ADJUSTMENT

Adjustment Mode

In Adjustment Mode, the transceiver can adjusted using its panel keys.

■ Items that can be adjusted in Adjustment Mode *1

1. Frequency Tune
2. Transmit High Power *2
3. Transmit Low Power *2
4. DCS Balance *3
5. Max Deviation *3
6. CTCSS Fine Deviation *3
7. DCS Fine Deviation *3
8. DTMF Fine Deviation
9. Band Pass Tuning *4
10. Squelch Tight *5
11. Squelch Open *5
12. S-Meter S1 Level
13. S-Meter Full Level

Note :

*1 : The PLL lock voltage and Max Power Alignment for transmission cannot be adjusted in Adjustment Mode.

*2 : Adjusted in 5 points in the transmission operating frequency range.

*3 : Adjusted in 3 points for the Wide Band Width in the transmission operating frequency range.
Adjusted in 1 point for the Narrow Band Width

*4 : Adjusted in 3 points in the reception operating frequency range.

*5 : Adjusted in 3 points for the Wide Band Width in the reception operating frequency range.
Adjusted in 1 point for the Narrow Band Width

■ How to Enter Adjustment Mode

To perform adjustments with transceiver panel keys, the transceiver must be set to "Adjustment Mode".

While shorting the following figure terminals on the PCB with tweezers, etc., turn the power switch ON to enter Adjustment Mode. (See Fig. 1.)

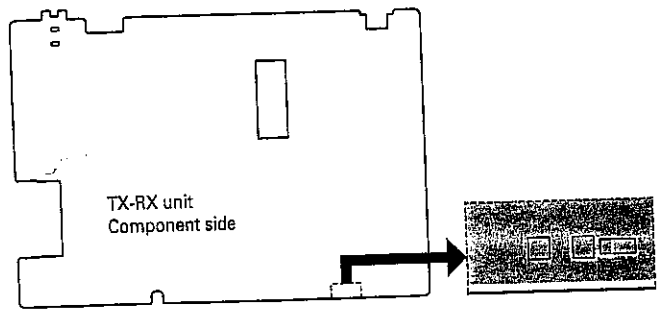


Fig. 1

■ LCD Display When Adjustment Mode is Enabled

Example of Frequency Tune. See "Table 1" for an LCD display list.

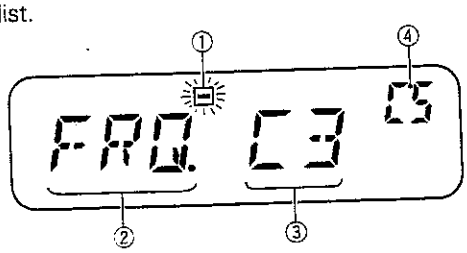


Fig. 2

① Blinks in Adjustment Mode.
② Adjustment item display
③ Adjustment value display. Can be adjusted while it is "blinking".
Displayed as a hexadecimal number from 00 to FF.
④ Adjustment value stored in memory.
When an adjustment value is determined, it is equal to the value in "3".

■ Panel Key Operation Method in Adjustment Mode

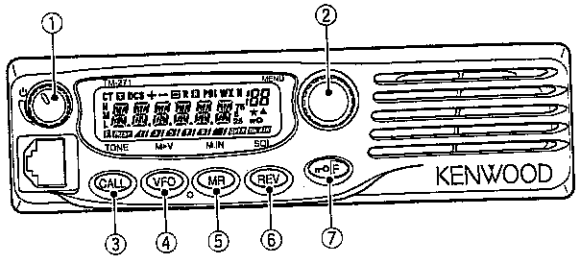


Fig. 3

① Power switch/Volume control
② When the knob is pressed once, the adjustment value display blinks. (Select an adjustment item with "4" or "5" key before performing the operation. It cannot be performed while transmitting.)
When the knob is rotated while the adjustment display is blinking, the adjustment value changes. (Adjust transmission items while transmitting.)
When the knob is pressed again, the adjustment value stops blinking and lights, and the adjustment value is saved in the memory of the transceiver. (For transmission item adjustment, enter receive mode before performing the operation.)
③ Changing between adjustment value display and frequency display
The display changes as follows : Adjustment value display → Transmit frequency display → Receive frequency display → Adjustment value display.
The frequency for adjustment can be confirmed.
④ Moves the adjustment item backward. (If it is operated when a frequency is displayed, the adjustment item display returns.)
⑤ Moves the adjustment item forward. (If it is operated when a frequency is displayed, the adjustment item display returns.)
⑥ If it is pressed before determining the adjustment value, the adjustment value of the Adjustment item returns to its original value.
⑦ Not used in Adjustment Mode.

