

APPENDIX 6
ALIGNMENT INSTRUCTIONS

FOUR (4) PAGES OF ALIGNMENT INSTRUCTIONS FOLLOW THIS SHEET

ALIGNMENT INSTRUCTIONS
FCC ID: C2R-DX-2547

APPENDIX 6

DX-2547

ALIGNMENT

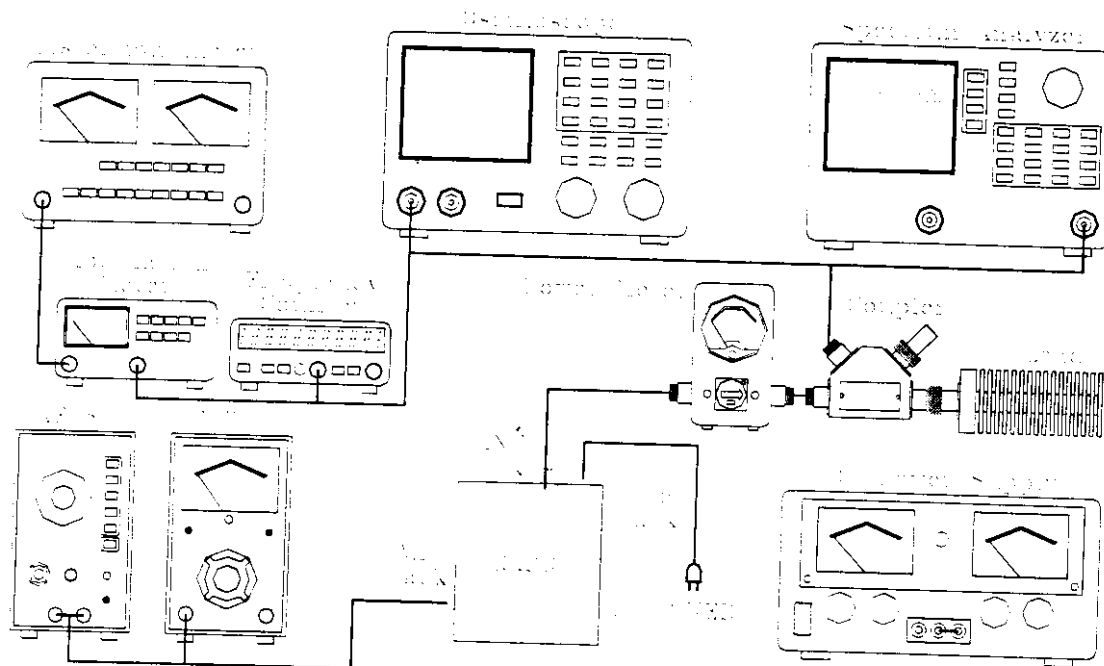
1.0 TEST EQUIPMENT

- | | |
|--------------------------------|---------------------------------|
| 1. Oscilloscope (50MHz) | 6. Frequency Counter (100MHz) |
| 2. DC Power Supply (13.8V,10A) | 7. MultiMate (digital) |
| 3. Deviation Meter | 8. Distortion Meter |
| 4. Audio Signal Generator | 9. Spectrum Analyzer |
| 5. RF Signal Generator | 10. RF Power Meter (100MHz,50W) |

1.1 PLL SYNTHESIZER / OSCILLATOR FREQUENCY ALIGNMENT

ITEM	CONNECTS & SETTING	ADJUST	MEASUREMENT
REGULATOR	POWER SW/GND	VR701	13.8V
VCO	Disconnect the "short PCB" from	L14	2.5VDC±0.1
VOLTAGE	TP7, TP8 and TP9. Set Radio to CH AM RX mode.Voice Lock Setting in 12 O' clock.Connect Connect Oscilloscope to TP3 Set radio to CH 1 AM RX mode Connect Frequency counter Pin8	L15 VC1	Maximum Output 10.240MHz±20Hz
AM FREQ	Set Radio to CH 1 AM RX mode Connect Frequency counter to TP3	L20	16.27000MHz ± 20Hz
USB FREQ	Set Radio to CH 1 USB mode Connect Frequency counter to TP3	L21	16.27250MHz ± 20Hz
LSB FREQ	Set Radio to CH 1 LSB mode Connect Frequency counter to TP3	L22	16.26750MHz ± 20Hz
TX FREQ	Set Radio to CH 1 AM TX mode Connect Frequency counter to TP3	VR7	16.27000MHz ± 20Hz
AM OSC	Set Radio to CH 1 AM TX mode Connect Frequency counter to TP5	L23	10.69500MHz ± 20Hz
USB OSC	Set Radio to CH 1 USB TX mode	L24	10.69250MHz ± 20Hz
LSB OSC	Set Radio to CH 1 LSB TX mode and short the Q34 E & C Connect Frequency counter to TP5	L25	10.69750MHz ± 20Hz

