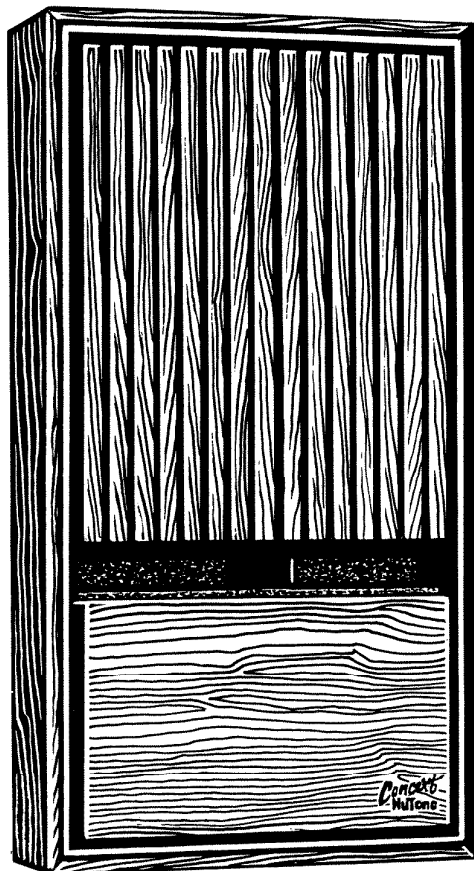
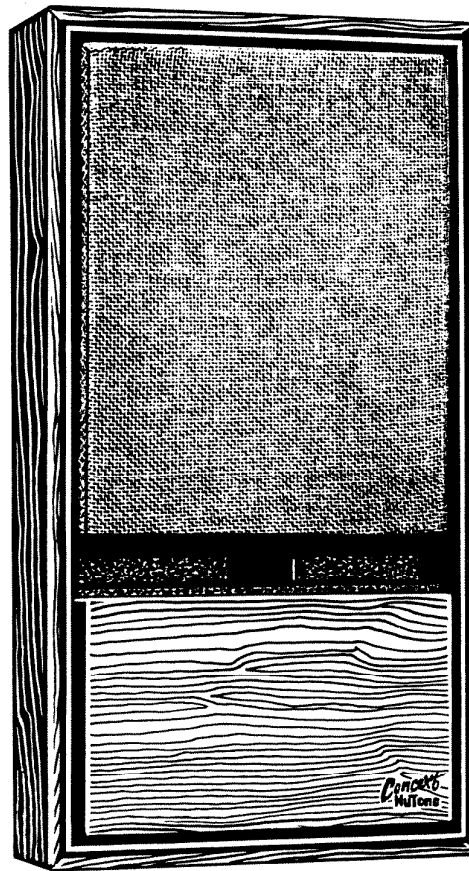


SERVICE MANUAL

MODELS: LA-60, LA-61 PROGRAMMABLE MUSICAL CHIMES



LA-60



LA-61

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NuTone

RUNNING THE WIRING

Transformer and Pushbuttons

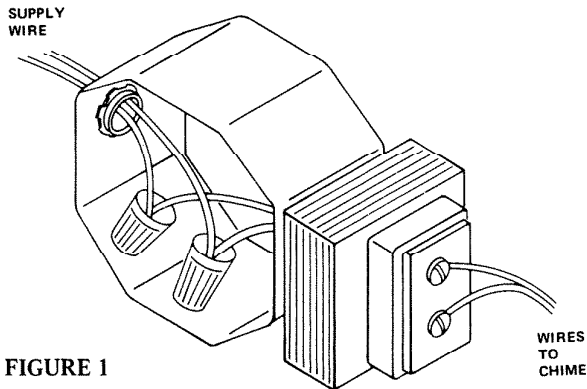


FIGURE 1

Caution: Before installing the transformer and chime, turn off the house power and leave it off until installation is complete.

