
	RX FM	0	0	0
	RX AM	0	0	0
	RX USB	0	0	0
	RX LSB	0	0	0
	RX NB/ON	1.9	8.0	1.1
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 2	RX CW	0	0	0
	RX FM	0	0	0
	RX AM	0	0	0
	RX USB	0	0	0
	RX LSB	0	0	0
	RX NB/ON	0.7	2.6	0
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 3	RX CW	0	0	0
	RX FM	0	0	0
	RX AM	0	0	0
	RX USB	0	0	0
	RX LSB	0	0	0
	RX NB/ON	2.6	8.0	1.8
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 4	RX CW	0	8.3	0
	RX FM	0	8.3	0
	RX AM	0	8.3	0
	RX USB	0	8.3	0
	RX LSB	0	8.3	0
	RX NB/ON	0	8.3	1.12
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 5	RX CW	0	7.7	0
	RX FM	0	7.7	0
	RX AM	0	7.7	0
	RX USB	0	7.7	0
	RX LSB	0	7.7	0
	RX NB/ON	0	7.7	0
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 6	RX CW	7.7	0	8.3
	RX FM	7.7	0	8.3
	RX AM	7.7	0	8.3
	RX USB	7.7	0	8.3
	RX LSB	7.7	0	8.3
	RX NB/ON	7.7	0	8.3
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 7	RX CW	0	0	0
	RX FM	0	0	0
	RX AM	0	0	0
	RX USB	0	0	0
	RX LSB	0	0	0
	RX NB/ON	0	0	0
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 8	RX CW	0.8	8.4	0.7
	RX FM	0.7	7.4	0.2
	RX AM	0.7	7.4	0.2
	RX USB	0.8	8.4	0.7
	RX LSB	0.8	8.4	0.7
	RX NB/ON	0	0	0.7
	TX CW	0	0	0
	TX FM	0	0	0.7
	TX AM	0	0	0.7
	TX LSB	0	0	0.7
TR 9	RX CW	0.8	0	0
	RX FM	0.7	3.2	0
	RX AM	0.7	3.2	0
	RX USB	0.8	0	0
	RX LSB	0.8	0	0
	RX NB/ON	0	0	0
	TX CW	0.7	0	0
	TX FM	0.7	0	0
	TX AM	0.7	0	0
	TX LSB	0.7	0	0
TR 10	RX CW	0	8.4	0
	RX FM	3.2	7.4	2.4
	RX AM	3.2	7.4	2.4
	RX USB	0	8.4	0
	RX LSB	0	8.4	0
	RX NB/ON	0	0	0
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 11	RX CW	0	8.4	0
	RX FM	2.4	7.2	1.7
	RX AM	2.4	7.2	1.7
	RX USB	0	8.4	0
	RX LSB	0	8.4	0
	RX NB/ON	0	0	0
	TX CW	0	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0	0	0
TR 12	RX CW	0.7	0	0
	RX FM	0	0	0
	RX AM	0	0	0
	RX USB	0.7	0	0
	RX LSB	0.7	0	0
	RX NB/ON	0	0	0
	TX CW	0.7	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0.7	0	0
TR 13	RX CW	0	0.1	0
	RX FM	0.7	0	0
	RX AM	0.7	0	0
	RX USB	-0.1	0.1	0
	RX LSB	-0.1	0.1	0
	RX NB/ON	0	0	0
	TX CW	0	0	0
	TX FM	0.7	0	0
	TX AM	0.7	0	0
	TX LSB	-0.5	0	0
TR 14	RX CW	0.7	0	0
	RX FM	0	0	0
	RX AM	0	0	0
	RX USB	0.7	0	0
	RX LSB	0.7	0	0
	RX NB/ON	0	0	0
	TX CW	0.7	0	0
	TX FM	0	0	0
	TX AM	0	0	0
	TX LSB	0.7	0	0
TR 15	RX CW	1.3	5.3	0.7
	RX FM	1.3	5.4	0.7
	RX AM	1.3	5.4	0.7
	RX USB	1.3	5.3	0.7
	RX LSB	1.3	5.3	0.7
	RX NB/ON	1.3	5.3	0.7
	TX CW	1.3	5.3	0.7
	TX FM	1.3	5.3	0.7
	TX AM	1.3	5.3	0.7
	TX LSB	1.3	5.2	0.7
TR 16	RX CW	0	0	0
	RX FM	0	0	0
	RX AM	0	0	0
	RX USB	0	0	0
	RX LSB	0	0	0
	RX NB/ON	0.8	0	0
	TX CW	0.8	0	0
	TX FM	0.8	0	0
	TX AM	0.8	0	0
	TX LSB	0.8	0	0