Note :

If Max Power for transmission is low, check the DC cable.

If the DC cable connector has poor contact due to rust or stain, voltage may drop occur frequently and correct transmission power may not be supplied.

In this case, polish the DC cable connector. If the problem still persists, replace the DC cable with a new one.

ADJUSTMENT

Adjustment Item	Adjustment Frequency Point	On the Display	Note	Transmit (MHz)	Receive (MHz)	Signalling
Frequency Tune	Center	FRQ		155.10	155.05	
TX High Power	Low	HPL .	"H" icon appear	136.10	136.05	
	Low'	HPL '		142.10	142.05	
	Center	HPC .		150.10	150.05	
	High'	HPH '		156.10	156.05	
	High	HPH .		173.90	173.95	
TX Low Power	Low	LPL .	"L" icon appear	136.10	136.05	
	Low'	LPL '		142.10	142.05	
	Center	LPC .		150.10	150.05	
	High'	LPH '		156.10	156.05	
	High	LPH .		173.90	173.95	
DCS Balance	Low	BAL L	"DCS" icon appear	136.10	136.05	DCS : 023N
	Center	BAL C		155.10	155.05	
	High	BAL H		173.90	173.95	
DCS Balance (Narrow)	Center	BAL C	"DCS" and "N" icon appear	155.10	155.05	
Max Deviation	Low	MAX L		136.10	136.05	
	Center	MAX C		155.10	155.05	
	High	MAX H		173.90	173.95	
Max Deviation (Narrow)	Center	MAX C	"N" icon appear	155.10	155.05	
CTCSS Fine Deviation	Low	DV L	"CT" icon appear	136.10	136.05	CTCSS : 88.5Hz
	Center	DV C		155.10	155.05	
	High	DV H		173.90	173.95	
CTCSS Fine Deviation (Narrow)	Center	DV C	"CT" and "N" icon appear	155.10	155.05	
DCS Fine Deviation	Low	DV L	"DCS" icon appear	136.10	136.05	DCS : 023N
	Center	DV C		155.10	155.05	
	High	DV H		173.90	173.95	
DCS Fine Deviation (Narrow)	Center	DV C	"DCS" and "N" icons appear	155.10	155.05	
DTMF Fine Deviation	Center	DT		155.10	155.05	DTMF : 9
DTMF Fine Deviation (Narrow)	Center	DT	"N" icon appear	155.10	155.05	
Band Pass Tuning	Low	BPL	"BUSY" icon appear	136.10	136.05	
	Center	BPC		155.10	155.05	
	High	BPH		173.90	173.95	
Squelch Tight	Low	SQT L		136.10	136.05	
	Center	SQT C		146.10	146.05	
	High	SQT H		173.90	173.95	
Squelch Tight (Narrow)	Center	SQT C	"N" icon appear	146.10	146.05	
Squelch Open	Low	SQO L		136.10	136.05	
	Center	SQO C		146.10	146.05	
	High	SQO H		173.90	173.95	
Squelch Open (Narrow)	Center	SQO C	"N" icon appear	146.10	146.05	
S-Meter S1 Level	Center	S 1		146.10	146.05	
S-Meter Full Level	Center	S 7		146.10	146.05	

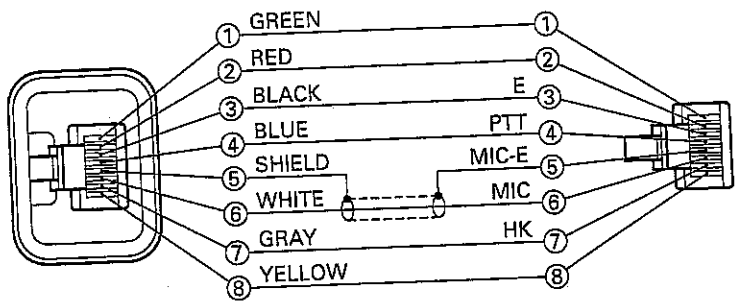
Table 1 Adjustment items, display and test frequency list