1. Mount the supplied transformer (NuTone 105N, 16V – 15VA) to a convenient junction or panel box. Connect the house power leads to the transformer as follows: black to black; white to white. See Figure 1.
2. Run 18-gauge wire from the transformer and the pushbuttons to the chime site. **Label all wires (TRANS, COMMON, FRONT, SIDE, REAR)** as they are run.

NOTE: Carefully fasten wiring to wall studs and ceiling joists. Avoid short circuits caused by staples or clips cutting through the wiring's insulation.

Intercom and Extension Speakers

1. To relay the chime tune throughout the house, the **Concerto** can be connected to any NuTone Radio-Intercom. For the type and number of wires that need to be run from the chime site to the Intercom Master Unit, refer to the Chime-Intercom section of these instructions (page 5).
2. To relay the chime tune to the other parts of the house without using a Radio-Intercom, the **Concerto** can be connected to three NuTone Extension Speakers (ISA-63, ISA-64, etc.). Run NuTone IW-2 (22 gauge, 2-conductor) cable from the chime site to each extension speaker location (200 feet maximum).

All wiring must comply with national and local electrical codes.

CHIME INSTALLATION AND WIRING

Mounting The Base Plate

1. Pull all of the wires which have been run to the chime site through one of the large holes in the base plate.
2. With the two terminal blocks toward top, mount the base plate by one of the following methods:

Mounting To Drywall.

- (A) Position base plate against wall and level.
- (B) Secure base plate to wall with molly bolts (recommended) through the two mounting holes in the upper corners and through the single mounting hole at the bottom center of the base plate.

Mounting To Wall Stud.

- (A) Using two screws through small end of keyhole slots, hang, level, and secure the base plate.
- (B) If necessary, further secure base plate with two screws through the two mounting holes in the upper corners of the base plate.

Mounting To Outlet Box.

- (A) Using outlet box screws through small end of keyhole slots, hang, level, and secure the baseplate.
- (B) If necessary, further secure base plate with two screws through the two mounting holes in the upper corners of the base plate.

