Cobra 148GTL DX Service Manual
Pages 32 to 63 Late Version

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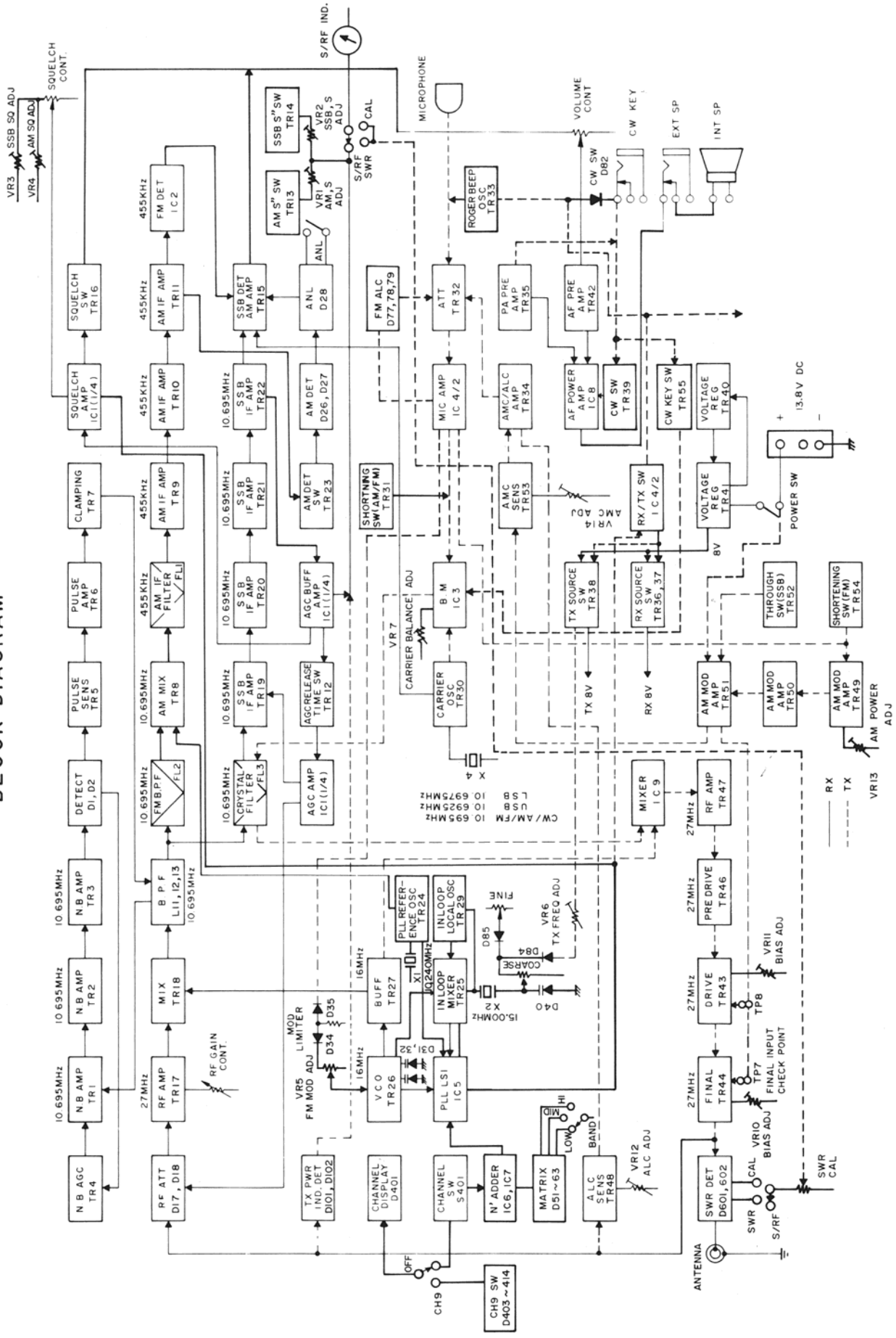
Early Version

Late Version

BLOCK DIAGRAM



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.

C148GTL 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 mimimum difference in output power.
6	Same as Step 1, except; Mode : AM Mic input 90% mod	L44	Adjust for Max. reading on RF VTVM.

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.

C148GTL DX ALIGNMENT PROCEDURE

Alignment of Transmitter Section

1. Test Equipment Required

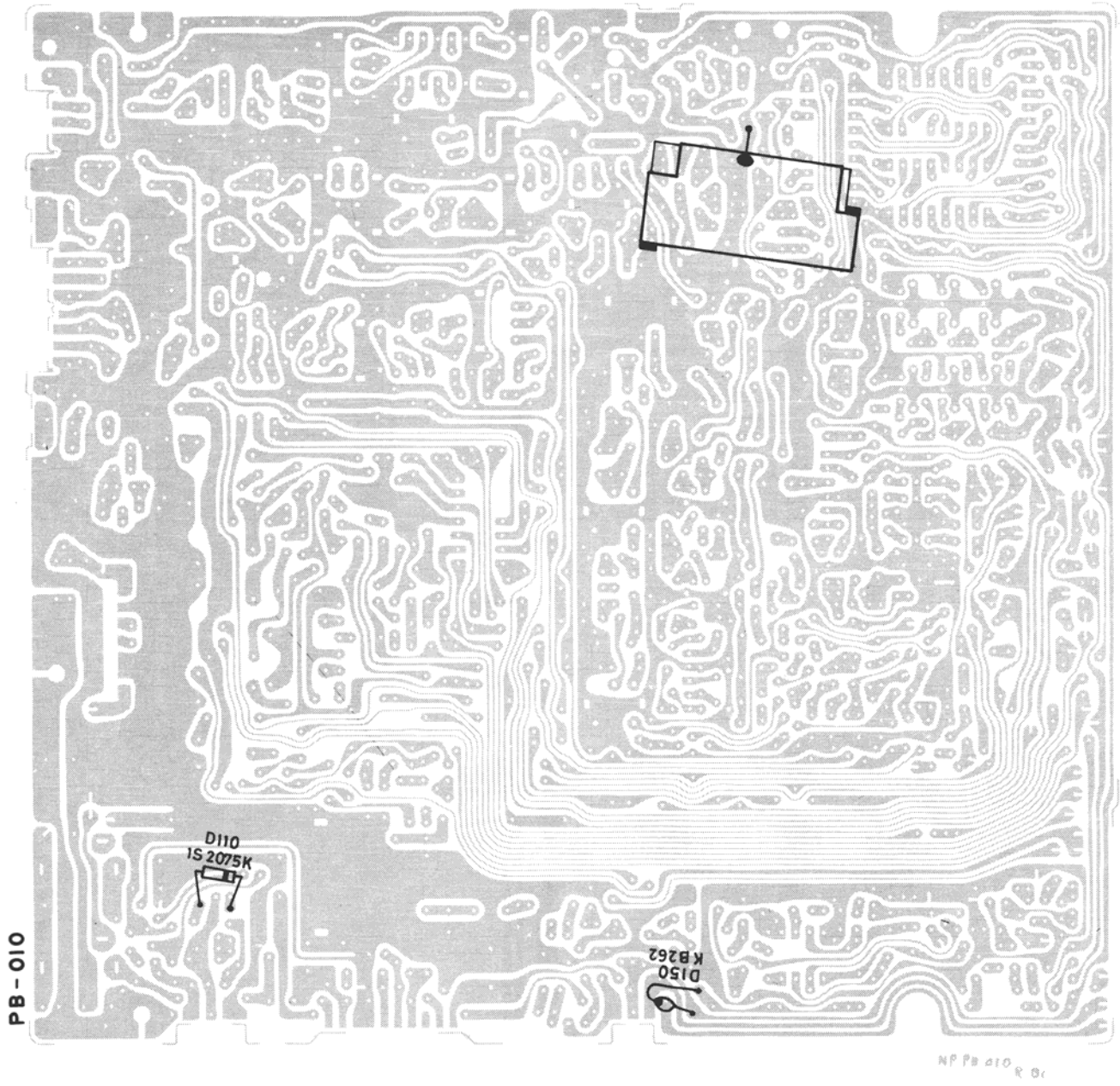
a) VTVM (Full scale; IV DC with RF Probe).
b) RF Output Power Meter.
c) Spectrum Analyzer.
d) Frequency Counter (0-30MHz).
e) DC Power Supply (13.8V, 2Amp.).
f) 50 ohm load and Attenuator.
g) Oscilloscope (0-30MHz).
h) AF Oscillator.
i) DC Ammeter.

