

- FCC ID: AUIFRS-200A -
2.1033(c)(9) ALIGNMENT

ALIGNMENT PROCEDURES

MODEL NO. : FRS-200A

DESTINATION : MUSICAL ELECTRONICS

FREQUENCY RANGE : 462.5825 ~ 467.7125 MHz

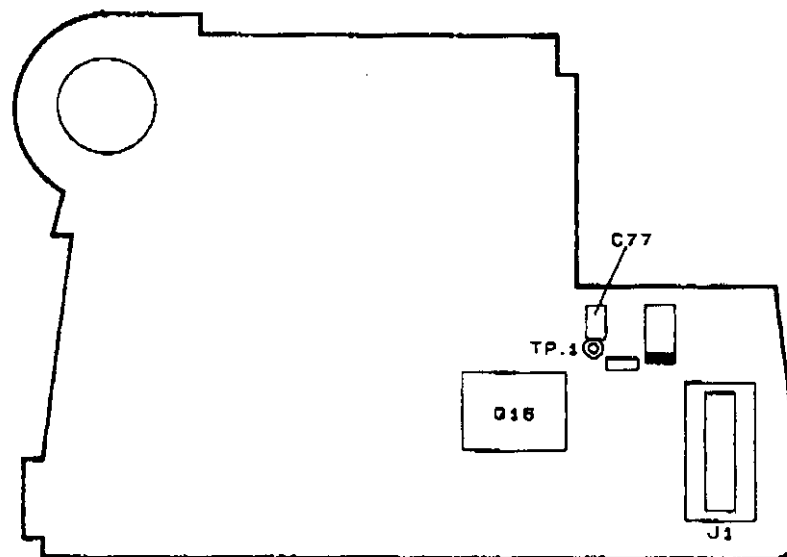
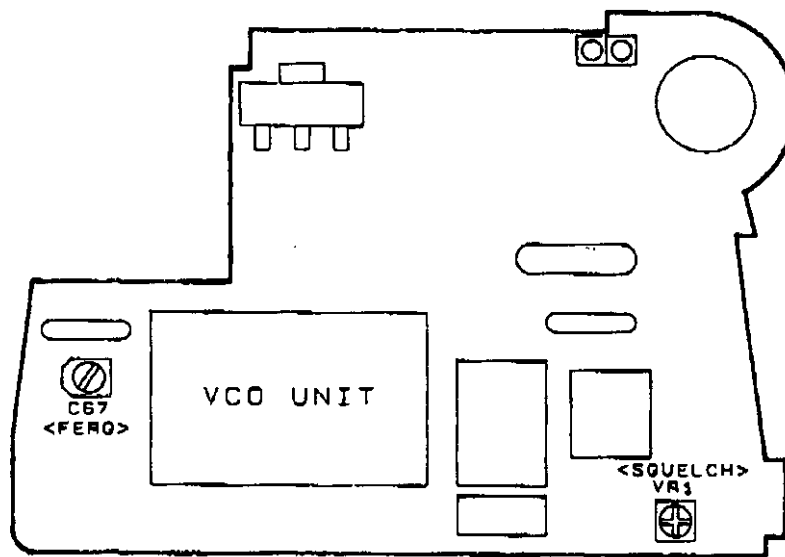


PALCOM ENGINEERING, INC.