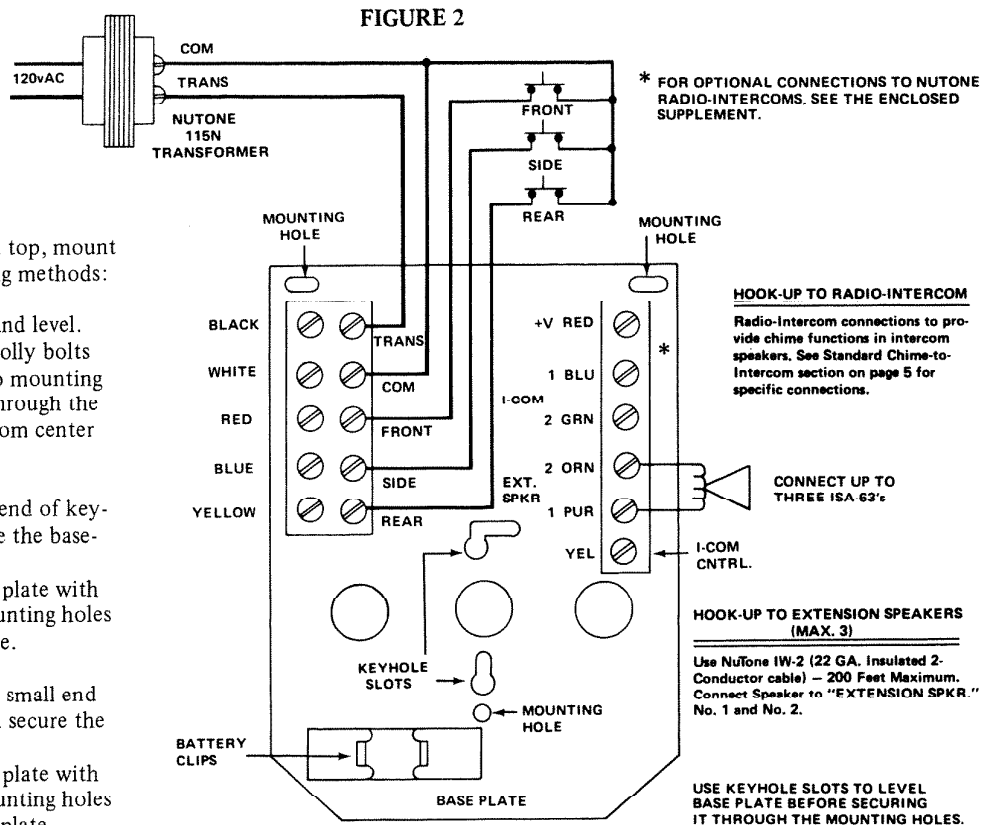


FIGURE 2

Wiring

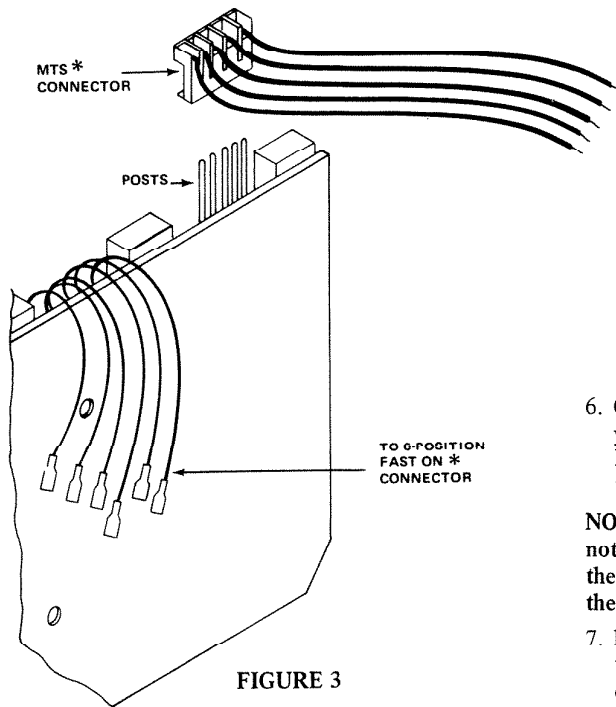


FIGURE 3

3. Connect the **TRANS**, **COMMON**, and **FRONT** (**SIDE** and **REAR** if applicable) wires to the right side screws of the five-position terminal block on the base plate. See Figure 2.
4. Connect the five colored wires (black, white, red, blue, yellow) of the supplied cable and connector assembly to their respectively labeled screw terminals on the five-position terminal block. See Figures 2 and 4.
5. Where applicable, connect the remaining wires – for Extension Speakers and Radio/Intercom use – to their respectively labeled screw terminals on the six-position terminal block on the base plate. See Figures 2 and 4.
6. Connect the six colored wires (red, blue, green, orange, purple, yellow) from the chime board to their respectively labeled **FAST ON*** terminals on the six-position terminal block on the base plate. See Figures 2 and 4.

NOTE: Even if the Radio Intercom and Extension Speaker's are not used, attach the six wires coming from the chime board to the **FAST ON*** terminals. This will prevent possible shorts on the Printed Circuit Board.

7. Push the red **M.T.S.*** connector of the cable assembly onto the five-position post which is located at the top right corner of the chime board. See Figure 3.

NOTE: The **M.T.S.*** connector must be put on the posts so that the wires exit the back of the connector and run toward the base plate. If the connector is reversed, the chime will not operate.

8. If a 9V transistor standby power battery is used, the chime will retain its memory for up to three or four hours in the event of a power loss. To install the battery (recommended Alkaline-Long Life Cell): (1) With terminals toward top, slide battery down between retaining tabs of battery clip until bottom of battery seats against the base plate flange. (2) Connect battery with snap-on connector. See Figure 4.