2. Alignment Procedure

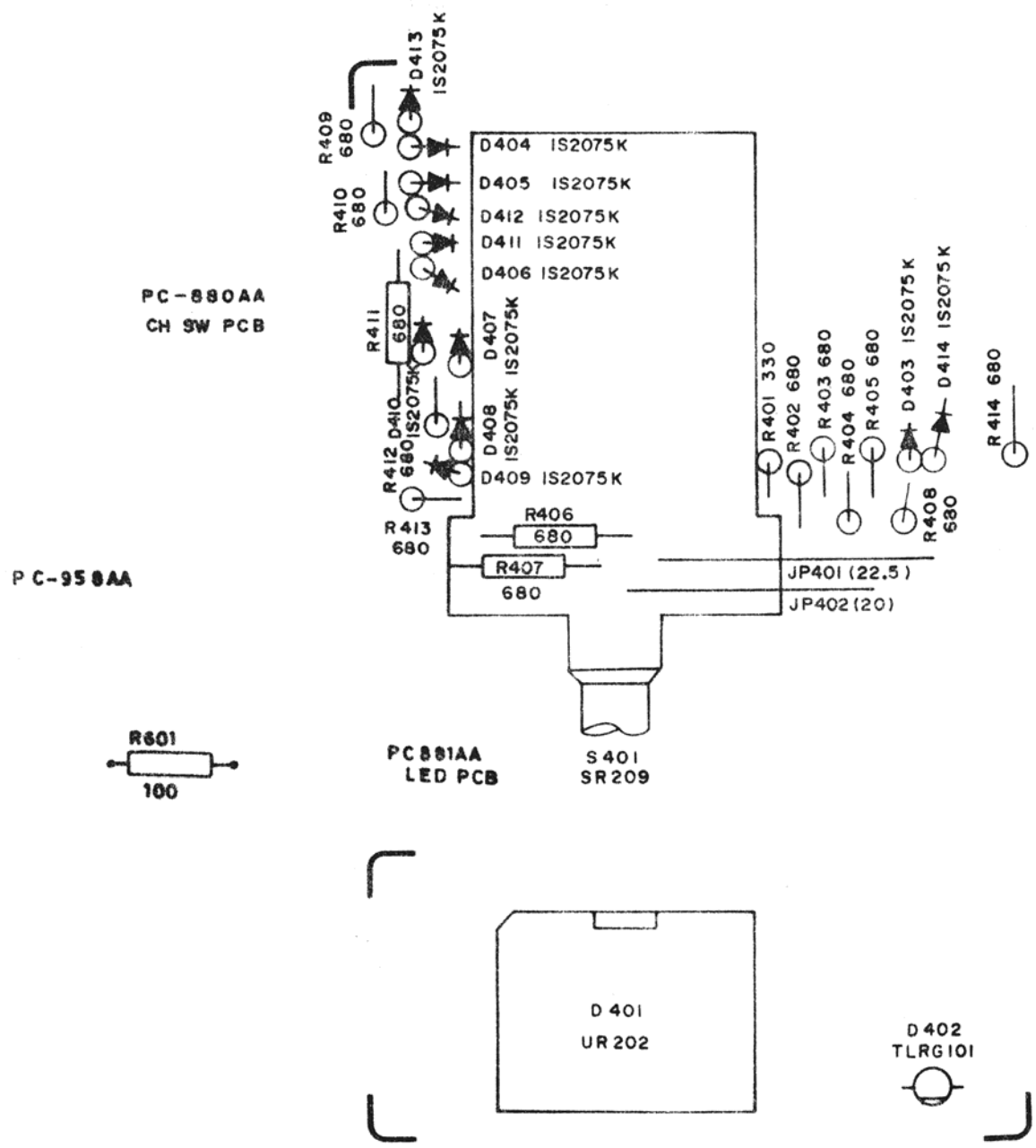
STEP	PRESET TO	ADJUSTMENT	PROCEDURE
1	TX. Mode. Band SW: Mid CH : 19 Mode : USB Mic. VR: CW CH9 : OFF Coarse : Center	VR11	Remove PC-834 (PCB) and connect DC Ammeter to TP9(+) and TP8(-). Adjust for 50mA reading.
2	Same as Step 1.	VR10	Connect DC Ammeter to TP9(+) and TP7(-) and adjust for 50mA reading.
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 mimimum difference in output power.
6	Same as Step 1, except; Mode : AM Mic input 90% mod	L44	Adjust for Max. reading on RF VTVM.

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 tl lmv with 1.5kHz deviation of 1kHz. Adjust Lb for Max. signwave output on Oscilloscope.