RF PCB ALIGNMENT POINT

LOCATION OF ADJUSTMENT IN RF PCB

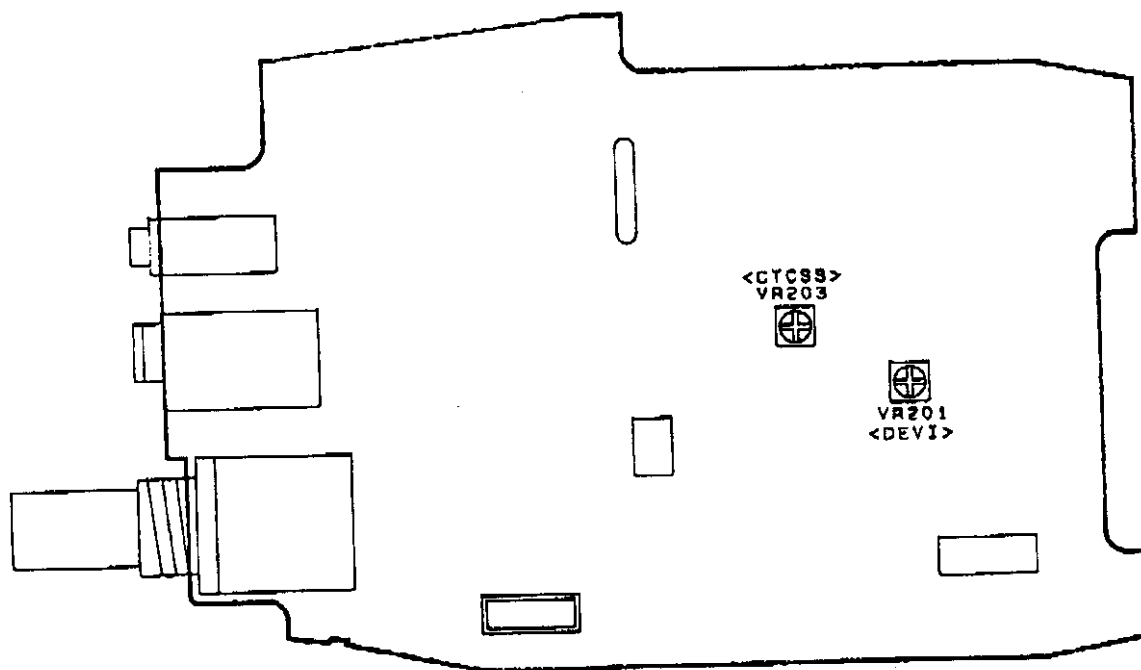
ERS-200A



CPU PCB ALIGNMENT POINT

LOCATION OF ADJUSTMENT IN CPU PCB

ERS-200A



ALIGNMENT CONDITIONS

Standard Conditions:

Power supply voltage 6.0 V DC.
 Audio output 75 mW
 Audio load 8 Ω
 Standard modulation $\pm 1.5\text{KHz}$ AT 1 KHz AF
 Transmission load 50 Ω
 Reception adjustment frequency See below
 Transmission adjustment frequency See below

TRANSMISSION / RECEPTION ADJUSTMENT FREQUENCIES

CHANNEL	FREQUENCY
1 CH	462.5625 MHz
7 CH	462.7125 MHz
14 CH	467.7125 MHz

« PLL ALIGNMENT »

Conditions:

- | | |
|-------------------------------|--------------|
| 1. Frequency | CH-1 , CH-14 |
| 2. SQL | OPEN |
| 3. VOL | MIN |
| 4. Power Supply Voltage | 6.0 V DC. |

PROCEDURES

- 1) Set a reception frequency to CH-1.
- 2) Connect a digital voltmeter with T.Pl .and confirm that a voltage shold be a range of
0.4 ~ 1.0 v.
- 3) Set a reception frequency to CH-14 and switch to transmit mode.
- 4) Confirm that a voltage shold be within a range of 2.0 ~ 3.0 V.

« TRANSMISSION ALIGNMENT »

Conditions:

- | | |
|-------------------------------|---------------|
| 1. Dummy load | 50 Ω |
| 2. Frequency | CH-1 , CH-14. |
| 3. SQL | OPEN |
| 4. VOL | MIN |
| 5. Power Supply Voltage | 6.0 V DC. |
-

Procedures:

- 1) RF output power alignment
 - a) Set supply voltage to 6.0 V.
 - b) Adjust a frequency to CH-1 and switch to transmit mode.
 - c) Confirm that the RF power obtained at CH-1 and CH-14 must be within a range of 0.45~ 0.50W.

2) TX FREQUENCY ALIGNMENT

- a) Set a frequency to CH-7, and switch to transmit mode.
- b) Adjust C67 so that a frequency counter reading should be within $462.7125 \text{ MHz} \pm 100 \text{ Hz}$.

3) DEVIATION

- a) Set a frequency to CH-7, and switch to transmit mode.
- b) Input 1KHz, from AG, 100 mV(Open Voltage) to the EXT-MIC terminal, and adjust VR201 so that deviation is $\pm 2.1 \text{ KHz}$.
- c) Lower the AG output, and adjust the deviation to $\pm 1.5 \text{ KHz}$. In that case, confirm that AG output voltage is within a range of 30 ~ 80 mV (Open Voltage).

4) CTCSS DEVIATION

- a) Set a frequency to CH-7, and set CTCSS CODE 38.
- b) Switch to transmit mode.
- c) Adjust VR203 so that a deviation is $\pm 0.6 \text{ KHz}$.

« RECEIVER ALIGNMENT »

Conditions:

1. Frequency CH-7
2. SQL OPEN
3. Power Supply Voltage 8.0 V DC.

Procedures:

1) RX SENSITIVITY ALIGNMENT

- A) Set a frequency to CH-7.
- b) Confirm that 12 dB SINAD is -9 dB approx.
- c) Confirm that a 12 dB SINAD of the frequencies at CH-1 and CH-14 must be below -7 dB.

2) SQUELCH SENSITIVITY ALIGNMENT

- A) Set a frequency to CH-7.
- b) Set a Signal Generator output Level -13.0dBμV E.M.F.
- C) Adjust the VRI so that Audio signal close POINT.

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— FCC ID: AUIFRS-200A —
2.1033(c)(10) CIRCUIT DESC.