VOLTAGE CHART

TR	Mode	Base	Collector	Emitter	Mode	Base	Collector	Emitter	Mode	Base	Collector	Emitter		
TR 17	RX CW	2.2	8.0	1.5	TR 21	RX CW	3.6	6.1	2.9	TR 25	RX CW	1.4	4.8	0.9
	FM	2.2	8.0	1.5		FM	1.9	1.2	1.2		FM	1.4	4.8	0.9
	AM	2.2	8.0	1.5		AM	1.9	1.2	1.2		AM	1.4	4.8	0.9
	USB	2.2	8.0	1.5		USB	3.6	6.1	2.9		USB	1.4	4.8	0.9
	LSB	2.2	8.0	1.5		LSB	3.6	6.1	2.9		LSB	1.4	4.8	0.9
TR 18	TX CW	0	0	0	TR 22	TX CW	0	0	0	TR 26	TX CW	2.1	7.3	1.4
	FM	0	0	0		FM	0	0	0		FM	2.1	7.3	1.4
	AM	0	0	0		AM	0	0	0		AM	2.1	7.3	1.4
	USB	0	0	0		USB	0	0	0		USB	2.1	7.3	1.4
	LSB	0	0	0		LSB	0	0	0		LSB	2.1	7.3	1.4
TR 19	RX CW	1.6	6.6	0.8	TR 23	RX CW	0	0.5	0	TR 27	RX CW	0.6	3.8	0
	FM	0.8	0.1	0		FM	0.7	0	0		FM	0.6	3.8	0
	AM	0.8	0.1	0		AM	0	0	0		AM	0.6	3.8	0
	USB	1.6	6.6	0.8		USB	0	0.5	0		USB	0.6	3.8	0
	LSB	1.6	6.6	0.8		LSB	0	0.5	0		LSB	0.6	3.8	0
TR 20	TX CW	2.3	6.8	7.5	TR 24	TX CW	0	0	0	TR 28	TX CW	0.6	3.8	0
	FM	2.9	2.0	7.4		FM	0.7	0	0		FM	0.6	3.8	0
	AM	2.9	2.0	7.4		AM	0	0	0		AM	0.6	3.8	0
	USB	2.3	6.8	7.5		USB	0	0	0		USB	0.6	3.8	0
	LSB	2.3	6.8	7.5		LSB	0	0	0		LSB	0.6	3.8	0
TR 29	RX CW	2.2	8.0	1.5	TR 30	RX CW	0.8	8.3	0.1	TR 31	RX CW	3.0	6.4	2.4
	FM	2.2	8.0	1.5		FM	0.8	8.3	0.1		FM	0	0	0
	AM	2.2	8.0	1.5		AM	0.8	8.3	0.1		AM	0	0	0
	USB	2.2	8.0	1.5		USB	0.8	8.3	0.1		USB	3.0	6.4	2.4
	LSB	2.2	8.0	1.5		LSB	0.8	8.3	0.1		LSB	3.0	6.4	2.4
TR 31	TX CW	0	0	0	TR 32	TX CW	0	0	0	TR 33	TX CW	1.3	7.7	0.6
	FM	0	0	0		FM	0	0	0		FM	1.3	7.7	0.6
	AM	0	0	0		AM	0	0	0		AM	1.3	7.7	0.6
	USB	0	0	0		USB	0	0	0		USB	1.3	7.7	0.6
	LSB	0	0	0		LSB	0	0	0		LSB	1.3	7.7	0.6