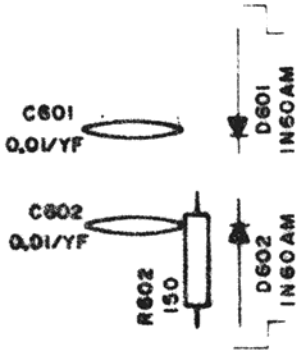
ADDED PARTS - MAIN PCB



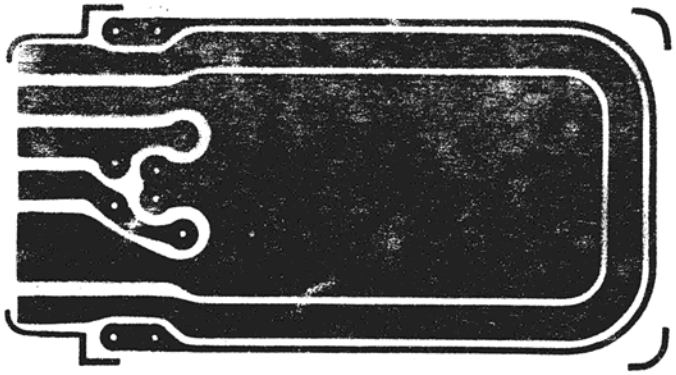
E24-3724

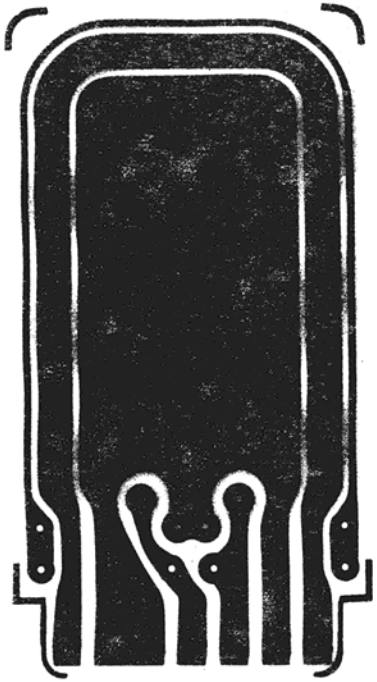


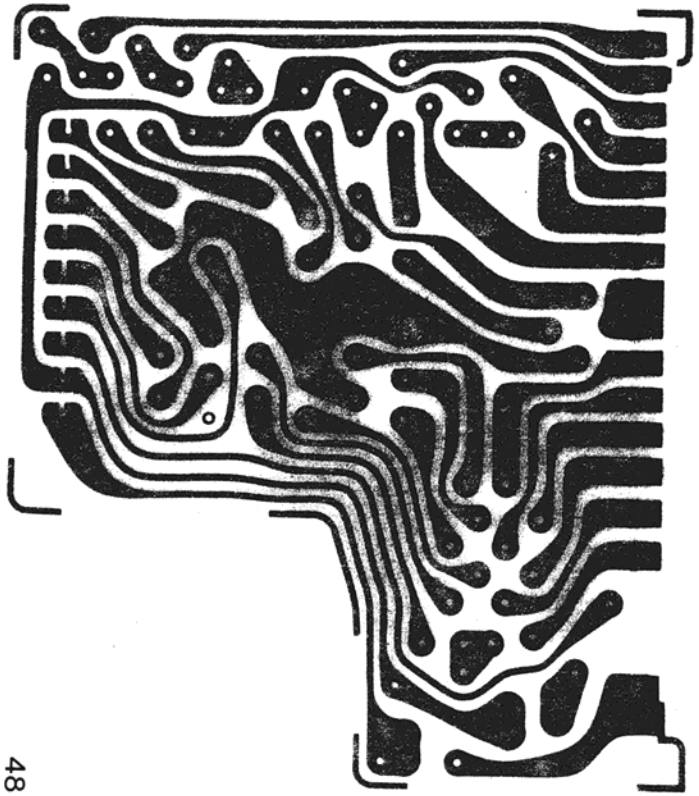
PC-958AA SWR PCB



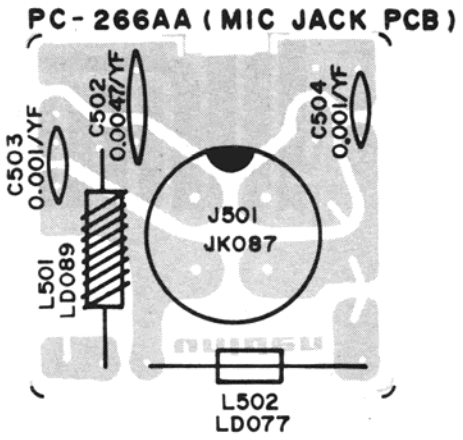
COPPER PATTERN SUB. ASSY. PCB's







PARTS LAYOUT - MIC JACK

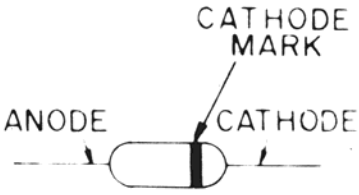


SEMI CONDUCTOR PIN CONFIGURATION

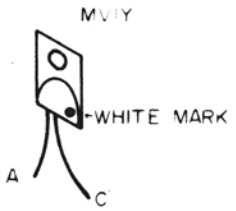
2SA733-P
2SC945A-Q
2SC1674-L
2SC1675-L
2SC1730-L

2SA473-O
2SA1012-O
2SC2166-C
2SC2312-C

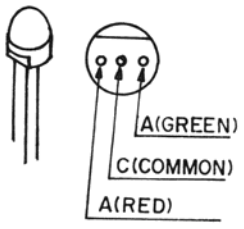
2SB525-C
2SC2086-D



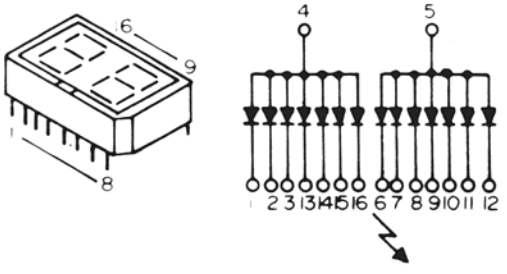
1N60-AM
MC-301
1N4003
MV-201
1S2339G
RD5.1EB2
RD7.5EB2
KB262
1S2075K