《CIRCUIT DESCRIPTION》

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RECEIVER CIRCUIT

1. RF AMPLIFIER CIRCUIT

- * The input signal received through Ant. Terminal goes through L.P.F.(L1,L2,L3,C1-7) and is applied to RF AMP(Q8:2SC5066).
- * The signal amplified by RF AMP goes through B.P.F(F1:SAW FILTER) and is applied to 2nd RF AMP(Q9:2SC5066) and is applied to 1st MIX(er)(Q10:2SC5066).

2. MIXER CIRCUIT

- * The signal amplified at 2nd RF AMP goes to Base of 1st MIX(Q10:2SC5066).
Local signal(RX Freq - 21.7MHz) from the PLL is applied to Base of 1st MIX and is mixed and converted to 21.7MHz.

3. IF AMPLIFIER CIRCUIT

- * The signal converted to 21.7MHz. at 1st MIX have adjacent signals removed by B.P.F.(F1:Crystal Filter) and is sent to IF AMP.(Q11:2SC4215).
- * The signal amplified by IF AMP. goes to IF-IC(Q12:TA31136F)pin 18. Signal is mixed in MIX circuit in Q12 with 2nd local signal(21.25MHz) and converted to 450KHz. and come out as output from pin 3 of Q12.
- * The output signal from pin 3 is supplied to B.P.F.(F3:CFWM450G)where adjoining signals are removed and is applied to pin 5. Signal received at pin 5 goes through 2nd IF AMP.,limiter, quadratur,detector and comes out through pin 9 as detector output.

4. AUDIO AMPLIFIER SECTION

- * The detector output from Q12 goes through audio amplifier(Q209:BA10324F). Signals amplified by preamplifier goes through H.P.F circuit(Q209:BA10324) and mute circuit(Q217:2SK2009) and L.P.F(Q216:2SC4081) to audio volume control(S201).
Signal volume adjusted at S201 goes through AF Power Amplifier(Q215:TA7368F) where the output goes through external speaker jack(J203) to operate internal speaker(E1).

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5. SQUELCH CIRCUIT

- * 30Hz. - 30KHz. noise part of detector output from Q12(TA31136F) is amplified using the squelch amplifier in Q12.
- * This signal will go to the CPU which will turn the audio signal "ON" "OFF".

6. MUTE CIRCUIT

- * With BUSY Signal going to CPU mute output goes "ON" and "OFF". Pin 36 is mute output for AF Power amplifier(Q215) and Pin 37 of Q226 goes to the terminal for AF signal mute.
- * When BUSY output is "HI" Pin 36 is "LO" while Pin 37 will be "HI". When in this condition, mute circuit switch(Q219:DTC114) for AF Power amplifier goes "ON" and power supply for Q215 is turned "OFF". Also AF signal mute circuit(Q217:2SK2009) will become "OFF" condition and AF signal will go into muted condition.
- * When BUSY output is "LO" the reverse operation will be done.
- * When Buzz sound is to be sounded, only pin 36 of Q226 will go "ON", "OFF".

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TRANSMITTER SECTION

1. Pre-AMP

* Signal from PLL output amplifier goes through TX/RX switch(Q5:HSM2693) and to Pre-AMP(Q4:BF G425W) where it is amplified and supplied to Power Amplifier(Q3:BFG135A) as input.

