15385 Carrie Drive
Grass Valley, CA 95949
Office: (530) 477-8400
Tech. Support: (530) 477-8402
FAX: (530) 477-8403
Sales: (800) 874-8663
Email: tech@norcommcorp.com
Web:www.norcommcorp.com

MODEL NC221 MOBILE TWO-TONE SEQUENTIAL DECODER INSTRUCTION MANUAL

INTRODUCTION

The Model NC221 is a miniature mobile dash-mount Two-tone sequential decoder designed for selective signalling of fleet dispatched vehicles. The NC221 features Tone "**A**" or "**B**" Group Calling, Horn control, Busy Lock-out, T.O.T., Microphone hang-up monitor/reset and Transpond functions. The NC221 is enclosed in a smartly styled high impact plastic enclosure for vehicular dash mounted applications, providing front panel illumination of Call, Horn and Monitor modes plus membrane switches for control of Monitor/reset and Horn functions.

OPERATION

Upon receipt of correct tones and sequence or Group call, the decoder provides the following control functions: [1] Latched relay output for control of speaker audio. [2] Momentary relay output for control of vehicle horn relay. [3] Front panel flashing call light. [4] Audible pulsating tone alert and [5] Transpond TX keying and pulsating tone outputs.

GENERAL

The Model NC221 has been engineered for maximum reliability. Should you require technical assistance or information regarding specific applications, i.e. interfacing, special timing of frequency formats, please contact our customer service department at (530) 477-8402.

SPECIFICATIONS

MODEL	**NC221-A-14**	**NC221-B-14**
SIGNAL FORMAT	Two-tone sequential (1+1)	SAME
DETECT TIME	Tone one detect 45mS Tone two detect 45mS	Tone one detect 350mS Tone two detect 350mS
TONE TWO WINDOW	150mS	1250mS
INTERTONE TIME	Zero	SAME
TONE A/B SEPARATION	>50 Hertz	SAME
GROUP CALL	2 seconds of tone "A" or "B"	6 seconds of tone "A" or "B"
FREQUENCY RANGE	Continuously tunable (800Hz to 3000Hz)	Continuously tunable (280Hz to 1425Hz)
FREQUENCY STABILITY	Better than ±0.5%	SAME
INPUT IMPEDANCE	47 Ohms speaker load (22K Ohms with load removed)	SAME
INPUT SENSITIVITY	0.1 to 2V p/p AC	SAME
BANDWIDTH	±1.50% typically	SAME
OPERATING VOLTAGE	10.5VDC to 16VDC	SAME
OPERATING CURRENT	<15mA quiescent	SAME
OPERATING TEMPERATURE	-20°C to +70°C	SAME

INTERFACING	Micro-miniature 14 pin Molex header and 3ft. color coded cable assembly.	
ENCLOSURE SIZE	2.40"W x 3.80"L x .90"H	
MOUNTING	Reversible swivel mounting bracket.	
DEC./T.O.T./B.L.O. TONE ALERT	Internal speaker (Pulsating 1200/600Hz)	SAME
TRANSPOND TONE	Pulsating 1200Hz (3 second operation)	SAME
TRANSPOND OUTPUT IMPEDANCE	>50K Ohms (Adjustable level)	SAME

--SPECIFICATIONS ARE SUBJECT TO CHANGE IN THE INTEREST OF TECHNICAL--
--IMPROVEMENT WITHOUT NOTICE OR OBLIGATION--

INTERFACING INSTRUCTIONS

The Model NC221 comes complete with aluminum swivel mounting bracket and 3ft. color coded cable and plug assembly. The enclosure has been designed for above or below vehicle dash mounting by use of the swivel bracket. Because of the size and light weight of the NC221, it may be desirable to remove bracket and attach the enclosure by means of velcro strips or taped adhesives.

Although the Model NC221 is engineered for maximum immunity to R.F., it is suggested that all leads be kept to minimum lengths and away from transmitter final circuitry.