VOLTAGE CHART

Mode	Base	Collector	Emitter
TR 33	RX CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
	TX CW 0.6 FM 0.5 AM 0.5 USB 0.6 LSB 0.6	0.6 0.6 0.6 0.6 0.6	0 0 0 0 0
TR 34	RX CW 7.8 FM 7.8 AM 7.8 USB 7.8 LSB 7.8	8.2 8.2 8.2 8.2 8.2	8.3 8.3 8.3 8.3 8.3
	TX CW 7.8 FM 7.8 AM 7.8 USB 7.8 LSB 7.8	8.1 0.6 0.6 0.6 0.6	8.3 8.3 8.3 8.3 8.3
TR 35	RX CW 8.2 FM 0 AM 0 USB 0 LSB 0	8.3 0 0 0 0	7.7 7.7 7.7 7.7 7.7
	TX CW 8.2 FM 0 AM 0 USB 0 LSB 0	8.3 0 0 0 0	7.7 7.7 7.7 7.7 7.7
TR 36	RX CW 7.7 FM 7.7 AM 7.7 USB 7.7 LSB 7.7	8.4 8.4 8.4 8.4 8.4	8.4 8.4 8.4 8.4 8.4
	TX CW 7.8 FM 7.8 AM 7.8 USB 7.8 LSB 7.8	0 0 0 0 0	8.3 8.3 8.3 8.3 8.3
TR 37	RX CW 0.66 FM 0.66 AM 0.66 USB 0.66 LSB 0.66	0.1 0.1 0.1 0.1 0.1	0 0 0 0 0
	TX CW 7.8 FM 7.8 AM 7.8 USB 7.8 LSB 7.8	7.8 7.8 7.8 7.8 7.8	0 0 0 0 0
TR 38	RX CW 7.9 FM 7.9 AM 7.9 USB 7.9 LSB 7.9	0 0 0 0 0	8.4 8.4 8.4 8.4 8.4
	TX CW 7.6 FM 7.6 AM 7.6 USB 7.6 LSB 7.6	8.2 8.2 8.2 8.2 8.2	8.4 8.4 8.4 8.4 8.4
TR 39	RX CW 0.69 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
	TX CW 0.7 FM 0 AM 0 USB 0 LSB 0	0 2.7 2.7 2.8 2.8	0 0 0 0 0
TR 40	RX CW 1.6 FM 1.6 AM 1.6 USB 1.6 LSB 1.6	12.9 12.9 12.9 12.9 12.9	1.0 1.0 1.0 1.0 1.0
	TX CW 1.6 FM 1.6 AM 1.6 USB 1.6 LSB 1.6	12.7 11.9 11.9 12.7 12.7	1.0 1.0 1.0 1.0 1.0
TR 41	RX CW 13.1 FM 13.1 AM 13.1 USB 13.1 LSB 13.1	8.5 8.5 8.5 8.5 8.5	13.8 13.8 13.8 13.8 13.8
	TX CW 13.0 FM 12.1 AM 12.1 USB 13.0 LSB 13.0	8.4 8.4 8.4 8.4 8.4	13.6 13.0 13.0 13.6 13.6
TR 42	RX CW 1.2 FM 1.2 AM 1.2 USB 1.2 LSB 1.2	3.2 3.2 3.2 3.2 3.2	0.6 0.6 0.6 0.6 0.6
	TX CW 1.2 FM 1.2 AM 1.2 USB 1.2 LSB 1.2	3.2 3.2 3.2 3.2 3.2	0.6 0.6 0.6 0.6 0.6
TR 43	RX CW - FM - AM - USB - LSB -	- - - - -	- - - - -
	TX CW - FM - AM - USB - LSB -	- - - - -	- - - - -
TR 44	RX CW 0 FM 0 AM 0 USB 0 LSB 0	5.7 5.7 5.7 13.8 13.8	0 0 0 0 0
	TX CW 0.7 FM 0.6 AM 0.6 USB 0.6 LSB 0.6	5.6 5.6 5.6 13.7 13.7	0 0 0 0 0
TR 45	RX CW 0 FM 0 AM 0 USB 0 LSB 0	5.7 5.7 13.8 13.8 13.8	0 0 0 0 0
	TX CW 0.7 FM 0.6 AM 0.6 USB 0.7 LSB 0.7	5.6 5.6 13.7 13.7 13.7	0 0 0 0 0
TR 46	RX CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
	TX CW 1.4 FM 1.4 AM 1.4 USB 1.4 LSB 1.4	8.1 7.4 7.4 8.1 8.1	0.8 0.8 0.8 0.8 0.8
TR 47	RX CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
	TX CW 1.4 FM 1.4 AM 1.4 USB 1.4 LSB 1.4	6.1 6.1 6.1 6.1 6.1	0.7 0.7 0.7 0.7 0.7
TR 48	RX CW 0 FM 0 AM 0 USB 0 LSB 0	7.8 7.8 7.8 7.8 7.8	0.5 3.6 3.6 0.5 0.5
	TX CW 0 FM 0 AM 0 USB 0 LSB 0	7.7 7.7 7.7 7.7 7.7	0.5 3.6 3.6 0.5 0.5