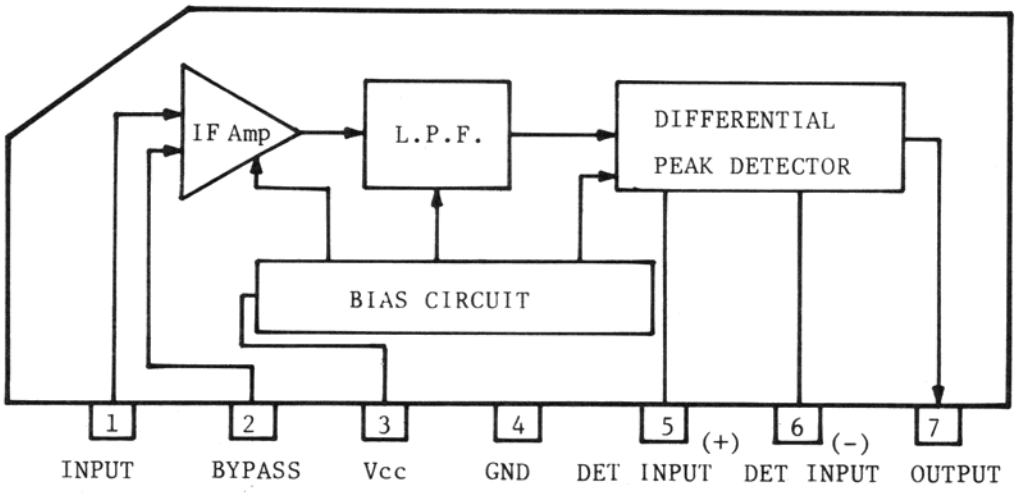
TLRG 101



UR202

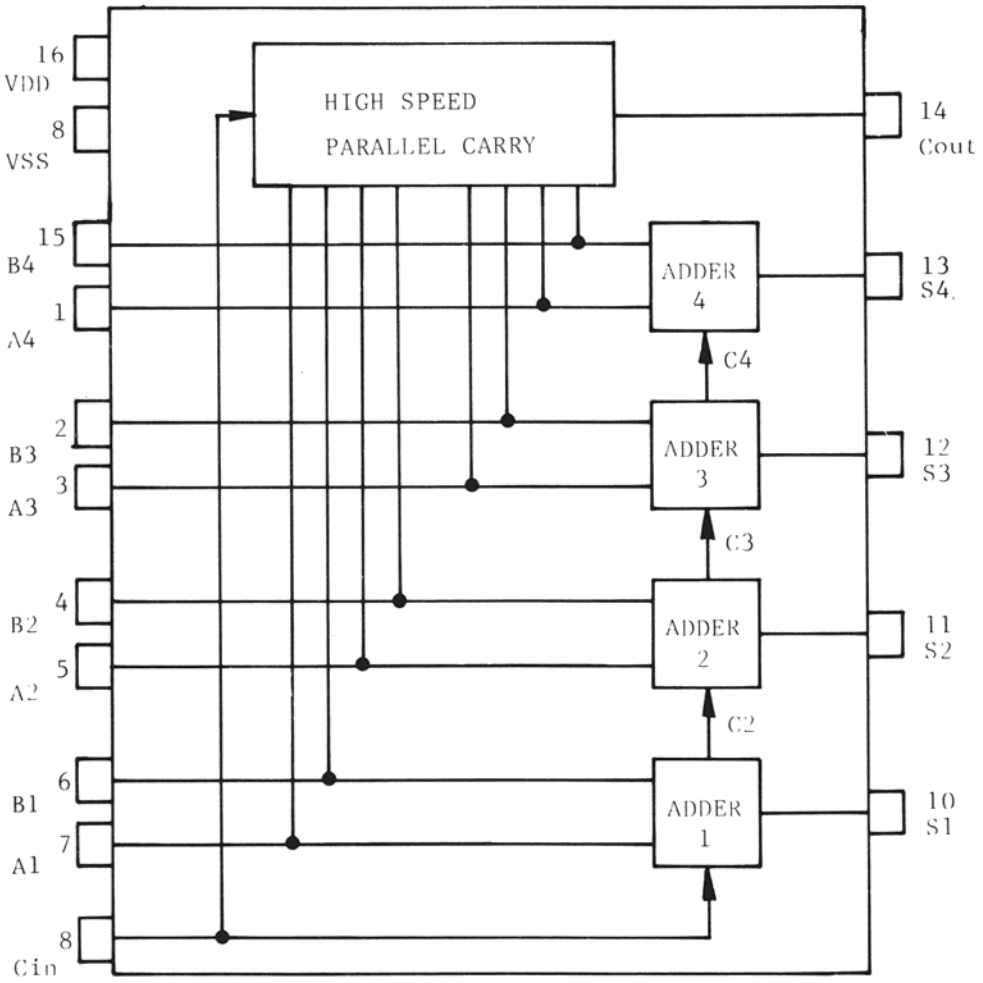


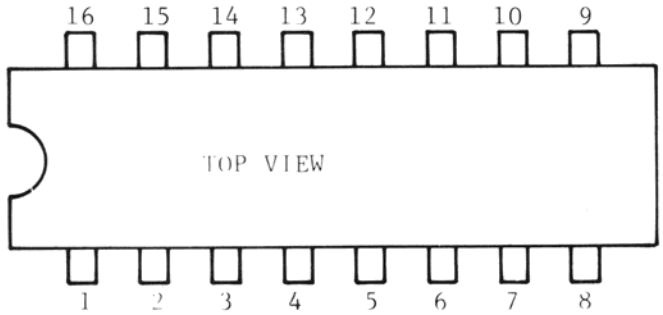
INTERNAL DIAGRAM - IC's



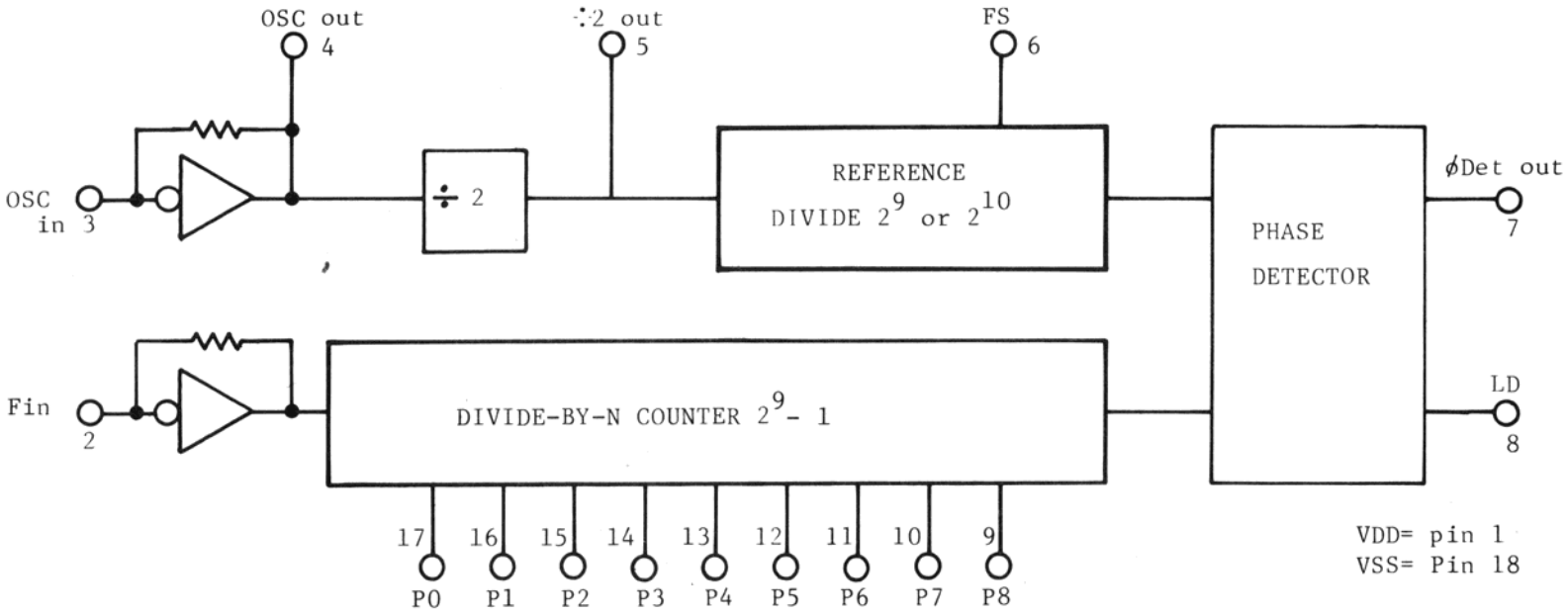
uPC1028H

MC14008B


16
VDD
8
VSS
15
B4
1
A4
2
B3
3
A3
4
B2
5
A2
6
B1
7
A1
8
Cin
HIGH SPEED
PARALLEL CARRY
ADDER
4
ADDER
3
ADDER
2
ADDER
1
C4
C3
C2
14
Cout
13
S4
12
S3
11
S2
10
S1

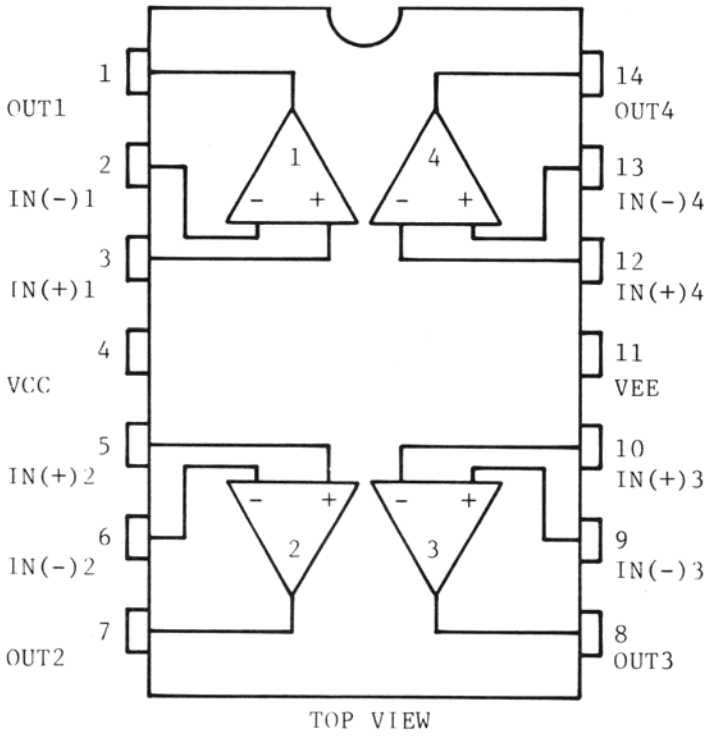

16 15 14 13 12 11 10 9
TOP VIEW
1 2 3 4 5 6 7 8

INTERNAL DIAGRAM IC's



MC145106

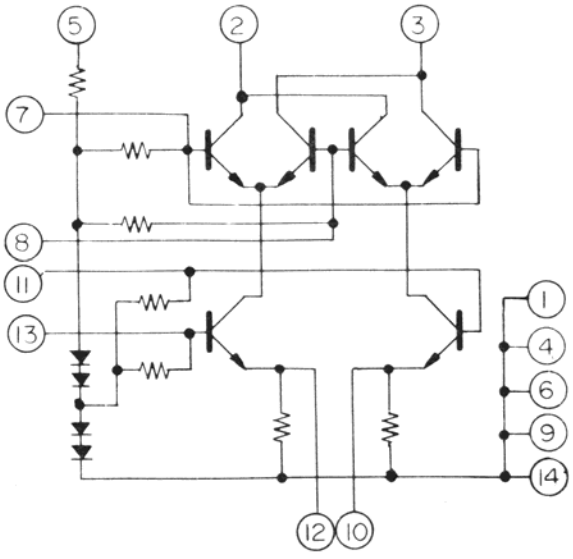
INTERNAL DIAGRAM IC's



TA75902P

INTERNAL DIAGRAM IC's

S042P



VOLTAGE CHART

148GTL-DX Late Version

	Mode		Base	Collector	Emitter
TR 1	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
		NS/ON	1.9	8.0	1.1
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 2	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
		NB/ON	0.7	2.6	0
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 3	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
		NB/ON	2.6	8.0	1.8
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 4	RX	CW	0	8.3	0
		FM	0	8.3	0
		AM	0	8.3	0
		USB	0	8.3	0
		LSB	0	8.3	0
		NB/ON	0	8.3	1.12
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0

	Mode		Base	Collector	Emitter
TR 5	RX	CW	0	7.7	0
		FM	0	7.7	0
		AM	0	7.7	0
		USB	0	7.7	0
		LSB	0	7.7	0
		NB/ON	0	7.7	0
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 6	RX	CW	7.7	0	8.3
		FM	7.7	0	8.3
		AM	7.7	0	8.3
		USB	7.7	0	8.3
		LSB	7.7	0	8.3
		NB/ON	7.7	0	8.3
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 7	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
		NB/ON	0	0	0
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 8	RX	CW	0.8	8.4	0.7
		FM	0.7	7.4	0.2
		AM	0.7	7.4	0.2
		USB	0.8	8.4	0.7
		LSB	0.8	8.4	0.7
	TX	CW	0	0	0.7
		FM	0	0	0.7
		AM	0	0	0.7
		USB	0	0	0.7
		LSB	0	0	0.7