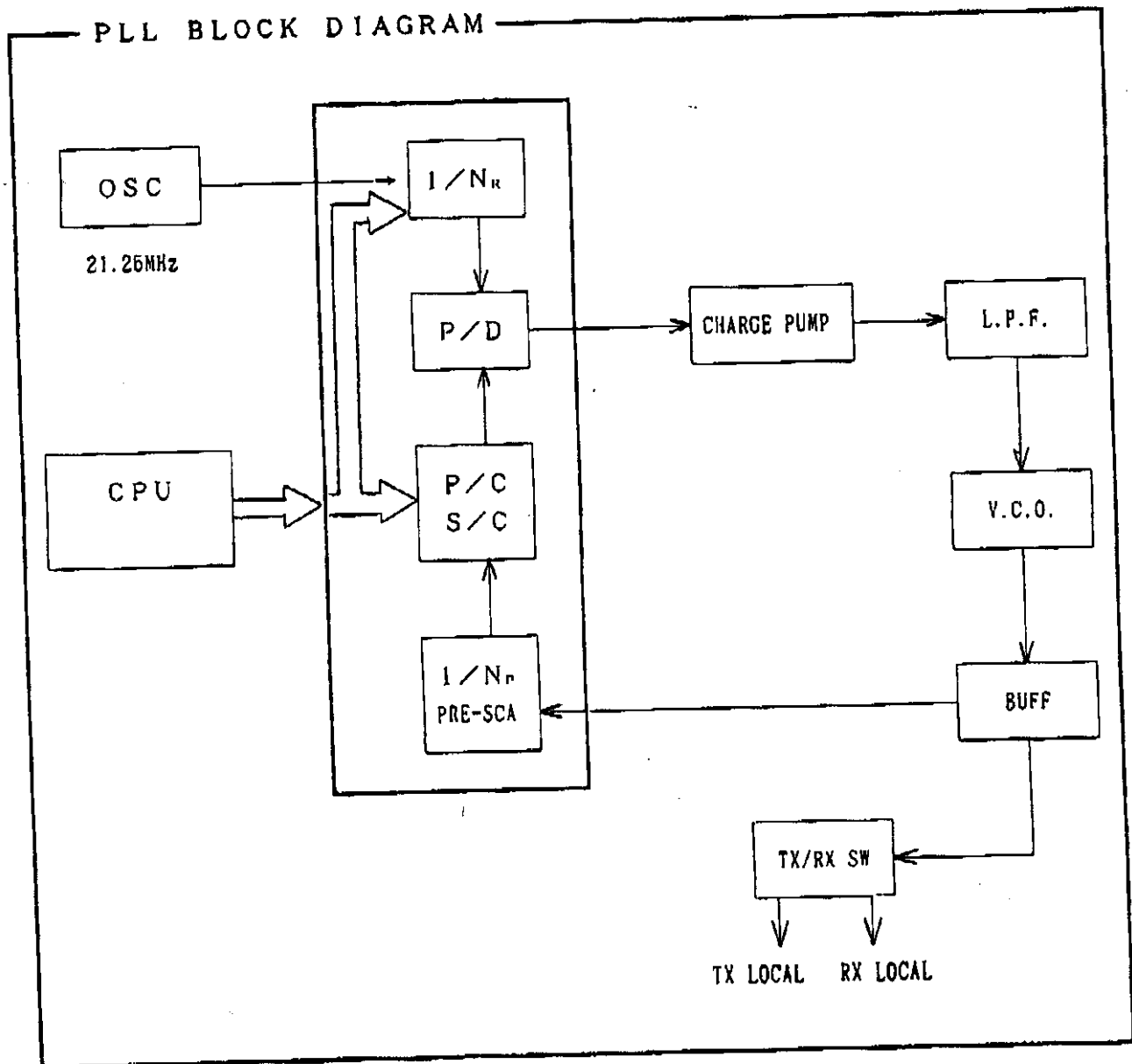
2. POWER AMP

* Signal is amplified at Power AMP(Q3:BFG135A) to approximately 0.6W. which goes through L.P.F(L5,C13) and to ANT AW(Q2:ISS356) circuit. After going through ANT SW circuit the signal goes through 2 stages of L.P.F. to reduce the high frequency harmonics and then to ANT terminal.

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PLL SECTION

- * PLL block of this unit is controlled by the micro-processor which is read in UP DOWN channel switch which is converted to serial data.
- * The PLL operates at the transmit frequency or the required L.O. frequency (receive-21.7MHz) according to whether it is in receive or transmit mode.
- * The PLL-IC(TB31202F) used in this circuit is a pulse swallow type and fundamental oscillator frequency divider, phase comparator, program counter, prescaler are all included internally.



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1. PROGRAMMABLE COUNTER, SWALLOW COUNTER SECTION

* Frequency data goes to micro-processor(Q226:uPD753036) and is processed to 17 bit serial data and divider ratio is set.

* Signal from CPU is added to PLL-IC(Q18:TB31202F) pin No.8(CLOCK), pin No.10(DATA), pin No.11(STROBE).

Calculation for divider ratio are set by the following;

TRANSMITTING FREQUENCY = WANTED FREQUENCY / STEP RATE

RECEPTION FREQUENCY = (WANTED FREQUENCY - 21.7MHz.) / STEP RATE

* The signal from V.C.O. goes into pin No.1 of PLL where the prescaler in the PLL-IC divides it by 1/64, 1/65 and goes to the program counter section.

2. PHASE DETECTION CIRCUIT SECTION, CHARGE PUMP SECTION

* The phase difference between fundamental oscillation frequency(21.25MHz) divided to $1/N_n$ internally in Q18(TB31202F) and frequency from programmable counter are detected.

Detected phase difference comes out as output from pin No.8 passes through Charge Pump and is supplied to PLL loop filter.

3. PLL LOOP FILTER SECTION

* The signal from charge pump is converted to DC voltage by loop filter consisting of CR integral circuit.

Converted DC voltage is applied to vari-cap diode(Q107:1SV279) of V.C.O. to change oscillation frequency within V.C.O..

4. V. C. O. CIRCUIT

* This is an oscillator circuit consisting of LC circuit and Q102(2SC4226).V.C.O. oscillating frequency is controlled by changing voltage applied to vari-cap Q107(1SV279).