ADJUSTMENT

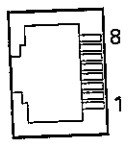
Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	136 to 175MHz Frequency modulation and external modulation –127dBm/0.1μV to greater than –7dBm/100mV
2. Power Meter	Input Impedance Operation Frequency Measurement Capability	50Ω 136 to 175MHz or more Vicinity of 100W
3. Deviation Meter	Frequency Range	136 to 175MHz
4. Digital Volt Meter (DVM)	Measuring Range Accuracy	1 to 20V DC High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 1000MHz 0.2ppm or less
7. Ammeter		20A
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 1mV to 3V
9. Audio Generator (AG)	Frequency Range Output	20Hz to 20kHz or more 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. 8Ω Dummy Load		Approx. 8Ω, 10W or more
12. Regulated Power Supply		13.8V, approx. 20A (adjustable from 9 to 17V) Useful if ammeter requipped
13. Spectrum Analyzer	Center frequency	50KHz to 1000MHz
14. Tracking Generator	Output Voltage	100mV or more

Test cable for microphone input (E30-3360-08)



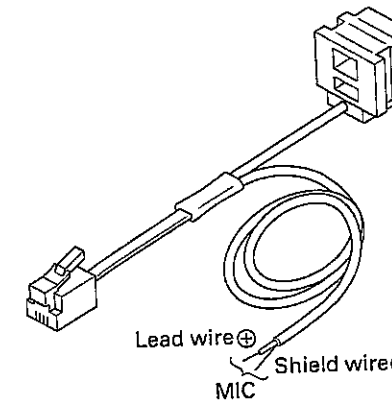
MIC connector (Front view)



1 : BLC
2 : PSB
3 : E
4 : PTT
5 : ME
6 : MIC
7 : HOOK
8 : CM

Tuning cable (E30-3383-05)

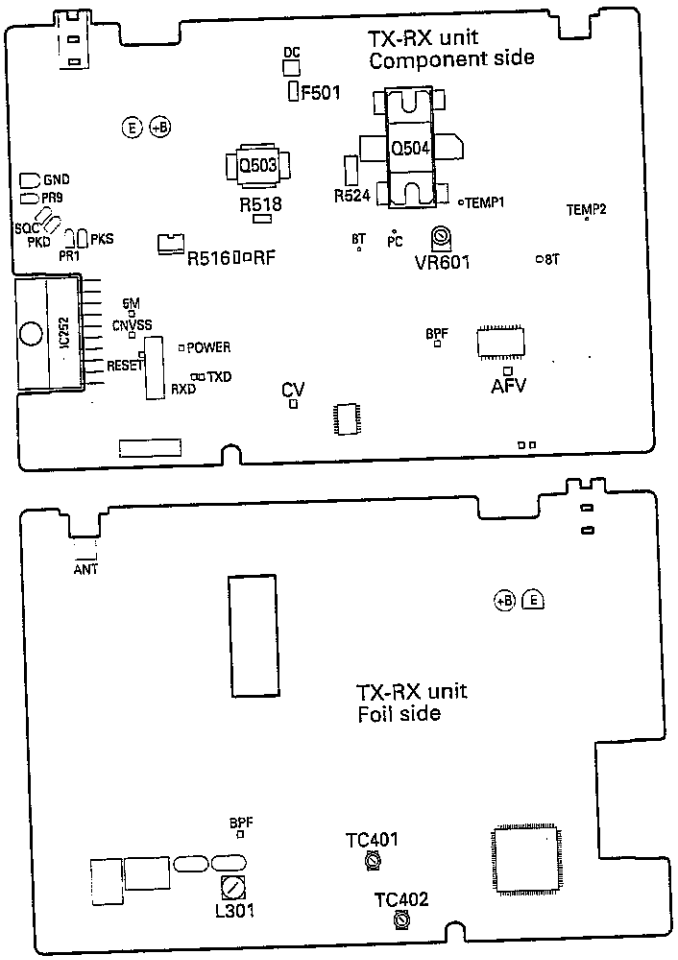
Adapter cable (E30-3383-05) is required for injecting an audio if adjustment mode is used.



