

NuTone

TROUBLE SHOOTING GUIDE

I-600 SELECTIVE CALL INTERCOM

NuTone

Housing Group Scovill

MADISON & RED BANK ROADS
CINCINNATI, OHIO 45227

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
<p>1. System inoperative, no intercom or radio.</p>	<p>1a. No AC power to I-600 central power supply.</p> <p>1b. Loss of DC power to I-614 master stations and M-640 radio.</p>	<p>1a. Test for 120V AC on primary of system 301N transformer. Check for transformer secondary voltage (16V AC) on AC terminals of I-600 (*).</p> <p>1b. Check for B+ (15V DC) on ORN (+) and BLK (-) terminals of I-600 (*).</p>
<p>2. After 16V AC power is initially connected to I-600: the busy indicator light is turned on at all master stations. Radio is silenced at one or two master stations, but is heard at other stations. One master receives sounds from another master.</p>	<p>2. DC voltages of system require a finite period of time to stabilize after initial 'power up' while voltages are changing, a spurious address signal may be generated by one of the stations and call another station.</p>	<p>2. Press "End Call" button on station receiving sounds--or wait for stations' time out circuit to complete its cycle (approx. 60 sec.) --to restore system to normal stand-by mode.</p>
<p>3. The same conditions as outlined in 2, but system cannot be restored.</p>	<p>3. Open data line (s)</p>	<p>3. Check logic state voltages of data lines on I600 terminal board (Refer to page 5 for check out procedure of I-600 terminal board).</p> <p>(*) See pages 5-8 for system voltage and resistance check-out procedures.</p>

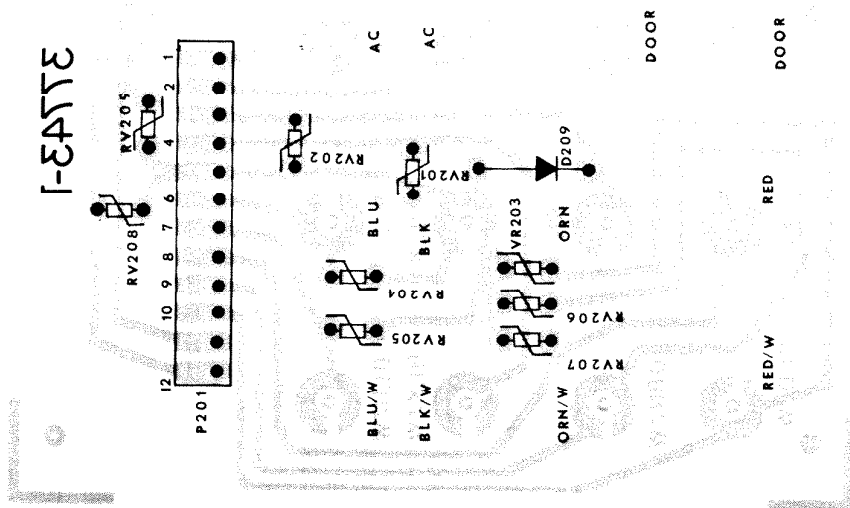
TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
<p>4. System cycles 'on' and 'off'.</p>	<p>4. Excessive current drain condition is causing automatic reset overload protector in system 301N transformer to open.</p>	<p>4. Check for short in B+ circuit. Disconnect ORN wire(s) from I-600.. If voltage on ORN terminal is below 15V DC & transformer continues to cycle I-600 is defective. If I-600 operates normally (transformer stops cycling), check for short in system wiring I A defective I 614 master station or M-640 radio. (*)</p>
<p>5. A Selective call to a specific station is received by another station (ie; station 1 calls station 2 but call is received by station 3)</p>	<p>5a. Shorted data line(s).</p> <p>5b. Wiring transposition of data lines.</p> <p>5c. Station identification wire connections on calling and receiving stations reversed.</p>	<p>5a. Check logic state voltages data lines on I-600 terminal board (*).</p> <p>5b. Check for wiring reversal on I-600 & I614 terminal strips.</p> <p>5c. Connect identification wire of calling and receiving stations to proper identification pin (refer to I-614 installation instruction sheet).</p>
<p>6. A called station cannot hear transmissions from originating station when its talk-bar is activated.</p>	<p>6. Shorted or open control line.</p>	<p>6. Control line (red-w) is normally LD (grd) but goes HI when talk-bar is activated, check for possible short between Red-w & Blk wires in system cable runs or short of Red-w fail path thru letter 'w' to chassis (See page 5 for check-out procedure of I-600 terminal board). Perform continuity test of Red-w wires (*).</p>
		<p>(*) See pages 5-8 for system voltage and resistance check-out procedures.</p>