* The V.C.O. of this unit is made to operate wide band and TX/RX switch over circuit are not used, also the V.C.O. are made nonadjustment.

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5. PLL OUTPUT CIRCUIT

- * The output of the V.C.O. goes to BUFF AMP(Q101:2SC5066) and is amplified to about -8dBm. This goes to TX/RX switch-over circuit(Q5:HSM2693) and is output to the RX LOCAL and TX LOCAL.

6. POWER SUPPLY CIRCUIT

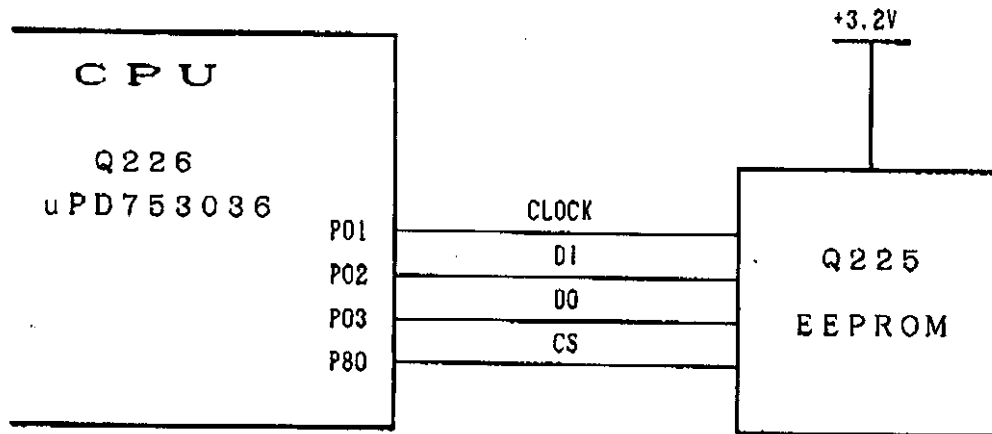
- * A constant 3.2V Supply is provided by RH5RL32A(Q220). The 3.2V line is switched to each of TX SW(Q224:2S8815), RX SW(Q223:DTA114TU), PLL SW(Q222:DTA114TU).
- * The switch-over of each section is done by command from CPU(Q226:uPD753036).

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EXPLANATION OF OPERATION OF CPU

CONTROL SECTION

1. Read in of EEPROM



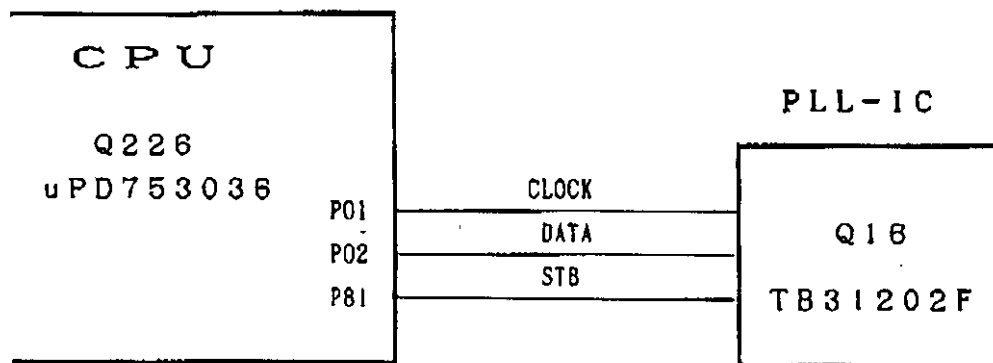
* The EEPROM(AT93C46) used in this unit has five function of read-out, write-in and others.
These functions are controlled by the CPU(Q228) port P01(CLOCK), P02(DI), P03(DO) and P80(CS)

* The contents of EEPROM memory are as shown below:

1. Operate frequency information.
2. Private Code information.
3. BEEP information.
4. Lock information.
5. Turn off BEEP information.

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2. CODE OUTPUT FOR PLL-IC

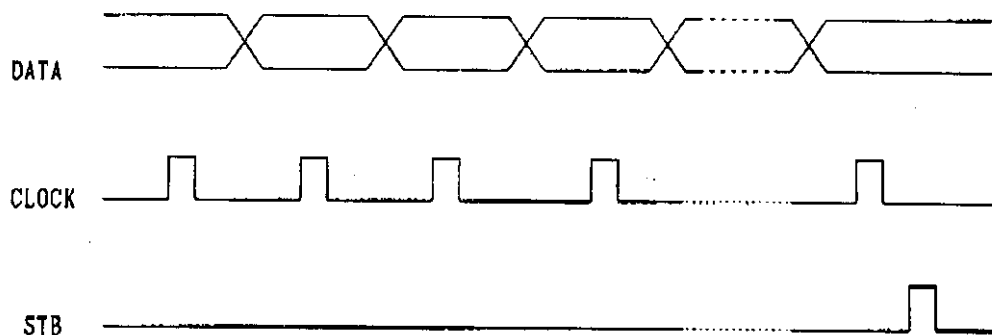


* P01(CLOCK), P02(DATA), P81(STB) of CPU(Q226) are sent out in serial form to control 12 bit programmable reference divider and 17 bit programmable divider.