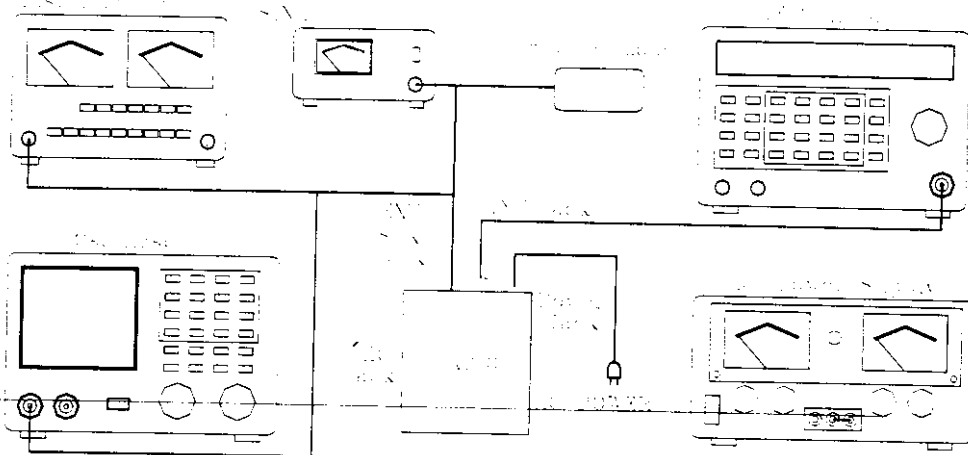
1.2 TRANSMITTER ALIGNMENT



ITEM	CONNECTS & SETTING	ADJUST	MEASUREMENT
Limits	Set Radio SSB Rx Connect		
BIAS	Voltage meter to TP7	VR17	Dc 12.5V
CURRENT	Set Radio CH 19, USB TX mode		
	MOD off Connect Current meter		
	TP7(+) and TP9(-)	VR12	100mA
	TP7(+) and TP8(-)	VR10	50mA
SSB	Set Radio CH 19 USB TX mode		
TX POWER	Connect "short PCB" to TP7,8,9	L43,44,42,	Power output Max.
	Connect RF Power meter to ANT	40	All Band Balance
	Connect AF SG to MIC Jack		Spurious Emission
	Change Radio Band & CH from		Min
	Lo , A Band to Hi , F Band		Power over 12W
	CH 1 & CH40 for Testing		
Emission	- MIC AF. input Off	VR6	Emission Min
APC	- Change to Hi A Band CH1		
(SSB Power)	AF 1Khz 30mv input MIC gain Max	VR13	Power output 11.5W
			All CH 11.5 ± 1W

ITEM	CONNECTS & SETTING	ADJUST	MEASUREMENT
AM	Set Radio CH19 AM TX mode	VR14	Power output 3.8W
TX POWER	MOD off (AF Signal off)		All CH 3.8W±1W
S/RF METER	Meter switch to S/RF position	VR9	Meter needle to green bar Max
AM	Set Radio Hi A Band CH1 AM TX		
MODULATION	Audio signal 30mV, 1KHz to MIC MIC Gain Max	VR16	95% All CH ±5%

1.3 RECEIVER ALIGNMENT



ITEM	CONNECTS & SETTING	ADJUST	MEASUREMENT
AM	Set Radio CH 19 AM RX mode		Audio output Max
SENSITIVITY	Voice Lock Set in 12 O'clock	L5,6,7,8,9	> 2Vrms
	RF gain Max . Vol.Max . SQ.Open	10,2,3	
	NB/ANL Off . Tone Hi		S/N >10db
	Connect RF SG to ANT jack		
	RF SG Set 26.965MHz.AM30%.1uv.		
	Connect AF equipment to Ext. SP jack		
	Change Radio to CH1	L5,L6	All CH Balance
	Change RF SG Frequency to 26.965MHz		output >2V
	Change Radio to CH40	L5,L6	S/N > 10db
	Change RF SG Frequency to 27.405MHz		