VOLTAGE CHART

IC	Mode	Pin																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
IC 1	RX	CW	-	-	-	8.4	0.1	0.1	0.3	0	1.9	1.5	0	0.3	0.3	0.6				
		FM	-	-	-	8.4	0	0	0	0	1.9	1.5	0	0.3	0.3	0.6				
		AM	-	-	-	8.4	0	0	0	0	1.9	1.5	0	0.3	0.3	0.6				
		USB	-	-	-	8.4	0.1	0.1	0.2	0	1.9	1.5	0	0.3	0.3	0.6				
		LSB	-	-	-	8.4	0.2	0.2	0.3	0	1.9	1.2	0	0.3	0.3	0.6				
IC 2	TX	SQ(CW)	-	-	-	-	-	0.9	-	3.2	-	-	-	-	-	-	-	-		
		CW	-	-	-	8.4	0	0	0	7.4	1.9	1.5	0	0.3	0.3	0.6				
		FM	-	-	-	8.4	0	0	0	7.4	1.9	1.5	0	0.3	0.3	0.6				
		AM	-	-	-	8.4	0	0	0	7.4	1.9	1.5	0	0.3	0.3	0.6				
		LSB	-	-	-	8.4	0	0	0	7.4	1.9	1.5	0	0.3	0.3	0.6				
IC 3	RX	CW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		FM	1.2	1.3	7.1	0	3.2	3.3	5.1	0	0	0	0	0	0	0	0	0	0	
		AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		USB	3.0	3.4	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		LSB	3.0	3.4	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IC 3	TX	CW	3.0	3.4	3.4	0	6.0	7.7	7.8	0	0	0	0	0	0	0	0	0	0	
		FM	0	3.4	3.4	0	6.0	7.7	7.8	0	0	0	0	0	0	0	0	0	0	
		AM	0	3.4	3.4	0	6.0	7.6	7.8	0	0	0	0	0	0	0	0	0	0	
		USB	3.0	3.4	3.4	0	6.0	7.7	7.8	0	0	0	0	0	0	0	0	0	0	0
		LSB	3.0	3.4	3.4	0	6.0	7.7	7.8	0	0	0	0	0	0	0	0	0	0	0