If battery fits loosely, squeeze tabs together until battery is firmly held in place.

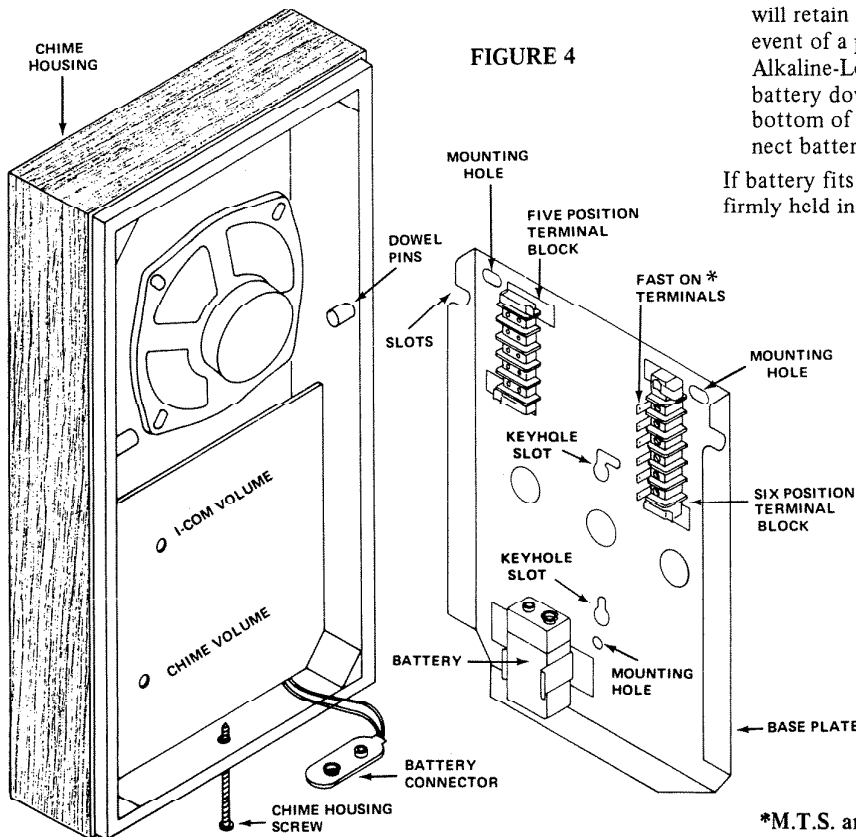


FIGURE 4

IMPORTANT: If the chime is being installed in new construction, do not install the battery until power is continuously supplied to the chime. The 9V battery is used for short power outages; if it is connected when the chime has no power, the chime will drain the battery and it will not function as a stand-by power source once the chime is in use.

9. When wire connections are complete, mount the chime housing/PCB assembly to the base plate by sliding the housing's two dowel pins into the slots on the upper sides of the base plate. See Figure 4.
10. Tighten the screw at the bottom of the chime housing to secure the housing to the base plate. See Figure 4.

*M.T.S. and FAST ON are registered trademarks of AMP Inc.

OPERATIONAL CHECKOUT

When the chime installation is completed, the installer should test the chime to make sure it is working properly.

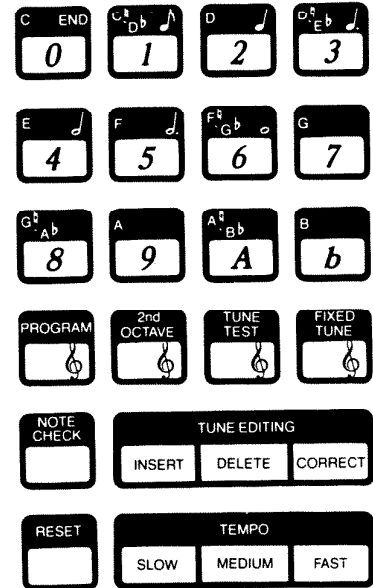
The procedures for testing are contained entirely in these installation instructions. There is no need to use the Operating Manual; the Operating Manual should be left in place, as packaged, for the owner's use. **Do not remove the band which wraps around the chime door and Operating booklet.**

Test 1

The first test checks the chime's response to the "Tune Test" key and the pushbutton(s). According to the instructions on the band, carefully remove the chime's door.