	Mode		Base	Collector	Emitter
TR 9	RX	CW	0.8	0	0
		FM	0.7	3.2	0
		AM	0.7	3.2	0
		USB	0.8	0	0
		LSB	0.8	0	0
	TX	CW	0.7	0	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	0.7	0	0
		LSB	0.7	0	0
TR 10	RX	CW	0	8.4	0
		FM	3.2	7.4	2.4
		AM	3.2	7.4	2.4
		USB	0	8.4	0
		LSB	0	8.4	0
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 11	RX	CW	0	8.4	0
		FM	2.4	7.2	1.7
		AM	2.4	7.2	1.7
		USB	0	8.4	0
		LSB	0	8.4	0
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 12	RX	CW	0.7	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0.7	0	0
		LSB	0.7	0	0
	TX	CW	0.7	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0.7	0	0
		LSB	0.7	0	0

	Mode		Base	Collector	Emitter
TR 13	RX	CW	0	0.1	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	-0.1	0.1	0
		LSB	-0.1	0.1	0
	TX	CW	0	0	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	-0.5	0	0
		LSB	-0.5	0	0
TR 14	RX	CW	0.7	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0.7	0	0
		LSB	0.7	0	0
	TX	CW	0.7	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0.7	0	0
		LSB	0.7	0	0
TR 15	RX	CW	1.3	5.3	0.7
		FM	1.3	5.4	0.7
		AM	1.3	5.4	0.7
		USB	1.3	5.3	0.7
		LSB	1.3	5.3	0.7
	TX	CW	1.3	5.3	0.7
		FM	1.3	5.3	0.7
		AM	1.3	5.3	0.7
		USB	1.3	5.2	0.7
		LSB	1.3	5.2	0.7
TR 16	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
		SQ(CW)	0.8	0	0
	TX	CW	0.8	0	0
		FM	0.8	0	0
		AM	0.8	0	0
		USB	0.8	0	0
		LSB	0.8	0	0

VOLTAGE CHART

	Mode		Base	Collector	Emitter
TR 17	RX	CW	2.2	8.0	1.5
		FM	2.2	8.0	1.5
		AM	2.2	8.0	1.5
		USB	2.2	8.0	1.5
		LSB	2.2	8.0	1.5
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 18	RX	CW	0.8	8.3	0.1
		FM	0.8	8.3	0.1
		AM	0.8	8.3	0.1
		USB	0.8	8.3	0.1
		LSB	0.8	8.3	0.1
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 19	RX	CW	1.6	6.6	0.8
		FM	0.8	0.1	0
		AM	0.8	0.1	0
		USB	1.6	6.6	0.8
		LSB	1.6	6.6	0.8
	TX	CW	2.3	6.8	7.5
		FM	2.9	2.0	7.4
		AM	2.9	2.0	7.4
		USB	2.3	6.8	7.5
		LSB	2.3	6.8	7.5
TR 20	RX	CW	0.7	3.6	0
		FM	0.4	1.9	0
		AM	0.4	1.9	0
		USB	0.7	3.6	0
		LSB	0.7	3.6	0
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0

	Mode		Base	Collector	Emitter
TR 21	RX	CW	3.6	6.1	2.9
		FM	1.9	1.2	1.2
		AM	1.9	1.2	1.2
		USB	3.6	6.1	2.9
		LSB	3.6	6.1	2.9
	TX	CW	0	6.8	0
		FM	0	2.1	0
		AM	0	2.1	0
		USB	0	6.8	0
		LSB	0	6.8	0
TR 22	RX	CW	0	2.9	7.4
		FM	0	1.2	8.2
		AM	0	1.2	8.2
		USB	0	2.9	7.4
		LSB	0	2.9	7.4
	TX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 23	RX	CW	0	0.5	0
		FM	0	0.5	0
		AM	0.7	0	0
		USB	0	0.5	0
		LSB	0	0.5	0
	TX	CW	0	0	0
		FM	0	0.2	0
		AM	0.7	0	0
		USB	0	0	0
		LSB	0	0	0
TR 24	RX	CW	2.5	6.4	1.8
		FM	2.5	6.4	1.8
		AM	2.5	6.4	1.8
		USB	2.5	6.4	1.8
		LSB	2.5	6.4	1.8
	TX	CW	2.5	6.4	1.8
		FM	2.5	6.4	1.8
		AM	2.5	6.4	1.8
		USB	2.5	6.4	1.8
		LSB	2.5	6.4	1.8

	Mode		Base	Collector	Emitter
TR 25	RX	CW	1.4	4.8	0.9
		FM	1.4	4.8	0.9
		AM	1.4	4.8	0.9
		USB	1.4	4.8	0.9
		LSB	1.4	4.8	0.9
	TX	CW	1.4	4.8	0.9
		FM	1.4	4.8	0.9
		AM	1.4	4.8	0.9
		USB	1.4	4.8	0.9
		LSB	1.4	4.8	0.9
TR 26	RX	CW	2.1	7.3	1.4
		FM	2.1	7.3	1.4
		AM	2.1	7.3	1.4
		USB	2.1	7.3	1.4
		LSB	2.1	7.3	1.4
	TX	CW	2.1	7.3	1.4
		FM	2.1	7.2	1.4
		AM	2.1	7.2	1.4
		USB	2.1	7.3	1.4
		LSB	2.1	7.3	1.4
TR 27	RX	CW	0.6	3.8	0
		FM	0.6	3.8	0
		AM	0.6	3.8	0
		USB	0.6	3.8	0
		LSB	0.6	3.8	0
	TX	CW	0.6	3.8	0
		FM	0.6	3.8	0
		AM	0.6	3.8	0
		USB	0.6	3.8	0
		LSB	0.6	3.8	0
TR 28	RX	CW	-	-	-
		FM	-	-	-
		AM	-	-	-
		USB	-	-	-
		LSB	-	-	-
	TX	CW	-	-	-
		FM	-	-	-
		AM	-	-	-
		USB	-	-	-
		LSB	-	-	-

	Mode		Base	Collector	Emitter
TR 29	RX	CW	1.3	7.7	0.6
		FM	1.3	7.7	0.6
		AM	1.3	7.7	0.6
		USB	1.3	7.7	0.6
		LSB	1.3	7.7	0.6
	TX	CW	1.3	7.7	0.6
		FM	1.3	7.7	0.6
		AM	1.3	7.7	0.6
		USB	1.3	7.7	0.6
		LSB	1.3	7.7	0.6
TR 30	RX	CW	3.0	6.4	2.4
		FM	0	0	0
		AM	0	0	0
		USB	3.0	6.4	2.4
		LSB	3.0	6.4	2.4
	TX	CW	3.2	6.9	2.7
		FM	3.2	6.9	2.7
		AM	3.2	6.9	2.7
		USB	3.2	6.9	2.7
		LSB	3.2	6.9	2.7
TR 31	RX	CW	0	3.0	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	0	3.0	0
		LSB	0	3.0	0
	TX	CW	0	3.0	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	0	3.0	0
		LSB	0	3.0	0
TR 32	RX	CW	0.7	0	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	0.7	0	0
		LSB	0.7	0	0
	TX	CW	0.7	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0