ITEM	CONNECTS & SETTING	ADJUST	MEASUREMENT
USB	Set Radio to Hi A Band CH1 USB Rx	L11.12	Audio output > 2V
SENSITIVITY	Voice Lock Set in 12 O'clock VOL. Max , SQ.Open , RF Gain Max RF SG Set 26.966MHz 0.5uv MOD Off		S/N > 10db
LSB	-Change SG frequency to 26.964Mhz	L11.12	Audio output > 2v
SENSITIVITY	-Change Radio to LSB Mode		S/N > 10db
NB	RF SG Set 26.975Mhz 100uv MOD Off	L1	DC voltage to Max
ADJUST	Radio Set Hi A Band CH1 AM NB ON Connect Dc Voltage Meter to TP1		(> 2V)
AM	RF SG Set 26.965Mhz 1mv AM30% MOD	VR4	Adjust very slowly
SQUELCH	Radio Set Hi A Band CH1 AM Vol.Max RF Gain Max SQ.Max (fully clockwise)		Slowly until squench just open
SSB	RF SG Set 26.966Mhz 1mv MOD Off	VR3	Adjust very slowly
SQUELCH	Radio Set Hi A Band CH1 USB Vol.Max RF Gain Max SQ.Max (fully clockwise)		Slowly until squench just open
AM	RF SG Set 26.965Mhz 100uv AM30% MOD	VR1	Meter needle to
METER	Radio Set Hi A Band CH1 AM RF Gain Max		" 9 "
SSB	RF SG Set 26.966Mhz 100uv MOD Off	VR2	Meter needle to
METER	Radio Set Hi A Band CH1 SSB RF Gain Max		" 9 "

1.4 OTHER ALIGNMENT

ITEM	CONNECTS & SETTING	ADJUST	MEASUREMENT
Counter	Set Radio Hi A Band CH1 AM	VC1(in counter)	TP3 frequency
Frequency	Connect other Frequency Counter to Main PCB TP3		Add 10.695Mhz

(only for "F" Model)

APPENDIX 7

CIRCUITS AND DEVICES TO STABILIZE FREQUENCY

All 40 channels of transmitting, and receiving, frequencies are provided by PLL (Phase Locked Loop) (IC3, RCI8719/RCI-8734) circuitry.

The purpose of the PLL is to provide a multiple number of frequencies from a VCO (Voltage Controlled Oscillator) with quartz crystal accuracy and stability locked to crystal oscillator reference frequency.

The reference crystal oscillator frequency is 10.240 MHz.

CIRCUITS AND DEVICES TO
STABILIZE FREQUENCY
FCC ID: C2R-DX-2547

APPENDIX 7

APPENDIX 8

1. Circuits For Suppression Of Spurious Radiation

The tuning circuit between frequency synthesizer and final amp and "PI" network L31, C199, C200, L30, C195, C194, C207, C201, C202, L29, C195, L28, C192, C193 and C239 in the output circuit serve to suppress spurious radiation. This network serves to impedance match final rf amplifier to the antenna and to reduce spurious content to acceptable levels in the frequency synthesizer.

2. Circuits For Limiting Modulation

A very effective ALC (Automatic Level Control) circuit is used to limit audio gain so as not to over modulate beyond 90%. The dynamic range of the ALC circuit for this purpose is over 50 dB.

The output audio level is sensed by Q54, Q55, Q53 and amplifier as a control signal in Q53 and Q55. The control signal serves as a voltage controlled attenuator, Q38, Q39.

To eliminate modulation percentage variation due to power supply voltage change a supply voltage sensor circuit is incorporated into the ALC system.

DEVICES AND CIRCUITS TO SUPPRESS
SPURIOUS RADIATION AND LIMIT
MODULATION

FCC ID: C2R-DX-2547

APPENDIX 8

APPENDIX 9
PLL DATA SHEETS

DATA SHEETS FOR RCI8719 FOLLOW THIS SHEET

COPY OF PLL DATA SHEETS
FCC ID: C2R-DX-2547

APPENDIX 9

6-2

RCI 8719/RCI 8734 DATA SHEET

DESCRIPTION :

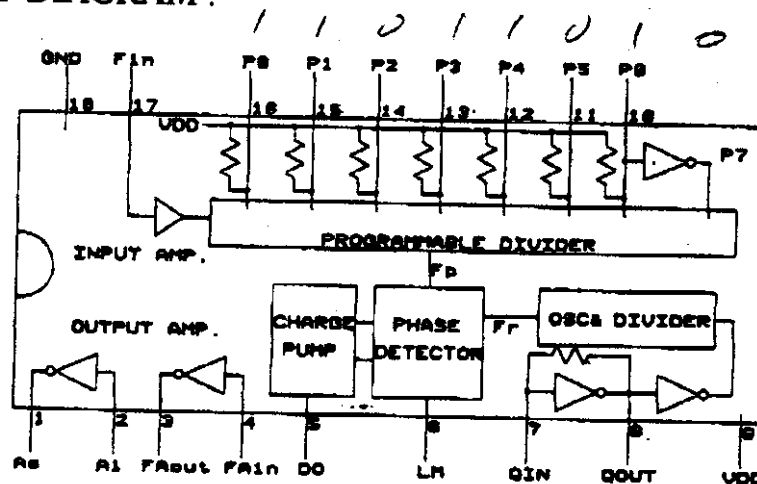
RCI 8719/RCI 8734 is a PLL frequency synthesizer in a 18-pin plastic dual-in-line package. The product is pin-to-pin compatible to the MB8719.