Follow these steps:

OPERATION	RESPONSE
1. Press the "Tune Test" key.	Chime plays 8-note Westminster.
2. Push the FRONT pushbutton.	Chime plays 8-note Westminster.
3. Push the REAR pushbutton (if applicable).	Chime sounds two notes.
4. Push the SIDE pushbutton (if applicable).	Chime sounds one note.



CHIME KEYBOARD

NOTE: If the chime's volume is too high or low, adjust the **CHIME VOLUME** control. Use a small screwdriver to make this adjustment. See Figure 4 for location of volume adjustment on the rear of the printed circuit board.

Test 2

The second test checks the chime's response to a **Fixed Tune** code sequence. Follow these steps:

OPERATION	RESPONSE
1. Press the "Fixed Tune" key.	None.
2. Find Fixed Tune codes next to keyboard. Enter the two-digit "tune code" for the selected tune.	Digital Display will show code numbers.
3. Press the "Tune Test" key.	The digital display will go blank and the selected tune will play.
4. Press the FRONT pushbutton.	The same tune will play.
5. Repeat the same procedure to select any of the other Fixed Tunes.	

Test 3

The third test checks the chime's response to a **Programmed** code sequence. Carefully follow these steps:

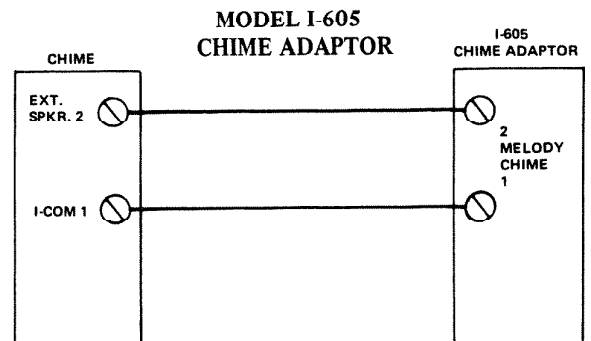
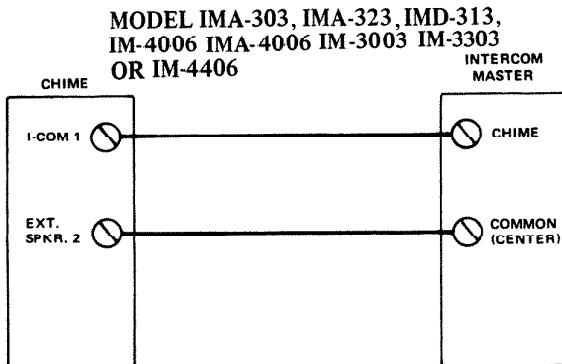
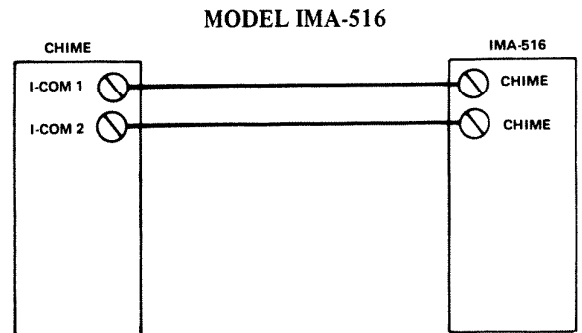
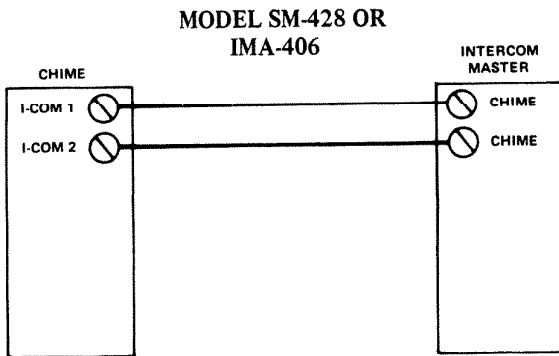
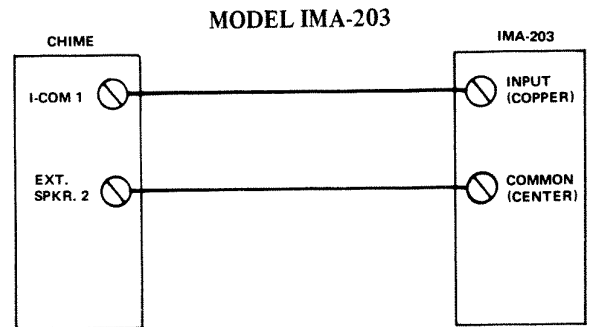