ADJUSTMENT

Adjustment Location

■ Adjustment Points



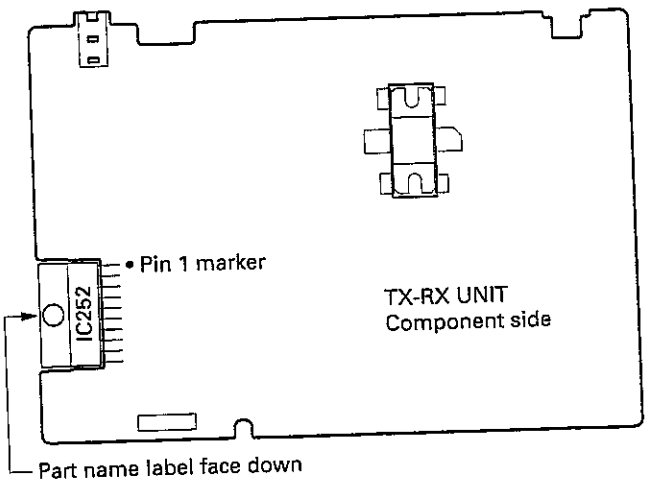
■ Notes

• EEPROM

The tuning data (Deviation, Squelch, etc.) for the EEPROM, is stored in memory. When parts are changed, re-adjust the transceiver.

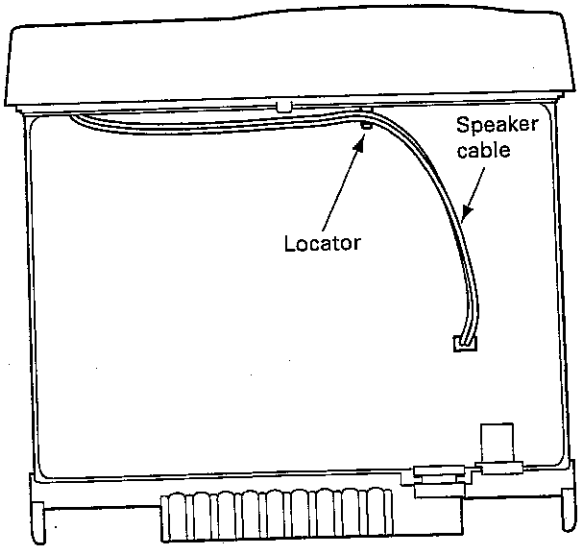
• AF PA IC (IC252)

How to mounting the IC252.



• Speaker Cable

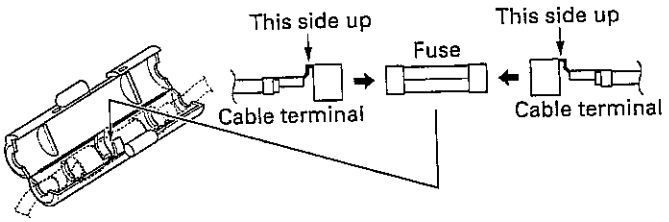
The speaker cable should be formed before mounting the shield cover as below.



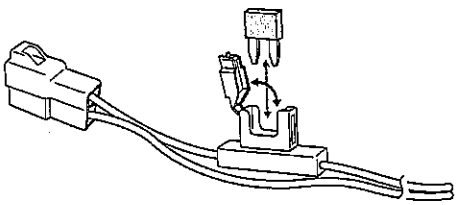
• Fuse

To mount the fuse, the cable terminal direction must be as follow.

• Except the E type models



• E type models



ADJUSTMENT

PCB Section

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
1. Setting	1) Power supply voltage DC Power supply terminal : 13.8V					
2. VCO lock voltage*	1) CH : TX high	Digital voltmeter	CV	TC402	5.5V	±0.2V
	2) CH : RX high			TC401	5.5V	±0.2V
	3) CH : TX low				Check	0.5V or more
	4) CH : RX low					
3. IF coil	1) CH : RX center (Wide) 2) SSG output : –53dBm (501µV) Mod : 1kHz Dev : 3kHz	SSG Digital voltmeter	AFV	L301	3.25~3.35V (DC)	

*** Adjustment of TX VCO lock voltage**

1. Remove R516, F501, R518 and R524 (all on component side).
2. Remove PCB from chassis.
3. Transmit and check voltage at [CV] point.

Warning : Do not transmit if step "1." is not complete.