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	Mode		Base	Collector	Emitter
TR 33	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
	TX	CW	0.6	0.6	0
		FM	0.5	0.6	0
		AM	0.5	0.6	0
		USB	0.6	0.6	0
		LSB	0.6	0.6	0
TR 34	RX	CW	7.8	8.2	8.3
		FM	7.8	8.2	8.3
		AM	7.8	8.2	8.3
		USB	7.8	8.2	8.3
		LSB	7.8	8.2	8.3
	TX	CW	7.8	8.1	8.3
		FM	7.8	0.6	8.3
		AM	7.8	0.6	8.3
		USB	7.8	0.6	8.3
		LSB	7.8	0.6	8.3
TR 35	RX	CW	8.2	8.3	7.7
		FM	0	0	7.7
		AM	0	0	7.7
		USB	0	0	7.7
		LSB	0	0	7.7
	TX	CW	8.2	8.3	7.7
		FM	0	0	7.7
		AM	0	0	7.7
		USB	0	0	7.7
		LSB	0	0	7.7
TR 36	RX	CW	7.7	8.4	8.4
		FM	7.7	8.4	8.4
		AM	7.7	8.4	8.4
		USB	7.7	8.4	8.4
		LSB	7.7	8.4	8.4
	TX	CW	7.8	0	8.3
		FM	7.8	0	8.3
		AM	7.8	0	8.3
		USB	7.8	0	8.3
		LSB	7.8	0	8.3

	Mode		Base	Collector	Emitter
TR 37	RX	CW	0.66	0.1	0
		FM	0.66	0.1	0
		AM	0.66	0.1	0
		USB	0.66	0.1	0
		LSB	0.66	0.1	0
	TX	CW	0	7.8	0
		FM	0	7.8	0
		AM	0	7.8	0
		USB	0	7.8	0
		LSB	0	7.8	0
TR 38	RX	CW	7.9	0	8.4
		FM	7.9	0	8.4
		AM	7.9	0	8.4
		USB	7.9	0	8.4
		LSB	7.9	0	8.4
	TX	CW	7.6	8.2	8.4
		FM	7.6	8.2	8.4
		AM	7.6	8.2	8.4
		USB	7.6	8.2	8.4
		LSB	7.6	8.2	8.4
TR 39	RX	CW	0.69	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
	TX	CW	0.7	0	0
		FM	0	2.7	0
		AM	0	2.7	0
		USB	0	2.8	0
		LSB	0	2.8	0
TR 40	RX	CW	1.6	12.9	1.0
		FM	1.6	12.9	1.0
		AM	1.6	12.9	1.0
		USB	1.6	12.9	1.0
		LSB	1.6	12.9	1.0
	TX	CW	1.6	12.7	1.0
		FM	1.6	11.9	1.0
		AM	1.6	11.9	1.0
		USB	1.6	12.7	1.0
		LSB	1.6	12.7	1.0

	Mode		Base	Collector	Emitter
TR 41	RX	CW	13.1	8.5	13.8
		FM	13.1	8.5	13.8
		AM	13.1	8.5	13.8
		USB	13.1	8.5	13.8
		LSB	13.1	8.5	13.8
	TX	CW	13.0	8.4	13.6
		FM	12.1	8.4	13.0
		AM	12.1	8.4	13.0
		USB	13.0	8.4	13.6
		LSB	13.0	8.4	13.6
TR 42	RX	CW	1.2	3.2	0.6
		FM	1.2	3.2	0.6
		AM	1.2	3.2	0.6
		USB	1.2	3.2	0.6
		LSB	1.2	3.2	0.6
	TX	CW	1.2	3.2	0.6
		FM	1.2	3.2	0.6
		AM	1.2	3.2	0.6
		USB	1.2	3.2	0.6
		LSB	1.2	3.2	0.6
TR 43	RX	CW	-	-	-
		FM	-	-	-
		AM	-	-	-
		USB	-	-	-
		LSB	-	-	-
	TX	CW	-	-	-
		FM	-	-	-
		AM	-	-	-
		USB	-	-	-
		LSB	-	-	-
TR 44	RX	CW	0	5.7	0
		FM	0	5.7	0
		AM	0	5.7	0
		USB	0	13.8	0
		LSB	0	13.8	0
	TX	CW	0.7	5.6	0
		FM	0.6	5.6	0
		AM	0.6	5.6	0
		USB	0.7	13.7	0
		LSB	0.7	13.7	0

	Mode		Base	Collector	Emitter
TR 45	RX	CW	0	5.7	0
		FM	0	5.7	0
		AM	0	5.7	0
		USB	0	13.8	0
		LSB	0	13.8	0
	TX	CW	0.7	5.6	0
		FM	0.6	5.6	0
		AM	0.6	5.6	0
		USB	0.7	13.7	0
		LSB	0.7	13.7	0
TR 46	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
	RX	CW	1.4	8.1	0.8
		FM	1.4	7.4	0.8
		AM	1.4	7.4	0.8
		USB	1.4	8.1	0.8
		LSB	1.4	8.1	0.8
TR 47	RX	CW	0	0	0
		FM	0	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
	TX	CW	1.4	6.1	0.7
		FM	1.4	6.1	0.7
		AM	1.4	6.1	0.7
		USB	1.4	6.1	0.7
		LSB	1.4	6.1	0.7
TR 48	RX	CW	0	7.8	0.5
		FM	0	7.8	3.6
		AM	0	7.8	3.6
		USB	0	7.8	0.5
		LSB	0	7.8	0.5
	TX	CW	0	7.7	0.5
		FM	0	7.7	3.6
		AM	0	7.7	3.6
		USB	0	7.7	0.5
		LSB	0	7.7	0.5