BROWN (PIN 13) . . . . . This configuration activates the Decode Latched Relay Output circuitry for channel monitoring when removed from ground and resets the decoder functions when returned to ground. This input function is most useful in today's front mount radios when connected to the circuitry provided by the microphone's hang-up button or when used with a hang-up switch box providing a circuit ground.
[MONITOR/RESET INPUT]

RED (PIN 2) . . . . . Connect to switched 10.5 to 16VDC source.
[+SUPPLY]

BLACK (PIN 10) . . . . . Connect to system ground.
[-SUPPLY]

BLUE (PIN 6) . . . . . Connect to vehicle's horn relay that requires an active **"LOW"** (to ground) to sound horn. This output function is controlled by the front panel Horn switch or by-passed for permanent 'on' condition by setting Dip-switch S1-3 to **"ON"** position. This feature prevents user from disabling Horn alert. Output pulsates for a duration of 5 seconds and is a form 1A relay that will sink to ground 1 Amp @ 30VDC. NOTE: To prevent damage to relay contacts, place a 1N4005 diode or equivalent across vehicle's horn relay.
[HORN CONTROL]

BLACK/WHITE (PIN 1) . . . . . Connect to transmitter audio input circuitry. This output provides a pulsating 1200Hz tone for a duration of 3 seconds. Adjust R25 for desired deviation. (See "Component Locator" for location of R25)
[TRANSPOND TONE OUTPUT]

WHITE/BLUE (PIN 12) . . . . . Connect to transmitter input PTT circuitry that requires an active **"LOW"** (to ground) to transmit. This output is an N-channel power MosFet and will sink to ground 200mA @ 50VDC . NOTE: This function follows Transpond tone output. **NOTE:** In order for this output function to control transceiver's PTT circuitry for the purpose of using Transmit Time-out (**T.O.T.**) or Busy Lock-out (**B.L.O.**) features, the decoder's PTT input/output leads must be installed in series with transmitter PTT circuitry.
[TRANSPOND/T.O.T./B.L.O. TX KEYING OUTPUT]

GRAY (PIN 8) . . . . . Connect to transceiver's PTT output circuitry that provides an active **"LOW"** (to ground) when microphone's PTT switch is closed. **NOTE:** Before making this connection, refer to Transpond/T.O.T./B.L.O. TX keying output.
[T.O.T./PTT INPUT]

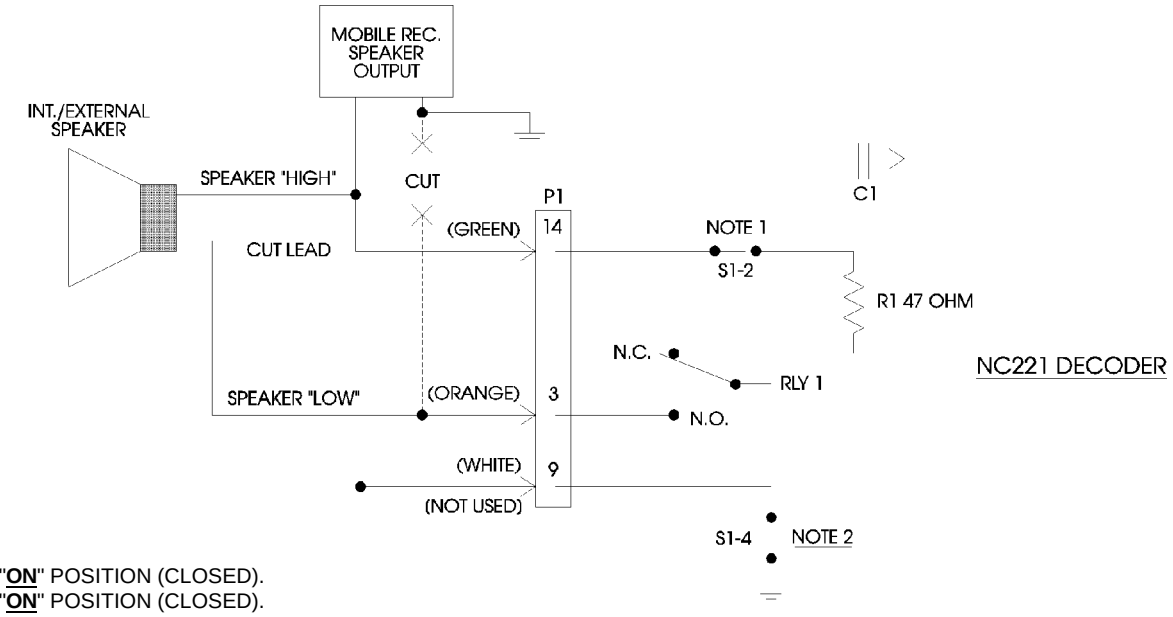
VIOLET (PIN 7) . . . . . Connect to receiver's squelch circuitry that provides a logic level of 0 to 2.0VDC or greater when channel is busy. A pulsating 1800Hz tone is generated at the Tone alert speaker if the PTT is activated during Busy Lock-out. This function serves to alert user that channel is in use and disables transmitter during this period.
[BUSY LOCK-OUT INPUT]