Output data are sent out in sequence from MSB in synchronization with the CLOCK and after the LSB is sent out, one positive pulse is sent out on STB to latch the data.

In receive mode, when channel UP or DOWN, data will be sent out to PLL IC.

Sending out format is shown in drawing below:



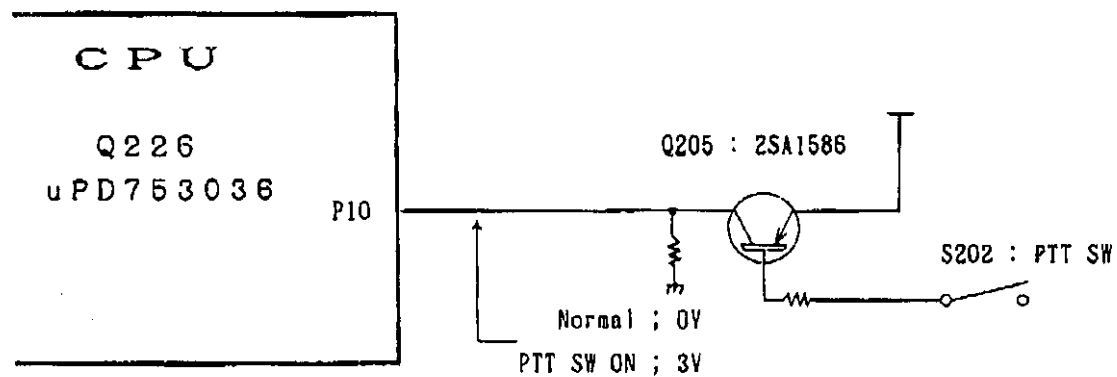
Output data can be calculated with equation shown below:

$$N(RX) = (RX \text{ FREQ} - 21.7\text{MHz}) / \text{STEP RATE}$$

$$N(TX) = (TX \text{ FREQ}) / \text{STEP RATE}$$

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3. P. T. T. SWITCH CIRCUIT



- * By setting of S202(PTT SW) to ON/OFF will change from receive mode to transmit mode.
- * When PTT SW is turned "ON", Q205(SW:2SA1586) will become "ON" and P10 of CPU(PTT read terminal) will become "HI" level.
- * In receiving condition(PTT SW : OFF) P10 goes low.

PARTS LIST

1999/5/12

FRS-200 RF BOARD

DATE: APR-22-1999

MANUFACTURER VENDOR	DESCRIPTION	DRAWING NUMBER	容 量	Q'TY	REFERENCE NUMBER	UNIT PRICE	TOTAL PRICE
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CK0R5C50PT	0.5p	3	C27,104,113		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CK010C50PT	1p	1	C63		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	1.5p	3	C3,112,118		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	3p	4	C2,7,36,64		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	4p	1	C10		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	5p	3	C6,10,30		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	7p	2	C13,111		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	8p	3	C4,44,45		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	10p	6	C5,21,26,65,109,115		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	22p	2	C25,37		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	24p	1	C40		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	33p	1	C86		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	47p	9	C9,20,22,29,39,61,81,105,108		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	56p	1	C66		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	100p	4	C32,52,68,69		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	220p	2	C55,56		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	470p	2	C31,72		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	0.001u	18	C1,8,11,16,19,23,28,38,41,42,47,48,53,58,62,71,101,107		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	0.0047u	1	C74		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	0.01u	6	C18,24,43,46,50,59		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	0.022u	1	C35		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	0.1u	4	C19,57,73,76		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	0.22u	1	C77		
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MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	3.3u/4V	1	C75		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	10u/4V	1	C106		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	33u/4V	1	C60		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	20p	1	C67		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	0.0	1	R40		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	100	3	R4,101,103		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	470	1	R3		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	1000	3	R11,13,36		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	1500	3	R1,18,20		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	2700	1	R22		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	3300	2	R15,107		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	4700	1	R27		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	5600	1	R23		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	8200	2	R2,24		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	1u0	1	R26		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	1.2k0	1	R113		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	1.5k0	1	R29		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH1R5C50PT	2.2k0	3	R7,8,9,14,33		