TR	Mode	Base	Collector	Emitter
TR 49	RX	CW	6.2	5.7
	FM	6.2	13.2	5.7
	AM	6.2	13.2	5.7
	USB	12.9	13.2	13.5
	LSB	12.9	13.2	13.5
TR 50	TX	CW	6.1	5.6
	FM	6.1	12.1	5.6
	AM	6.1	12.1	5.6
	USB	12.8	13.2	13.4
	LSB	12.8	13.2	13.4
TR 51	RX	CW	13.2	13.3
	FM	13.2	5.7	13.3
	AM	13.2	5.7	13.3
	USB	13.3	13.8	13.1
	LSB	13.3	13.8	13.1
TR 52	TX	CW	12.6	5.6
	FM	12.1	5.5	12.5
	AM	12.1	5.5	12.5
	USB	13.2	13.7	13.0
	LSB	13.2	13.7	13.0
TR 53	RX	CW	0.9	0
	FM	0.9	7.7	0
	AM	0.9	7.7	0
	USB	0.9	7.7	0
	LSB	0.9	7.7	0
TR 54	RX	CW	0	0
	FM	0.7	0	0
	AM	0	0	0
	USB	0	0	0
	LSB	0	0	0
TR 55	TX	CW	0.7	0
	FM	0.7	0	0
	AM	0.7	0	0
	USB	0.7	0	0
	LSB	0.7	0	0

TR	Mode	Base	Collector	Emitter
TR 49	RX	CW	6.2	5.7
	FM	6.2	13.2	5.7
	AM	6.2	13.2	5.7
	USB	12.9	13.2	13.5
	LSB	12.9	13.2	13.5
TR 50	TX	CW	6.1	5.6
	FM	6.1	12.1	5.6
	AM	6.1	12.1	5.6
	USB	12.8	13.2	13.4
	LSB	12.8	13.2	13.4
TR 51	RX	CW	13.2	13.3
	FM	13.2	5.7	13.3
	AM	13.2	5.7	13.3
	USB	13.3	13.8	13.1
	LSB	13.3	13.8	13.1
TR 52	TX	CW	12.6	5.6
	FM	12.1	5.5	12.5
	AM	12.1	5.5	12.5
	USB	13.2	13.7	13.0
	LSB	13.2	13.7	13.0
TR 53	RX	CW	0.9	0
	FM	0.9	7.7	0
	AM	0.9	7.7	0
	USB	0.9	7.7	0
	LSB	0.9	7.7	0
TR 54	RX	CW	0	0
	FM	0.7	0	0
	AM	0	0	0
	USB	0	0	0
	LSB	0	0	0
TR 55	TX	CW	0.7	0
	FM	0.7	0	0
	AM	0.7	0	0
	USB	0.7	0	0
	LSB	0.7	0	0

VOLTAGE CHART

Mode		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
IC 4	RX	CW	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1											
		FM	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1											
		AM	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1											
		USB	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1											
		LSB	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1											
			4.4	4.4	4.4	0	4.4	3.2	7.5	8.1											
	TX	CW	4.4	4.4	4.4	0	2.2	3.2	2.3	8.1											
		FM	4.4	4.4	4.4	0	2.1	3.2	2.3	8.1											
		AM	4.4	4.4	4.4	0	2.1	3.2	2.3	8.1											
		USB	4.4	4.4	4.4	0	2.2	3.2	2.3	8.1											
		LSB	4.4	4.4	4.4	0	2.2	3.2	2.3	8.1											
			4.4	4.4	4.4	0	2.2	3.2	2.3	8.1											
IC 5	RX	CW	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0	
		L FM	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		O AM	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		W USB	8.4	4.3	4.3	4.3	-	-	3.2	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		LSB	8.4	4.3	4.3	4.3	-	-	3.2	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
			8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	8.3	0	8.3
	TX	CW	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		M FM	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		I AM	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		D USB	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		LSB	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
			8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
	TX	CW	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		H FM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		I AM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		USB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
		LSB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3
			8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	8.3