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
<p>7. Intercom call cannot be heard at either the called or originating station</p>	<p>7a. Called stations' private 7b. Shorted output line</p>	<p>7a. Release private button 7b. Check for possible short between BLK-W + BLK lines in system cable runs or on I-600 terminal board(*) Also check that BLK-W wire in cable to M-640 Radio is not connected to BLK-W terminal of unit. (See M-640 installation instructions)</p>
<p>8. Sounds T-614 Master set for listen in mode (monitoring) cannot be heard at other T-614 station</p>	<p>8a. Radio on/off switch on T-614 in off position 8b. Intercom volume control on T-614's set to off or too low. 8c. Open 'D' Data Line</p>	<p>8a. Place Radio on/off switch in 'on' position at listen in station and receiving stations. 8b. Adjust intercome volume controls of 614's to desired levels. 8c. Check continuity of CRN-W lines in system wiring (*)</p>
<p>9. Call tone signal weak</p>	<p>9. Call tone volume control in T-614 Master (s) set too low.</p>	<p>9. Adjust call tone volume control for desired sound level (Refer to T-614 Installation Instructions).</p>
		<p>(*) See Pages 5-8 for Systems Voltage Resistance check out procedures</p>

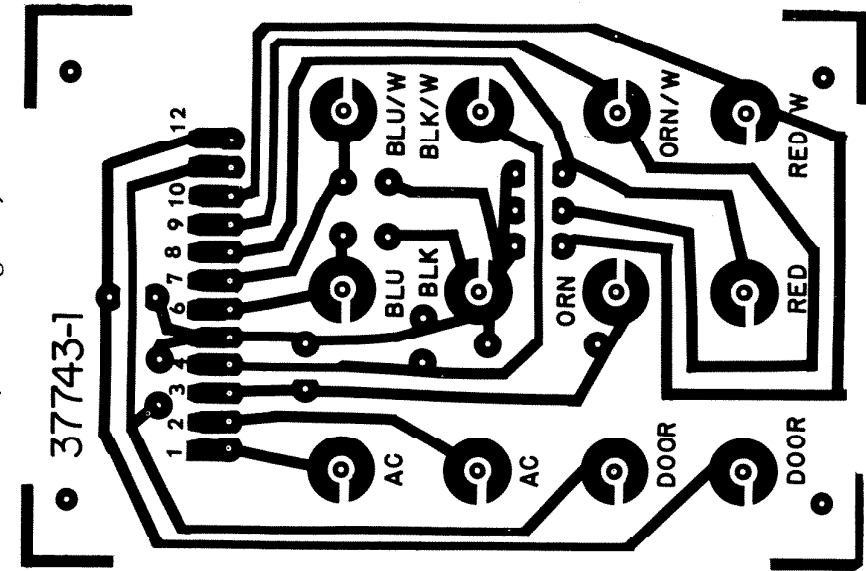
TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
10. M-640 Radio inoperative	10. No DC voltage to M-640	10. Check for B+ (Min 12VDC) between ORN (+) and BLK (-) terminal of M-640
11. Radio is heard at M-640 but not at 614 Master Stations	11a. Open or short 'D' Data Line 11b. Resistor/Capacitor assembly systems without radio option not removed from I-600	11a. Check ORN-W wire connections on M-640 and I-600 (*) 11b. Remove resistor/capacitor assembly between ORN-W & BLK terminals of I-600
12. Weak FM or AM radio reception	12. Door or weak radio signal conditions at M-640 location	12. If unused wires in system cable run to M-640 have been used for radio antenna, disconnect & hook up twin lead antenna supplied with unit (See M-640 Installation Instructions) NOTE: An outside FM antenna locally purchased may be required in commercial buildings of steel and masonry construction. (*) See Pages 5-8 for voltage and resistance check-out procedures