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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	-	-	-	8.4	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				
		SQ(CW)	-	-	-	-	-	-	-	0.9	-	3.2	-	-	-	-				
	TX	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				
		USB	-	-	-	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 2	RX	CW	0	0	0	0	0	0	0											
		FM	1.2	1.3	7.1	0	3.2	3.3	5.1											
		AM	0	0	0	0	0	0	0											
		USB	0	0	0	0	0	0	0											
		LSB	0	0	0	0	0	0	0											
	TX	CW	0	0	0	0	0	0	0											
		FM	1.2	1.3	7.1	0	3.4	3.4	3.9											
		AM	0	0	0	0	0	0	0											
		USB	0	0	0	0	0	0	0											
		LSB	0	0	0	0	0	0	0											
IC 3	RX	CW	3.0	3.4	3.4	0	6.0	7.7	7.8											
		FM	0	3.4	3.4	0	6.0	7.6	7.8											
		AM	0	3.4	3.4	0	6.0	7.6	7.8											
		USB	3.0	3.4	3.4	0	6.0	7.7	7.8											
		LSB	3.0	3.4	3.4	0	6.0	7.7	7.8											
	TX	CW	3.0	3.4	3.4	0	6.0	7.5	4.0											
		FM	0	3.4	3.4	0	6.0	7.5	3.7											
		AM	0	3.4	3.4	0	6.0	7.5	4.0											
		USB	3.0	3.4	3.4	0	6.0	7.5	4.0											
		LSB	3.0	3.4	3.4	0	6.0	7.5	4.0											

	Mode		Base	Collector	Emitter
TR 49	RX	CW	6.2	13.2	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
	TX	CW	6.1	12.6	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 50	RX	CW	13.2	5.7	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
	TX	CW	12.6	5.6	13.1
		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 51	RX	CW	13.3	5.7	13.8
		FM	13.3	5.7	13.8
		AM	13.3	5.7	13.8
		USB	13.1	13.8	13.8
		LSB	13.1	13.8	13.8
	TX	CW	13.1	5.6	13.7
		FM	12.5	5.5	13.0
		AM	12.5	5.5	13.0
		USB	13.0	13.7	13.7
		LSB	13.0	13.7	13.7
TR 52	RX	CW	0	5.7	0
		FM	0	5.7	0
		AM	0	5.7	0
		USB	7.9	13.8	7.2
		LSB	7.9	13.8	7.2
	TX	CW	0	5.6	0
		FM	0	5.5	0
		AM	0	5.5	0
		USB	7.8	13.7	7.1
		LSB	7.8	13.7	7.1

	Mode		Base	Collector	Emitter
TR 53	RX	CW	0.9	7.7	1.7
		FM	0.9	7.7	1.7
		AM	0.9	7.7	1.7
		USB	0.9	7.7	4.2
		LSB	0.9	7.7	4.2
	TX	CW	0.9	7.7	1.7
		FM	0.9	7.7	1.7
		AM	0.9	7.7	1.7
		USB	0.9	7.7	4.2
		LSB	0.9	7.7	4.2
TR 54	RX	CW	0	0	0
		FM	0.7	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
	TX	CW	0	0	0
		FM	0.7	0	0
		AM	0	0	0
		USB	0	0	0
		LSB	0	0	0
TR 55	RX	CW	0.7	0	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	0.7	0	0
		LSB	0.7	0	0
	TX	CW	0.7	0	0
		FM	0.7	0	0
		AM	0.7	0	0
		USB	0.7	0	0
		LSB	0.7	0	0

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	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										
	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										
IC 5	RX	CW	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
	L	FM	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
	O	AM	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
	W	USB	8.4	4.3	4.3	4.3	-	-	3.2	8.2	0	0	0	0	0	8.3	0	8.3	8.3	0
		LSB	8.4	4.3	4.3	4.3	-	-	3.2	8.2	0	0	0	0	0	8.3	0	8.3	8.3	0
		CW	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
	M	FM	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
	I	AM	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
	D	USB	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
		LSB	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
		CW	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
	H	FM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
	I	AM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
		USB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
		LSB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3

	Mode		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 5 (con't)	TX	CW	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
	L	FM	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
	O	AM	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
	W	USB	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
		LSB	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	0	8.3	0	8.3	8.3	0
		CW	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
	M	FM	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
	I	AM	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
	D	USB	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
		LSB	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	0	0	8.3
		CW	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
	H	FM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
	I	AM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
		USB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
		LSB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	0	8.3	8.3
IC 6	RX	CW	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		FM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
	L	AM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
	O	USB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
	W	LSB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		CW	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
	M	FM	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
	I	AM	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
	D	USB	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
		LSB	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
		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		
	H	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		
		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		
		LSB	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		

VOLTAGE CHART

	Mode		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 6 (con't)	TX LOW	CW	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		FM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		AM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		USB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
		LSB	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3		
	MID	CW	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
		FM	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
		AM	0	0	8.3	0	0.5	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
		USB	0	0	8.3	0	8.3	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
		LSB	0	0	8.3	0	8.3	0	8.3	0	0	8.3	0	8.3	0	0	0	8.3		
	HI	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		
		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		
		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		
		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		
		LSB	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		
IC 7	RX LOW	CW	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		FM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		AM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		USB	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		LSB	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
	MID	CW	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		AM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		USB	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		LSB	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
	HI	CW	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		FM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		AM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		USB	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		LSB	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		

	Mode		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 7 (con't)	TX LOW	CW	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		FM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		AM	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		USB	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
		LSB	0	7.9	0	0	8.3	0	0	0	0	0	8.3	8.3	0	-	0	8.3		
	MID	CW	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		AM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		USB	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
		LSB	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	-	0	8.3		
	HI	CW	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		FM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		AM	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		USB	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
		LSB	0	0	0	0	8.3	7.9	0	0	8.3	0	0	8.3	8.3	-	7.9	8.3		
IC 8	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	13.0	6.3	0	0.5	2.2	2.2	0	0	0	10.9								
		AM	13.0	6.3	0	0.5	2.2	2.2	0	0	0	10.9								
		USB	13.7	6.6	0	0.5	2.2	2.2	0	0	0	11.6								
		LSB	13.7	6.6	0	0.5	2.2	2.2	0	0	0	11.6								
IC 9	RX	CW	0	0	0	0	0	0	0	0	0	0	-0.3	0	-0.3	0				
		FM	0	0	0	0	0	0	0	0	0	0	-0.3	0	-0.3	0				
		AM	0	0	0	0	0	0	0	0	0	0	-0.3	0	-0.3	0				
		USB	0	0	0	0	0	0	0	0	0	0	-0.3	0	-0.3	0				
		LSB	0	0	0	0	0	0	0	0	0	0	-0.3	0	-0.3	0				
		CW	0	8.0	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0				
		FM	0	8.0	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0				
		AM	0	8.0	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0				
		USB	0	7.9	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0				
		LSB	0	7.9	8.0	0	8.0	0	2.7	2.7	0	1.0	1.4	1.0	1.4	0				

C148GTL 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 Temerature 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 strenght, 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 ½-watt of audio output. AM: 0.5 uV for 10 dB (S+N)/N at greater than ½-watt of audio output. FM: 1.0 uV for 20 dB (S+N)/N at greater than ½-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 SSB/CW: 10.695 MHz.
Adjacent-Channel Rejection 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; thereshold 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