Mode		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
IC 5 (cont'd)	TX	CW	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0
		L FM	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0
		O AM	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0
		W USB	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0
		LSB	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	0	8.3	0
			8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	8.3	0
	TX	CW	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0
		M FM	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0
		I AM	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0
		D USB	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0
		LSB	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0
			8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0
TX	CW	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	
	H FM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	
	I AM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	
	USB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	
	LSB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	
		8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	0	8.3	0	8.3	0	8.3	0	
IC 6	RX	CW	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	8.3	0	0	8.3	0	8.3	0
		FM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	8.3	0	0	8.3	0	8.3	0
		L AM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	8.3	0	0	8.3	0	8.3	0
		O USB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	8.3	0	0	8.3	0	8.3	0
		W LSB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	8.3	0	0	8.3	0	8.3	0
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	8.3	0	0	8.3	0	8.3	0
	TX	CW	0	0	8.3	7.9	0.5	7.9	8.3	0	0	8.3	0	8.3	0	0	8.3	0	8.3	0
		M FM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	8.3	0	8.3	0	0	8.3	0	8.3	0
		I AM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	8.3	0	8.3	0	0	8.3	0	8.3	0
		D USB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	8.3	0	8.3	0	0	8.3	0	8.3	0
		LSB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	8.3	0	8.3	0	0	8.3	0	8.3	0
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	8.3	0	8.3	0	0	8.3	0	8.3	0

VOLTAGE CHART

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
IC 6 (cont.)	Mode																			
	TX	CW	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		L FM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		O AM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		W USB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
	M	CW	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	0	8.3	0	0	8.3		
		L FM	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	0	8.3	0	0	8.3		
		I AM	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	0	8.3	0	0	8.3		
		D USB	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	0	8.3	0	0	8.3		
	H	CW	0	7.9	8.3	0	0.5	7.9	8.3	0	0	0	8.3	0	0	8.3	7.9	8.3		
		L FM	0	7.9	8.3	0	0.5	7.9	8.3	0	0	0	8.3	0	0	8.3	7.9	8.3		
		I AM	0	7.9	8.3	0	0.5	7.9	8.3	0	0	0	8.3	0	0	8.3	7.9	8.3		
		D USB	0	7.9	8.3	0	0.5	7.9	8.3	0	0	0	8.3	0	0	8.3	7.9	8.3		
	I	CW	0	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	0	0	8.3		
L FM		0	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	0	0	8.3			
I AM		0	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	0	0	8.3			
D USB		0	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	0	0	8.3			
IC 7	Mode																			
	RX	CW	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		L FM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		O AM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		W USB	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
	M	CW	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		L FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		I AM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		D USB	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
	H	CW	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		L FM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		I AM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		D USB	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
IC 7 (cont.)	Mode																				
	TX	CW	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3			
		L FM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3			
		O AM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3			
		W USB	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3			
	M	CW	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3			
		L FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3			
		I AM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3			
		D USB	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3			
	H	CW	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3			
		L FM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3			
		I AM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3			
		D USB	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3			
	IC 8	Mode																			
RX		CW	13-8	6-6	0	0	1.1	1.1	0	0	7.0	13.1									
		L FM	13-8	6-6	0	0	1.1	1.1	0	0	7.0	13.1									
		O AM	13-8	6-6	0	0	1.1	1.1	0	0	7.0	13.1									
		W USB	13-8	6-6	0	0	1.1	1.1	0	0	7.0	13.1									
TX		CW	13-7	6-6	0	0	1.1	1.1	0	0	6.9	13.0									
		L FM	13-0	6-3	0	0.5	2.2	2.2	0	0	10.9										
		I AM	13-0	6-3	0	0.5	2.2	2.2	0	0	10.9										
		D USB	13-7	6-6	0	0.5	2.2	2.2	0	0	11.6										
IC 9		Mode																			
		RX	CW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			L FM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			O AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			W USB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	M	CW	0	8.0	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0	0	0	0	0	
		L FM	0	8.0	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0	0	0	0	0	
		I AM	0	8.0	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0	0	0	0	0	
		D USB	0	7.9	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0	0	0	0	0	
	I	CW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		L FM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		I AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		D USB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

CI48GTL DX

SPECIFICATIONS

GENERAL

Channels	120FM, 120AM, 120 LSB, 120 USB, 120CW.
Frequency Range	Low Band, 26.515 to 26.955 MHz. Mid Band, 26.965 to 27.405 MHz. Hi Band, 27.415 to 27,855 MHz.
Frequency Control	Phase Lock Loop (PLL) synthesizer.
Frequency Tolerance	0.005%
Frequency Stability	0.001%
Operating Temperature Range	-30 C to +50 C.
Microphone	Plug-in dynamic: with push-to-talk switch and coiled cord.
Input Voltage	13.8 DC nominal 15.9 max., 11.7V min. (positive or negative ground). Transmit: AM full mod., 2.2A. SSB 12 watts PEP output, 2A. Receiver: Squelched, 0.3 A. Maximum audio output, 0.7 A.
Size	2-3/8" (H) x 7-7/8" (W) x 9-1/4" (D).
Weight	5 lbs.
Antenna Connector	UHF, SO239
Meter (3-in-1)	Illuminated; indicates relative output power, received signal strength, and SWR.