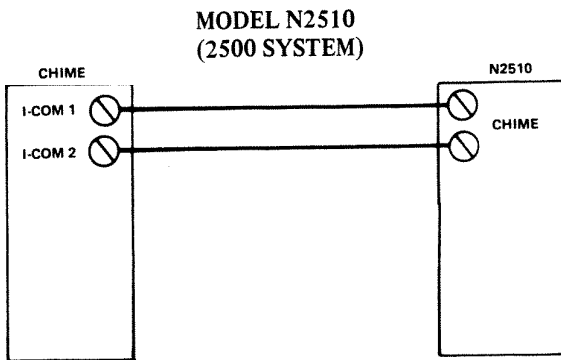
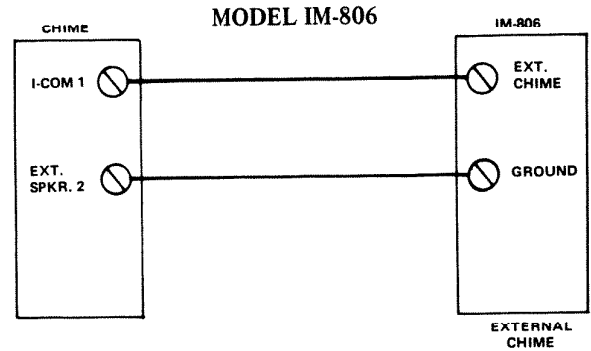
OPERATION	RESPONSE
1. Press the "Program" key.	None.
2. Enter the sequence of notes exactly as it is printed here. Where an asterisk (*) precedes a code number, press the "2nd Octave" key BEFORE entering the two-digit code. "Twinkle, Twinkle, Little Star" – 72, 72, *22, *22, *42, *42, *24, *02, *02, b2, b2, 92, 92, 76, 00.	Digital display will show code numbers as they are entered.
3. Press the "Medium" Tempo key.	Digital display will go blank when "End" key is pressed twice (00).
4. Press the "Tune Test" key.	None.
	Chime will play the programmed tune – "Twinkle, Twinkle."

NOTE: The chime memory will lose the programmed song if any of the following occurs: (1) power is lost; (2) "Fixed Tune" key is pressed; (3) "Program" key is pressed.

STANDARD CHIME-TO-INTERCOM CONNECTIONS

Inside/patio speakers will receive chime functions; chime will override radio and intercom. If special optional functions, such as muting, are desired, see the supplemental instructions packaged with this chime.

INTERCOM VOLUME ADJUSTMENT – The volume adjustment potentiometer for chime volume in intercom systems is factory set for normal chime volume. It may be necessary to readjust this control in some installations. This control is accessible through a hole in the printed circuit board and can be adjusted with a small screwdriver. See Figure 4.