GREEN (PIN 14) . . . . . Connect to transceiver's speaker "**HIGH**" output. Refer to "Speaker Interfacing. [Figure 1]
[SPEAKER HIGH/HI-Z INPUT]

WHITE (PIN 9) . . . . . This is the "**COMMON**" connection for speaker relay control and is not generally used. [See Figure 1]
[RELAY COMMON]

ORANGE (PIN 3) . . . . . Cut lead from "**LOW**" (Ground) side of speaker. Connect cut speaker lead coming from transceiver to ground. Connect "**ORANGE**" lead from Decoder to remaining half of cut speaker lead (Speaker side). Refer to "Speaker Interfacing". [Figure 1] **NOTE:** Set Dip-switch S1-2 and S1-4 to **"ON"** position.
[SPEAKER LOW/N.O. RELAY CONTACT]

SPEAKER INTERFACING - FIGURE 1



NOTES:

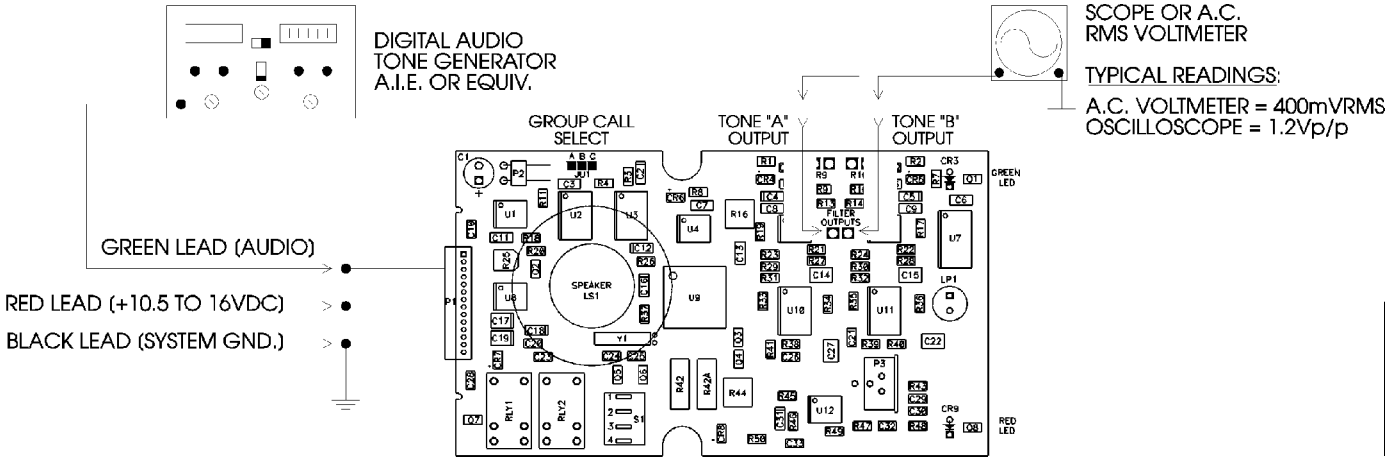
1) S1-2 TO "**ON**" POSITION (CLOSED).
2) S1-4 TO "**ON**" POSITION (CLOSED).

CAUTION: Since the decoder "listens" to the high side of the speaker line for its decode tones, the volume control of your radio must **NOT** be completely turned down. Doing so will result in lowering the signal below decode level. One solution is to place a 47Ω resistor in series with low side of the volume control.