PARTS LIST

MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY132V	3.3k Ω	4	R5,19,31,105
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY142V	4.7k Ω	4	R30,41,42,104
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1822V	8.2k Ω	1	R43
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1103V	10k Ω	2	R6,108
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1223V	22k Ω	1	R39
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1333V	33k Ω	1	R38
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1473V	47k Ω	2	R28,109
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1823V	82k Ω	2	R12,102
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1104V	100k Ω	2	R106,110
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1124V	120k Ω	1	R17
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1194V	150k Ω	3	R21,32,35
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1334V	330k Ω	2	R25,34
MATSUSHITA	CHIP RESISTOR (1.6 X 0.8)	ER3GEY1474V	470k Ω	1	R10
ROHM	SEMIFIXED RESISTOR	NVR34N1-473	47k	1	VR1
TDK	CHIP COIL	MLF1608D668KT	0.66u	2	L17,16
TAIYO YUDEN	CHIP COIL	LEP015B 1R0M	1u	1	L4
TAIYO YUDEN	CHIP COIL	LEP015B 1R5M	1.5u	1	L18
MATSUTA	CHIP COIL	0603-10N	10n	1	L15
MATSUTA	CHIP COIL	0603-15N	15n	1	L8
MATSUTA	CHIP COIL	0603-22N	22n	3	L9,19,101
MATSUTA	CHIP COIL	0603-27N	27n	1	L6
MATSUTA	CHIP COIL	0603-33N	33n	1	L13
MATSUTA	CHIP COIL	0805-39N	39n	1	L10
LCIIDA	CHIP COIL	451403	12n	5	L1,2,3,11,103
LCIIDA	CHIP COIL	451404	17n	1	L5
ROHM	DIGITAL TRANSISTOR	DIC114TL		1	Q13
SIEMENS	TRANSISTOR	BFG135A		1	Q3
PHILIPS / SIEMENS	TRANSISTOR	BFG425W / BFP420		1	Q4
ROHM	TRANSISTOR	2SC4081T		1	Q103
TOSHIBA	TRANSISTOR	2SC4215(Y)		2	Q11,14
TOSHIBA	TRANSISTOR	2SC5066(O)		4	Q8,9,10,101
TOSHIBA	TRANSISTOR	2SC4226(R24)		3	Q6,15,102
NEC	CHIP DIODE	ISS302		1	Q7
TOSHIBA	CHIP DIODE	ISS356		2	Q1,2
ROHM	CHIP DIODE	MA116		1	Q17
MATSUSHITA	CHIP DIODE	HSM2693		1	Q5
HITACHI	CHIP DIODE	ISV279		2	Q104,107
TOSHIBA	VIRCAP DIODE	TB31202FN		1	Q16
TOSHIBA	IC (PIL)	TA31136FN		1	Q12
TOSHIBA	IC (IF)	LTM4506W		1	F3
CHEQUERS	CERAMIC FILTER	UMF-7182 (21.7MHz)		1	F2
UNIDEN	XTAL FILTER	KF465 (465MHz)		1	F1
KOREA ELECTRONICS	SAW FILTER	ITBM450C24		1	X1
CHEQUERS	CERAMIC DISC	ITBM450C24		1	X2
UNIDEN	XTAL (PIL REF)	21.25MHz		1	X1
LG	CONNECTOR	GB080-14P-H25-SD-C		1	11

PARTS LIST

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	ANTENA			1	ANTI		
	PCB	RF PCB		1	P1		
	PCB	VCO PCB		1	P2		