4. Adjust of voltage can be done by tuning TC402.

Transmitter Section

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
1. Frequency	1) CH : TX center 2) Transmit	Frequency counter	ANT	Encoder knob	Adjust to center frequency	Within ±50Hz
2. Maximum power alignment	1) CH : TX high 2) Adjustment HEX value : FF 3) Transmit	Power meter		VR601	55W	±1W
3. High power	1) CH : TX low CH : TX low' CH : TX center CH : TX high' CH : TX high 2) Transmit			Encoder knob	Low : 50W Low' : 60W Center : 60W High' : 50W High : 50W	±1.0W
4. Low power	1) CH : TX low CH : TX low' CH : TX center CH : TX high' CH : TX high 2) Transmit				25W	±1.0W
5. DCS balance	1) CH : TX low (Wide) CH : TC center (Wide/Narrow) CH : TX high (Wide) 2) Transmit	Modulation analyzer or Linear detector (LPF : 3kHz) Oscilloscope			Adjust the waveform as below 	

ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
6. MAX deviation	1) CH : TX low (Wide) CH : TX center (Wide/Narrow) CH : TX high (Wide) 2) AG : 1kHz/50mV 3) Transmit	Modulation analyzer or Linear detector (LPF : 15kHz) Oscilloscope AG AF V.M	ANT MIC	Encoder knob	±4.0kHz (Wide) ±2.0kHz (Narrow) According to the large +, –	±100Hz (Wide) ±50Hz (Narrow)
7. MIC sensitivity	1) CH : TX center (Narrow) 2) AG : 1kHz/5.4mV (TM-271A) AG : 1kHz/2.4mV (TM-271E) 3) Transmit				Check	±1.2~1.9kHz (Narrow)
8. CTCSS fine deviation	1) CH : TX low (Wide) CH : TX center (Wide/Narrow) CH : TX high (Wide) 2) Transmit	Modulation analyzer or Linear detector (LPF : 3kHz) Oscilloscope		Encoder knob	±0.75kHz (Wide) ±0.35kHz (Narrow)	±50Hz
9. DCS fine deviation	1) CH : TX low (Wide) CH : TX center (Wide/Narrow) CH : TX high (Wide) 2) Transmit				±0.75kHz (Wide) ±0.35kHz (Narrow)	±50Hz (Wide) ±40Hz (Narrow)
10. DTMF fine deviation	1) CH : TX center (Wide/Narrow) 2) Transmit				±3.0kHz (Wide) ±1.5kHz (Narrow)	±200Hz (Wide) ±100Hz (Narrow)

If normal power is not obtained, please follow the step below

Open the shielding cover (upper), and screw 3 locations around ANT pin.

1. Switch off the transceiver.
   Impedance of Final FET (Q504) and Drive FET (Q503) can be measured easily using DVM Ω mode.
   Normal condition – Gate : 20kΩ~50kΩ, Drain : 1MΩ~2MΩ
   The above impedance values are rough estimations.
2. Switch on the transceiver. Check the voltage at F501 output point.
   The voltage is around 13.8V in receiving condition. The voltage will be 12.6V~ in transmitting condition. If found 0V at this point then F501 is broken.
3. Remove R516.
4. Connect 50Ω load at the ANT location.
   Transmit and check current drain at High power mode.
   If the current drain is less than 1A, then Final FET is broken.
   If the current drain is less than 5.0A, short the Drive FET gate to ground, and check the current drain.
   If the current drain is not 0.1A less than the original value, then the Drive FET is broken.
5. Check input power level at Drive FET gate location.
   Connect the wire to [RF] location.
   Transmit and check for power to be within the range of 0.3W~0.6W.
   If power found is less than 0.3W, check the circuit before the Drive FET.

Receiver Section

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
1. Band pass tuning	1) CH : RX low (Wide) CH : RX center (Wide/Narrow) CH : RX high (Wide) 2) SSG output : –121dBm (0.2μV) (Wide) : –119dBm (0.25μV) (Narrow) Mod : 1kHz Dev : ±3.0kHz (Wide) Dev : ±1.5kHz (Narrow)	SSG Oscilloscope AF V.M Distortion meter	ANT EXT. SP	Encoder knob	Adjust to maximum SINAD.	SINAD : 12dB or higher

ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
2. Squelch tight	1) CH : RX low (Wide) CH : RX center (Wide/Narrow) CH : RX high (Wide) 2) SSG output : –115dBm (0.4μV) (Wide/Narrow) Mod : 1kHz Dev : ±3.0kHz (Wide) Dev : ±1.5kHz (Narrow)	SSG Oscilloscope AF V.M Distortion meter	ANT EXT. SP	Encoder knob	Adjust to open the squelch	
3. Squelch open	1) CH : RX low (Wide) CH : RX center (Wide/Narrow) CH : RX high (Wide) 2) SSG output : –125dBm (0.126μV) (Wide/Narrow) Mod : 1kHz Dev : ±3.0kHz (Wide) Dev : ±1.5kHz (Narrow)					
4. RSSI writing	1) CH : RX center (Wide) 2) SSG output : –53dBm (501μV) Mod : 1kHz Dev : ±3.0kHz			Push encoder knob	RSSI value writing is performed by the "Squelch open" item (center wide). SSG output level is changed and adjusted after SQ adjustment. This adjustment should not turn the encoder.	
5. S-meter S1	1) CH : RX center (Wide) 2) SSG output : –118dBm (0.28μV) Mod : 1kHz Dev : ±3.0kHz					
6. S-meter full scale	1) CH : RX center (Wide) 2) SSG output : –96dBm (3.54μV) Mod : 1kHz Dev : ±3.0kHz					

TERMINAL FUNCTION

TX-RX UNIT (X57-685X-XX)

CN No.	Pin No.	Name	Function
CN1	1	ENC A	Encoder A
	2	CM	Microphone Key Check
	3	ENC B	Encoder B
	4	MIC KEY	Microphone Key
	5	DI	Data Out from LCD
	6	CE	Chip Enable for LCD
	7	CL	Clock for LCD
	8	DO	Data transfer to LCD
	9	5C	5V DC power supply
	10	8C	8V DC supply
	11	VOL	Volume
	12	POWER	Power Key
	13	RXD	RXD
	14	BRI	Brightness Control
	15	PTT	PTT
	16	GND	Ground
	17	GND	Ground
	18	MIC	Microphone
CN2	1	GND	Ground
	2	SQC	Squelch Signal
	3	PKS	Transmission Control
	4	PR1	1200bps Receive Data
	5	PR9	9600bps Receive Data
	6	GND	Ground
	7	PKD	Transmission Modulation

CN No.	Pin No.	Name	Function
CN5	1	INT SP	Internal speaker
	2	GND	Ground

DISLAY UNIT (X54-3450-10)

CN No.	Pin No.	Name	Function
CN1	1	ENC A	Encoder A
	2	CM	Microphone Key Check
	3	ENC B	Encoder B
	4	MIC KEY	Microphone Key
	5	DI	Data Out from LCD
	6	CE	Chip Enable for LCD
	7	CL	Clock for LCD
	8	DO	Data transfer to LCD
	9	5C	5V DC power supply
	10	8C	8V DC supply
	11	VOL	Volume
	12	POWER	Power Key
	13	RXD	RXD
	14	BRI	Brightness Control
	15	PTT	PTT
	16	GND	Ground
	17	ME	ME
	18	MIC	Microphone

Kenwood TM-271A Mod for PL Decode Logic Out

I found what I consider a major flaw when using the Kenwood TM-271A 2 meter radio as a remote base. There is no way to use it in full PL mode. You can program it for full PL but there is only a COS logic line available externally to the RC-210. Thus when the Kenwood is in full PL mode the RC-210 thinks it sees a regular carrier operated radio. I figured out where to tap into the Kenwood to get a valid PL logic output.

To modify the radio you will need a 2N3904 transistor, a 10k resistor and a 1k resistor. I assume you have already done the remote "packet connector" mod to use the radio as a remote base.

Refer to the TM-271 service manual. It turns there is valid PL logic available inside the radio at pin 51 (SPM) of the CPU (IC-101). That is hairy to get to. I also wanted to buffer the logic line. That logic is also available at Q 254 transistor's base. Refer to figure 1. What I did was connect a 10 K resistor to Q 254's base. The other end of the 10 K resistor goes to the base of a 2N3904 transistor I added to the radio. The emitter of the 2N3904 gets a ground by connecting to pin 9 of IC 252. The collector of the 2N3904 connects to a 1K pull up resistor to pin 7 of IC 252 which is a convenient 5 volt source. The violet wire in figure 1 ties to the collector of the 2N3904. The violet wire is brought out to the rear of the radio. This violet wire is the valid PL Decode line. It goes 5 volts HI on valid PL decode.

Because I am using a 10 k resistor in the base of the transistor it places a negligible load on the CPU line.