TRANSMITTER

Power Output	AM/FM/CW, 5 watts. SSB, 12 watts, PEP
Modulation	High-and low-level Class B, Amplitude Modulation: AM, Variable capacitance Frequency Modulation: FM.
Intermodulation Distortion	SSB: 3rd order, more than -25 dB. 5th order, more than -35 dB.
SSB Carrier Suppression	55 dB
Unwanted Sideband	50 dB
Frequency Response	AM and FM: 450 to 2500 Hz.
Output Impedance	50 ohms, unbalanced
Output Indicators	Meter shows relative RF output power and SWR. Transmit LED glows red when transmitter is in operation.

RECEIVER

Sensitivity	SSB/CW: 0.25 uV for 10 dB (S-N)/N at greater than 1/2-watt of audio output. AM: 0.5 uV for 10 dB (S+N)/N at greater than 1/2-watt of audio output. FM: 1.0 uV for 20 dB (S+N)/N at greater than 1/2-watt of audio output.
Selectivity	AM/FM: 6 dB @3 KHz, 50 dB @9 KHz. SSB/CW: 6 dB @2.1 KHz, 60 dB @3.3 KHz.
Image Rejection	More than 65 dB.

IF Frequency	AM/FM: 10.695 MHz 1st IL, 455 KHz 2nd IF
Adjacent-Channel Rejection	SSB/CW: 10.695 MHz.
AM/FM and SSB/CW/RF	60 dB AM/FM & 70 dB SSB/CW.
Gain Control	45 dB adjustable for optimum signal reception.
Automatic Gain Control (AGC)	Less than 10 dB change in audio output for inputs from 10 to 100,000 microvolts.
Squelch	Adjustable; threshold less than 0.5 uV.
ANL	Switchable.
Noise Blanker	RF type, effective on AM/FM and SSB/CW.
Voice Lock Range	Coarse (TX/RX) + or - 7KHz.
	Fine (RX) + or - 1 KHz.
Audio Output Power	4 watts into 8 ohms.
Frequency Response	300 to 2800 Hz.
Built-in Speaker	8 ohms, round.
External Speaker (Not Supplied)	8 ohms; disables internal speaker when connected.

FREQUENCY

CHANNEL	LOW BAND	MID BAND	HI BAND	CHANNEL	LOW BAND	MID BAND	HI BAND
1	26.515	26.965	27.415	21	26.765	27.215	27.665
2	.525	.975	.425	22	.775	.225	.675
3	.535	.985	.435	23	.805	.255	.705
4	.555	27.005	.455	24	.785	.235	.685
5	.565	.015	.465	25	.795	.245	.695
6	.575	.025	.475	26	.815	.265	.715
7	.585	.035	.485	27	.825	.275	.725
8	.605	.055	.505	28	.835	.285	.735
9	.615	.065	.515	29	.845	.295	.745
10	.625	.075	.525	30	.855	.305	.755
11	.635	.085	.535	31	.865	.315	.765
12	.655	.105	.555	32	.875	.325	.775
13	.665	.115	.565	33	.885	.335	.785
14	.675	.125	.575	34	.895	.345	.795
51	.685	.135	.585	35	.905	.355	.805
16	.705	.155	.605	36	.915	.365	.815
17	.715	.165	.615	37	.925	.375	.825
18	.725	.175	.625	38	.935	.385	.835
19	.735	.185	.635	39	.945	.395	.845
20	.755	.205	.655	40	.955	.405	.855