FEATURES :

The RCI 8719/RCI 8734 features a reference oscillator/amplifier, a 1024 reference divider chain, a parallel programmable 8-bit counter, phase detector, charge pump, and filter amplifier.

All parallel load inputs have internal pull-up circuit. Combined with an external VCO circuit each synthesizer block can provide all the remaining functions for a PLL frequency synthesizer.

BLOCK DIAGRAM :



6-3

FUNCTION DESCRIPTION :

Programmable Counter :

Using mechanical switches or electronic circuitry program P0..P6 to define the division ratio (N*) as follow :

P0	P1	P2	P3	P4	P5	P6	N
0**	0	0	0	0	0	1	64
1	0	0	0	0	0	1	65
0	1	0	0	0	0	1	66
:							:
1	1	1	1	1	1	1	127
0	0	0	0	0	0	0	128
1	0	0	0	0	0	0	129
0	1	0	0	0	0	0	130
:							:
1	1	1	1	1	1	0	191

* FOR RCI 8719 $64 \leq N \leq 191$

RCI 8734 $64 \leq N \leq 127$

** '1' = OPEN

'0' = GND

Divider :

The reference frequency (Fr) is divided by 1024 from oscillator input pin.

Phase Detector :

LM output 'H' when reference frequency (Fr) and programmed frequency (Fp) having phase error at falling edge.

Charge Pump :

DO is a tri-state output pin. It is dependent on Fr and Fp.

When $Fr > Fp$ DO = 'H' (source current)
 $Fr = Fp$ DO = 'Z' (high impedance)
 $Fr < Fp$ DO = 'L' (sink current)

6-4

Filter and Amplifier :

Pin 1..Pin 4 are two amplifiers. The output of DO is filtered and amplified to control the external VCO circuit.

ABSOLUTE MAXIMUM RATINGS :

Parameter	Sym .	Range	Units
SUPPLY VOLTAGE	VDD	- 0.3 -- + 12.0	V
INPUT VOLTAGE	V_i	- 0.3 -- + VDD	V
OUTPUT VOLTAGE	V_o	- 0.3 -- + VDD	V
OUTPUT CURRENT	I_o	± 10	mA
OPERATING TMP .	T_{opt}	- 20 -- +80	°C
STORAGE TMP .	T_{stg}	- 65 -- +150	°C

ELECTRICAL CHARACTERISTICS :

Parameter	Sym .	Condition	Min	Typ	Max	Unit
INPUT VOLTAGE P0-P6 ; FAin ; Ai ; Qin	V_{ih} V_{il}		6.5		1.0	V
INPUT VOLTAGE F_{in}	V_f	peak to peak	0.3			V
OUTPUT VOLTAGE FAout ; Ao	V_{oh} V_{ol}	$I_{oh} = - 0.5 \text{ mA}$ $I_{ol} = 0.5 \text{ mA}$	7.5		0.5	V
OSCILLATOR OUTPUT VOLTAGE Qout	V_{oh} V_{ol}	$C1 = C2 = 60 \text{ pF}$	6.5		1.0	V
SUPPLY VOLTAGE	VDD		7.8		8.2	V
OPERATE CURRENT	IDD	**		9.0		mA
INPUT FREQUENCY	F_{maxp} F_{maxq}	F_{in} (Pin 17) Qout (Pin 8)	4.0 11.0			MHZ

* @ VDD = 8.0 V T = 25°C

** FAin = Ai = 0 V ; $F_{in} = 1 \text{ MHZ}$; P0..P6 OPEN ; Qin-Qout CONNECT
10.24 MHZ CRYSTAL OSCILLATOR ; $C1 = C2 = 60 \text{ pF}$

APPENDIX 10
FINAL RF AMPLIFIER DATA SHEETS

THREE (3) PAGES FOR 2SC1969 FOLLOW THIS SHEET

FINAL RF AMP DATA SHEET
FCC ID: C2R-DX-2547

APPENDIX 10

ws\randx2547.TA

2SC1969

Item	X	A	B	C	D
Age	10-25	20-45	35-70	55-110	90-180