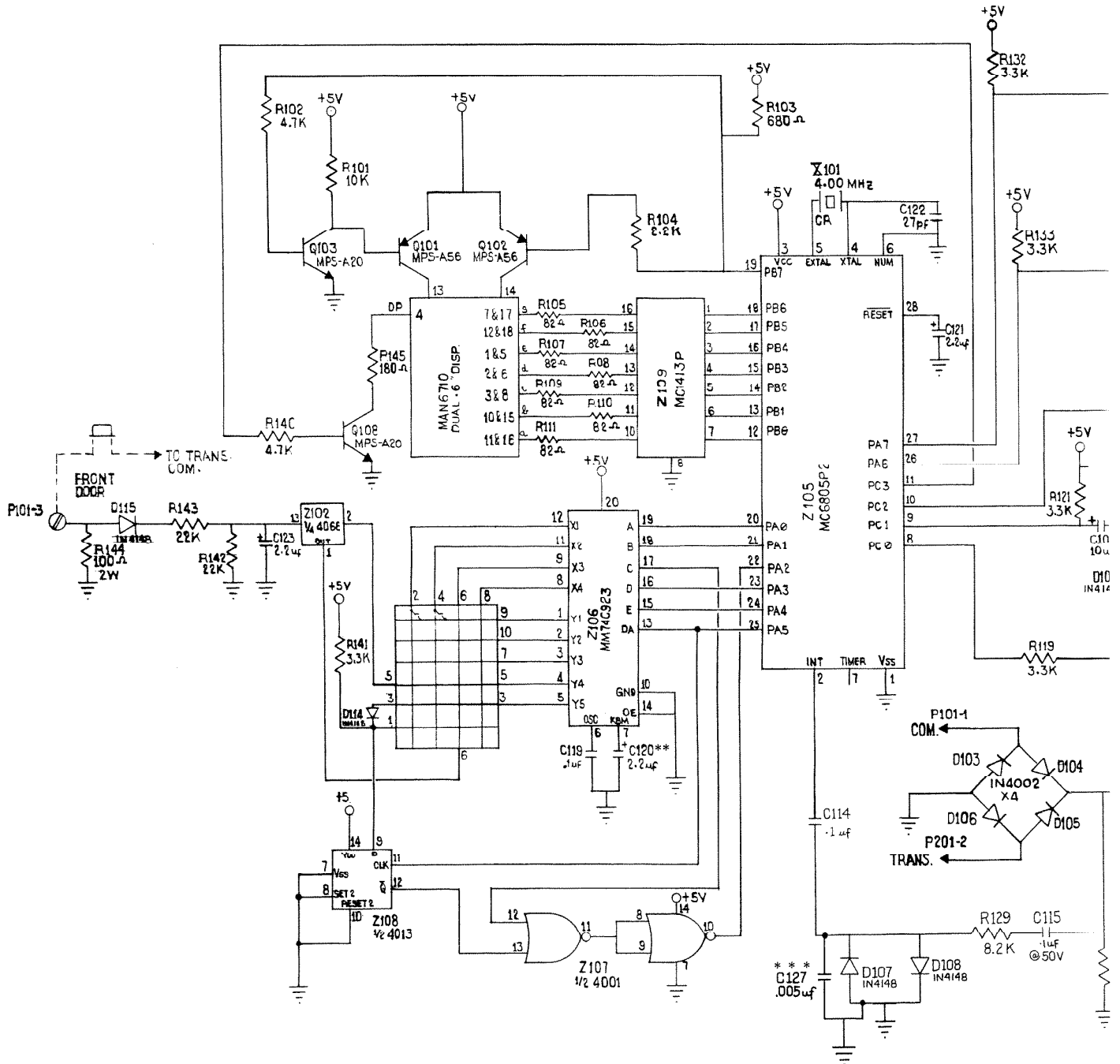


TROUBLE-SHOOTING GUIDE

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
1. Chime inoperative.	1a. No 120vAC Power to transformer primary.	1aa. Check for: blown fuse or tripped circuit breaker; open circuit (break in wiring, loose connections) in wiring to transformer primary.
	1b. No 16vAC Power to transformer secondary.	1bb. Check for open circuit in wiring from transformer secondary to chime terminal; replace defective transformer.
	1c. Pushbutton(s) stuck.	1cc. Check all pushbuttons. Repair or replace as necessary.
	1d. Incorrect wiring.	1dd. The LA-60/61 Chime may not be used in multiple Chime hookup applications. These chimes will accept up to three (3) extension speakers, Model ISA-63. Check wiring diagram on page 2.
	1e. Incorrect value (volts and/or watts) transformer.	1ee. Use NuTone 105N transformer. Primary – 120V; Secondary – 16V – 15W.
2. Chime operates irregularly when operated by calling guests.	2a. Dirty and/or corroded contacts on pushbutton(s).	2aa. Clean or replace pushbutton.
	2b. Defective (intermittent) transformer – possibly located in high temperature attic area.	2bb. Replace defective transformer. Locate in non-high temperature area or use high temperature transformer (NuTone part: 42069-000).
3. Chime operates unwanted intermittently.	3a. Intermittent short at pushbutton and/or in wiring, possibly caused by wire collars or staples.	3aa. Check pushbutton and/or wiring for shorts.
	3b. Defective chime printed circuit board.	3bb. Replace defective printed circuit board.
4. Chime operates only when pushbutton is held in.	4a. No common wire installed from transformer to COM terminal on chime terminal board; open circuit in common wire.	4aa. Install common wire from transformer to chime location. Check wiring for continuity – see wiring diagram on page 2.
5. Volume too high or too low.	5a. Misadjusted chime speaker volume control.	5aa. Adjust chime speakers volume control with small screwdriver. Volume control is located on printed circuit board to rear of chime. See Figure 4.