One caveat. For this mod to work the Kenwood's volume control has to be set at greater than the 9 o'clock position. I also understand the COS line will not work unless the volume control is set to greater than the 9 o'clock position. When the Kenwood is set to COS only the PL logic line will go high on a valid squelch break. That was not a problem for me. This mod should work with any controller that supports the Kenwood TM-271A. I'm using mine with an Arcom RC-210 and it works fine.

73 and Good Luck

Bernie Parker

K5BP

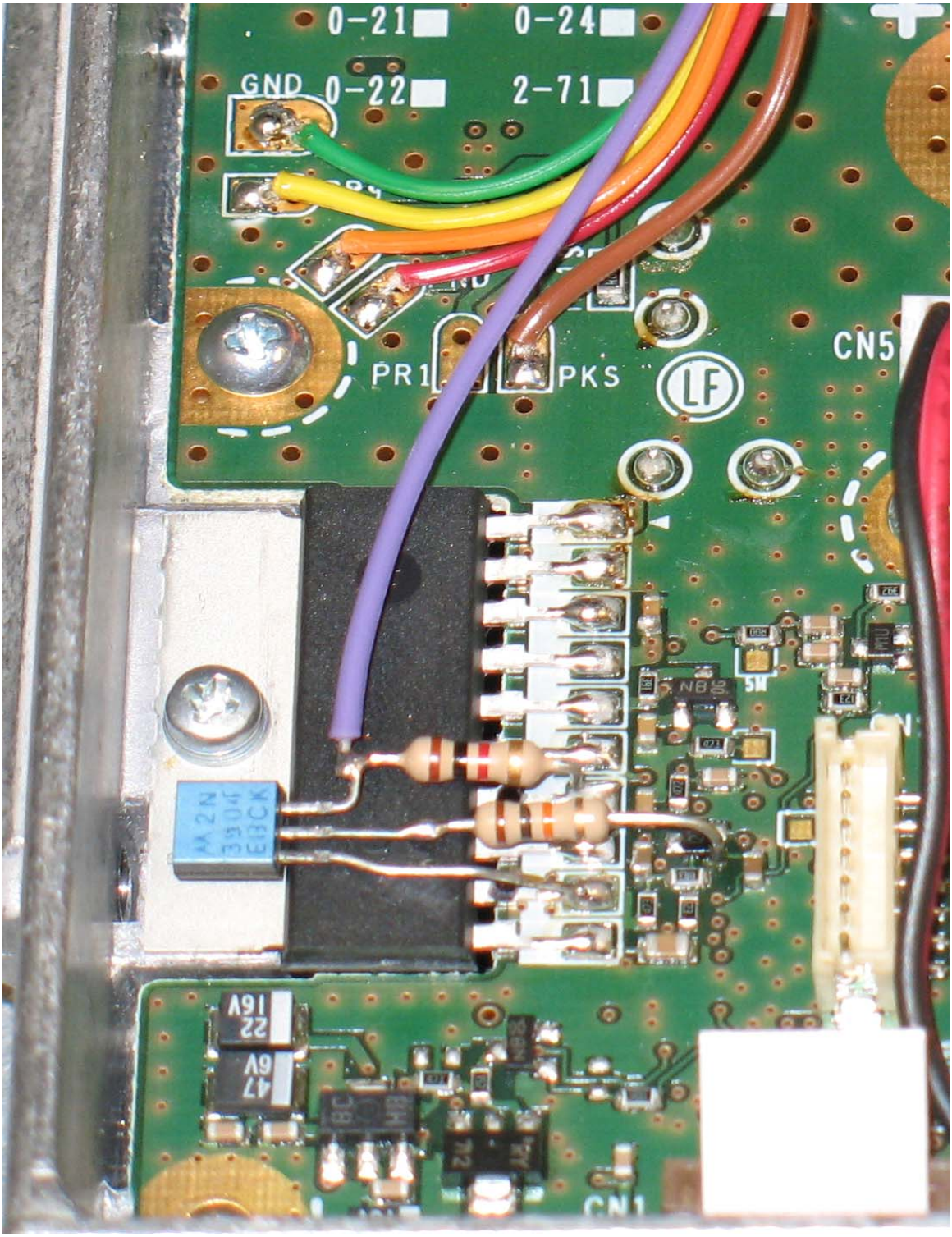


FIGURE 1

LH side of top of Kenwood TM-271