PARTS LIST

1999/5/12

FRS-200 CPU BOARD

DATE: APR-22-1999

MANUFACTURER VENDER	DISCRIPTION	DRAWING NUMBER	容量	QTY	REFERENCE NUMBER	UNIT PRICE	TOTAL PRICE
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH220150PT	22p	2	C274,275		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH470150PT	47p	7	C201,215,231,261,264,269,283		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH101150PT	100p	1	C261		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH221150PT	220p	1	C227		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39CH561150PT	560p	2	C208,246		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B102K50PT	0.001u	7	C211,213,243,259,266,270,272		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B272K50PT	0.0027u	1	C233		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B332K50PT	0.0033u	1	C228		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B472K50PT	0.0047u	2	C226,256		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B682K50PT	0.0068u	1	C234		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B103K50PT	0.01u	12	C216,217,218,219,232,238,253,263,265,268,292,296		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B153K50PT	0.015u	1	C207		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B183K50PT	0.018u	1	C242		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B333K50PT	0.033u	1	C244		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B393K50PT	0.039u	3	C236,237,239		
MURATA	CHIP CAPACITOR (1.6X0.8)	GRM39B473K50PT	0.047u	6	C202,205,221,222,257,258		
MURATA	CHIP CAPACITOR (2X1.25)	GRM40B823K25PT	0.082u	1	C245		
MURATA	CHIP CAPACITOR (2X1.25)	GRM40B104K25PT	0.1u	6	C209,214,223,229,235,253		
MURATA	CHIP CAPACITOR (2X1.25)	GRM40B184K25PT	0.18u	1	C224		
MURATA	CHIP CAPACITOR (3.2X1.6)	GRM42-6B334K25PT	0.33u	1	C241		
NEC	CHIP TANTALUM CAP	MSV421C105M	1u/16V	6	C204,206,220,225,247,249		
NEC	CHIP TANTALUM CAP	MSV420J225M	2.2u/6.3V	1	C240		
NEC	CHIP TANTALUM CAP	MSV420J475M	4.7u/6.3V	3	C210,212,254		
NEC	CHIP TANTALUM CAP	MSV40G106M	10u/4V	1	C250		
NEC	CHIP TANTALUM CAP	MSV40G336M	33u/4V	2	C271,273		
NEC	CHIP TANTALUM CAP	10REV100M6.3x5.5	100u/10V	2	C260,267		
RUBYCON	CHIP ELECTRO CAP	6.3REV100M5x5.5	100u/6.3V	1	C252		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY0R00V	0Ω	4	R227,289,290,296		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1220V	22Ω	1	R273		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1470V	47Ω	1	R260		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1101V	100Ω	1	R286		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1271V	270Ω	2	R292,293		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1471V	470Ω	2	R262, R263		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1102V	1kΩ	2	R261,269		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1222V	2.2kΩ	6	R202,215,224,275,301,302		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1332V	3.3kΩ	1	R239		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1392V	3.9kΩ	1	R242		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1472V	4.7kΩ	2	R225,280		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1682V	6.8kΩ	1	R223		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1103V	10kΩ	19	R203,204,206,207,208,211,214,216,221,222,231,232,243,		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1103V	10kΩ	0	255,264,265,268,270,281		
MATSUSHITA	CHIP RESISTOR (1.6X0.8)	ERJ3GEY1123V	12kΩ	1	R219		

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MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1223V	22k Ω	2	R238, 282		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1333V	33k Ω	1	R201		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1393V	39k Ω	2	R218, 283		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1473V	47k Ω	9	R226, R228, R230, R234, R237, R253, R259 , 287, R300		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1683V	68k Ω	2	R233, R272		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1104V	100k Ω	2	R205, 209, 210, 217, 235, 236, 247, 248, 251 , 252, 254, 258, 266,		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1154V	150k Ω	0	267, 271, 276, 277, 278, 288, 297, 298, 299 , 303		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1224V	220k Ω	3	R213, 241, 244, 245, 246		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1334V	330k Ω	1	R240		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1474V	470k Ω	3	R220, 229, 279		
MATLSHITA	CHIP RESISTOR (1.6×0.8)	ER3GEY1105V	1M Ω	1	R291		
ROHM	CHIP RESISTOR ARRAY	MN14E0104J	100k	2	R284, 285		
ROHM	SEMI FIXED RESISTOR	MVR34NJ-103	10k	3	VR201, 202, 203		
TOSHIBA	FET	2SK2009		1	Q217		
ROHM	DIGITAL TRANSISTOR	DTA114TL		2	Q222, 223		
ROHM	DIGITAL TRANSISTOR	DTC114TL		1	Q219		
MATLSHITA	TRANSISTOR	2SB779/R		2	Q218, 224		
TOSHIBA	TRANSISTOR	2SA1586/GR		1	Q205		
ROHM	TRANSISTOR	2SC4081T		4	Q204, 212, 214, 216		
ROHM	DIODE	DA204		2	Q211, 213		
MATLSHITA	DIODE	MA728		2	Q202, 203		
NEC	IC(CPU)	μPD733036		1	Q226		
TOSHIBA	IC(ALDIO)	T7368F		1	Q215		
RICOH	IC(REG)	RH5RL32A		1	Q220		
RICOH	IC(RESET)	RN5VL30A		1	Q221		
ROHM	IC	BA10924F		1	Q209		
TOSHIBA	IC	TA75V01FL		3	Q201, 206, 207, 208, 210		
ATMEL	EEP ROM	AT93C46		1	Q225		
MAREN TECHNOLOGY	LCD	MA205		1	LCD1		
LINDEN	X'TAL	SGO-2001(4MHz)		1	X201		
RING FORD	E.C.M	CE034D		1	E2		
REPLICON	SPEAKER	283A8B0-28-020(A)		1	E1		
IG	CONNECTOR	G8080-14S-H35-SD-C		1	J201		
TAI CHUNG	SPEAKER JACK	TC38-076-01		1	J203		
DAICHI PARTS	MIC JACK	ELM-3-2625		1	J202		
MECHATRONICS	POWER SV/VOL	RV091NS-B10K-15KΩ		1	S201		
CHUN KAI	SW	TC-SMD02N		8	S202, 203, 204, 205, 206, 207, 208, 209		
FLUTURE TECHNOLOGY	LED	FTEC-SM-1114G-A100		2	LED1, 2		
2592	PCB	CPL-PCB		1	P201		
2593	PCB	PTT-PCB		1	P203		