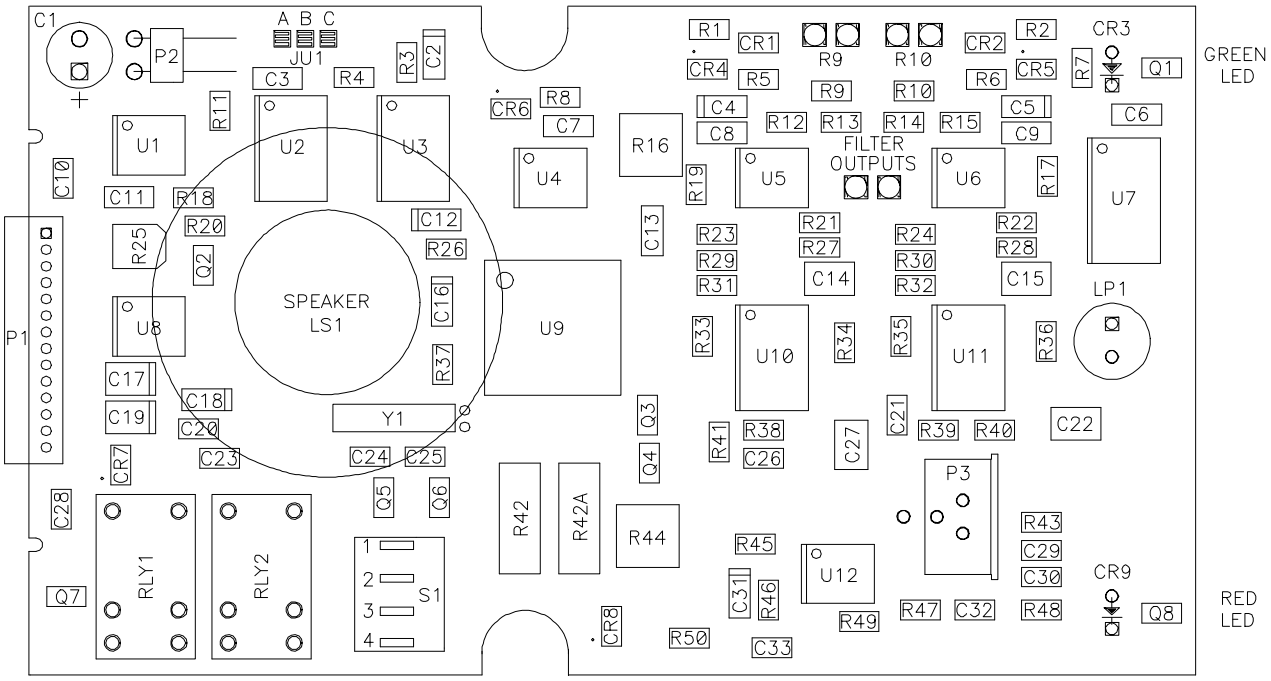
FREQUENCY TUNING

Using the following steps, adjustment of each tone frequency is tunable through it's specified range and is easily performed. **NOTE:** Group Call is factory jumpered (JU1-A&B) for tone **"B"**.

1. Connect test equipment as shown below.
2. Connect **"RED"** lead to +10.5VDC/16VDC source.
3. Connect **"BLACK"** lead to system ground.
4. Place dip switch #2 in **"OFF"** position.
5. Connect **"GREEN"** lead to audio signal generator.
6. Connect an A.C. (RMS) volt meter or scope probe to tone **"A"** filter output pin.
7. Apply tone **"A"** frequency and adjust R44 multi-turn pot. for maximum signal indication.
8. Remove A.C. (RMS) voltmeter or scope probe from tone **"A"** pin to tone **"B"** filter output pin.
9. Apply tone **"B"** frequency and adjust R16 multi-turn pot. for maximum signal indication.
10. Remove equipment. Unit is now operational.
11. NOTE: To select Group Call **"A"**, solder bridge jumper JU1-B&C.
    To Select Group Call **"B"**, solder bridge jumper JU1-A&B.



COMPONENT LOCATOR



WARRANTY POLICY

NorComm products are unconditionally guaranteed for two (2) years on materials and labor from date of purchase.

All Warranty repairs must be performed at NorComm's Customer Service Department in Grass Valley, CA. Units under warranty can be returned for repair or replacement without prior authorization, however, a letter explaining the defect should be enclosed with the unit. Out of warranty units returned constitute Purchaser's authorization for NorComm to repair or replace equipment and to invoice Purchaser for any and all reasonable costs of repair labor, parts and freight.

NorComm shall not be obligated to repair or replace equipment rendered defective, in whole or in part, by causes external to the equipment, such as, but not limited to, catastrophe, power failure, or transients, environmental extremes, improper use, and maintenance or interfacing applications. NorComm further assumes no liability for any incidental or consequential damages which may result from the applications of its products by the Purchaser or any other party.

SCHEMATIC LAYOUT