I-600 TERMINAL BOARD SERVICE NOTE

- (1) In early production units, the I-600 TERMINAL BOARD was drilled, and the varistors RV201-RV209 were installed manually.
- (2) During drilling operation, one or more PC paths on the TERMINAL BOARD may have been cut, and the continuity may have been broken between one or more labelled Screw Terminal(s) and its (their) respective J201/P201 terminal(s). (See I-600 Schematic Diagram.)
- (3) A break may be determined by visual inspection and/or by running a continuity check between each labeled Screw Terminal and its respective J201/P201 terminal. Resistance between these points should be zero.
- (3.1) When making continuity check, suggest that the a-c power be turned off: disconnect the 16 Vac wires of the S-143 cable from the AC Screw Terminals. Make certain that these wires are not shorted, insulate the ends.
- (4) When a break in the PC path is found, it may be repaired by making a solder-bridge across the break. Make certain that PC paths are not shorted to one another.
- (5) The dynamic status may be determined by making voltage measurements. The reading should be the same at the labeled Screw Terminal and its respective J201/P201 terminal. Unless otherwise specified, voltages should be measured in respect to circuit common ground J201/P201-5. (See Page 6)



Page 5 (TOP VIEW)



(BOTTOM VIEW)

MAKING SYSTEM'S TERMINAL VOLTAGE MEASUREMENTS

(1) The System's operating voltages can be determined at the individual color-coded terminals in the I-600; and at all I-614's and I-650's.

(1.1) The potential on the ORN and ORN/W wires and terminals can be measured at the M-340 AM/FM Receiver when it is included in the System.

(2) Recommend that, when available, a high-impedance-input voltmeter (analog or digital) be used.

(2.1) If necessary, a standard 20 kohm/volt multi-meter may be used, and for general servicing the readings will be within practical field service requirements.

(3) Connect the common (negative) lead of the voltmeter to the BLK ground (VSS) terminal in the component at which the voltage is being measured.

(4) Set the voltmeter to the scale that is capable of measuring the maximum voltage that can be expected at the terminal under measurement.

(5) Connect the positive lead of the voltmeter to the color-coded terminal at which the potential is being measured.

(6) ALL VOLTAGES ARE DC POSITIVE IN RESPECT TO CIRCUIT GROUND (VSS) EXCEPT WHERE NOTED IN THE CHART.

(7) CARE MUST BE EXERCISED TO MAKE CERTAIN THAT THE VOLTMETER PROBES DO NOT SHORT THE TERMINAL BEING MEASURED TO ANY OTHER TERMINAL: COMPONENT: NOR PC PATH.

TERMINAL	FUNCTION	VOLTAGE* (LOGIC STATE)	REMARKS
ORN ALSO AT M-640	B +	REGULATED +15VDC (14.25-15.75V at I-600)	Must measure a minimum of 9Vdc at every I-614, when an ALL CALL is addressed by the originating station. Must measure a minimum of 12Vcc at the M-640.
BLK/W	OUTPUT (T/L INTERCOM AUDIO SIGNALS)	0VDC	During intercom operation, Audio AC may be measured with a low-scale AC voltmeter; a db meter, or an oscilloscope.
RED/W	CONTROL LINE	LO (VSS)	Will go HI (to originating Station's VDD) when the T/L Relay in the originating Station is in the TALK mode.
BLU	"A" DATA LINE	LO (VSS)	DATA LINE(S) go HI (to originating Station's VDD) when addressed. See pages 8.
BLU/W	"B" DATA LINE	LO (VSS)	
RED	"C" DATA LINE	LO (VSS)	
ORN/W ALSO AT M-640	"D" DATA LINE (ALSO CARRIES RADIO AND "LISTEN-IN" AUDIO SIGNALS)	LO (VSS)	At END OF CALL, DATA LINES return to a LO state in an exponential (RC time) manner.
AC TO AC	POWER SUPPLY	16VAC TO 18VAC	MEASURE AT I-600 ONLY.
DOOR TO DOOR	DOOR SPEAKERS	AUDIO AC	MEASURE AT I-600 ONLY. Intercom Audio AC voltage to/from DOOR SPEAKER(S) when these Speaker(s) is/are addressed. Voltages may be read with a low-scale voltmeter, a db meter or an oscilloscope.

NOTE: (*) All voltages (logic states) d-c positive unless otherwise noted.

(**) LO (VSS) is nominally circuit ground, actual potential may measure a small positive voltage, depending on IR line losses and/or voltage at the output of the various CMOS devices.

SYSTEM'S TERMINAL RESISTANCE MEASUREMENTS AND WIRING CONTINUITY CHECK

(1) The System's interconnecting IW-8 color-coded wiring continuity can be determined by measuring the resistance at the matching color-coded terminals in the I-600; and at all I-614's and I-650's.

(1.1) The resistance measured at these points may vary slightly ($\pm 10\%$), but in general will be very close to those shown in the Chart, Figure 14.

(1.2) The ORN and ORN/W wires and terminals can also be checked at the M-640 AM/FM Receiver when it is included in the System.

(2) Turn power off: Disconnect both wires of the 16Vac cable from the AC terminals on the I-600 Terminal Board. Insulate bare wire ends.

SYSTEM WIRE/TERMINALS RESISTANCE TO GROUND

TERMINAL	FUNCTION	RESISTANCE IN OHMS (K = 1000)
ORN*	B +	1.5K — 8K*
BLK/W	OUTPUT (T/L INTERCOM AUDIO SIGNALS)	560 (R207)**
RED/W	CONTROL LINE	100K (R214)**
BLU	"A" DATA LINE	22K (R210)**
BLU/W	"B" DATA LINE	22K (R211)**
RED	"C" DATA LINE	22K (R212)**
ORN/W	"D" DATA LINE ALSO CARRIES RADIO AND "LISTEN-IN" AUDIO SIGNALS	470K (R228)**

NOTE: (*) Will charge to this resistance as power supply filter capacitors are charged. Greatest resistance will be measured at I-600 with no I-614's connected. Resistance will be less with each I-614 that is connected into System.

IF ohmmeter leads are reversed, resistance will measure but a few ohms, line will be shorted to ground through D209 on I-600 Terminal Board.

(**) Indicates line resistors to ground that are located on the I-600 PC Board.

(3) The resistance values shown in Figure 14(A) are measured from the terminal indicated to the circuit common ground (VSS).

(3.1) Connect the common (negative) lead of the ohmmeter to the BLK ground (VSS) terminal in the component at which the resistance is being measured.

(3.2) Connect the positive lead of the ohmmeter to the color-labelled terminal at which the resistance is being measured.

(4) Figure 14(B): The resistance values shown are measured between the two wires so indicated.

(4.1) Polarity of ohmmeter leads is not critical except as indicated for the ORN terminal/wire measurements.

WIRE/TERMINAL TO WIRE/TERMINAL RESISTANCE IN OHMS

WIRES MUST BE CONNECTED TO CORRECT TERMINALS IN I-614'S AND IN I-650'S.

	ORN/W	RED	BLU/W	RED/W	BLK/W	ORN*
RED	492K	RED				
BLU/W	492K	44K	BLU/W			
BLU	492K	44K	44K	BLU		
RED/W	570K	122K	122K	122K	RED/W	
BLK/W	470.56K	22.56K	22.56K	22.56K	100.56K	BLK/W
ORN*	471.5K*	23.5K*	23.5K*	23.5K*	101.5K*	2.06K*

NOTE: (*) Connect positive lead of ohmmeter to ORN TERMINAL. Resistance shown is minimum. Resistance will rise to a greater value as the power supply filter capacitors are charged.

DATA LINES VOLTAGE CHART

Key Pad Pushbutton address number of station called	LOGIC STATUS OF DATA LINES			
	D (orn-W)	C (Red)	B (Blu-W)	A (Blue)
(0) End Call	LO	LO	LO	LO
1	LO	LO	LO	HI
2	LO	LO	HI	LO
3	LO	LO	HI	LO
4	LO	HI	LO	LO
5	LO	HI	LO	HI
6	LO	HI	HI	LO
7	LO	HI	HI	LO
8	HI	LO	LO	LO
9	HI	LO	LO	HI
10	HI	LO	HI	LO
11	HI	LO	HI	HI
12	HI	HI	LO	LO
13	HI	HI	LO	LO
14	HI	HI	HI	LO
(15) End Call	HI	HI	HI	HI

LO = Standard Binary Logic '0' = VSS (grd)
 HI = Standard Binary Logic '1' = VDD (10-15VDC)