6. Low/Weak volume from extension speaker(s).	6a. Incorrect value (volts and/or watts) transformer.	6aa. Refer to 1ee.
	6b. More than three (3) extension speakers used.	6bb. No more than three (3) extension speakers may be used – including the door speaker.

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
7. Hum in extension speaker.	7a. Non-use of twisted pair wire – NuTone Model No. IW-2.	7aa. Use only NuTone IW-2 twisted pair wire.
	7b. Extension speaker wiring paralleling AC house wiring within 12 inches.	7bb. Do not parallel this speaker wire with any AC wiring. You may cross this wire with others at 90 degree angles.
	7c. Defective speaker or wrong value speaker (in ohms).	7cc. Replace with correct speaker.
	7d. Defective volume control.	7dd. Repair/replace control as necessary.
8. Chime loses program.	8a. If house power is lost, chime will return to 8-note Westminster chime.	8aa. Check to see if chime has lost program and returned to Westminster chime.
	8b. Defective transformer.	8bb. Refer to 2bb.
	8c. When house power is lost, the Chime will retain its memory for up to 3 or 4 hours, IF a 9 volt transistor standby power battery is used. The strength of the battery will determine the length of time the Chime retains its memory.	8cc. Replace 9V transistor battery (recommended use of Alkaline-Long Life Cell). Battery is located in lower left hand corner of chime base plate.
	8d. If “Program” key or “Fixed Tune” key is pressed, memory of any programmed tune will be cancelled. “Reset” key will cancel tune only when display is lit. Additionally, please understand that only one tune can be stored in the memory at one time. When another tune is entered and/or played, the former tune is lost and must be reprogrammed.	8dd. Reprogram Tune.
	8e. Defective chime printed circuit board.	8ee. Replace defective printed circuit board.
9. Difficulty being experienced with proper operation of electronic chime with Radio-Intercom.	9a. See appropriate Radio-Intercom Trouble-Shooting Manual.	9aa. See appropriate Radio-Intercom Trouble-Shooting Manual.

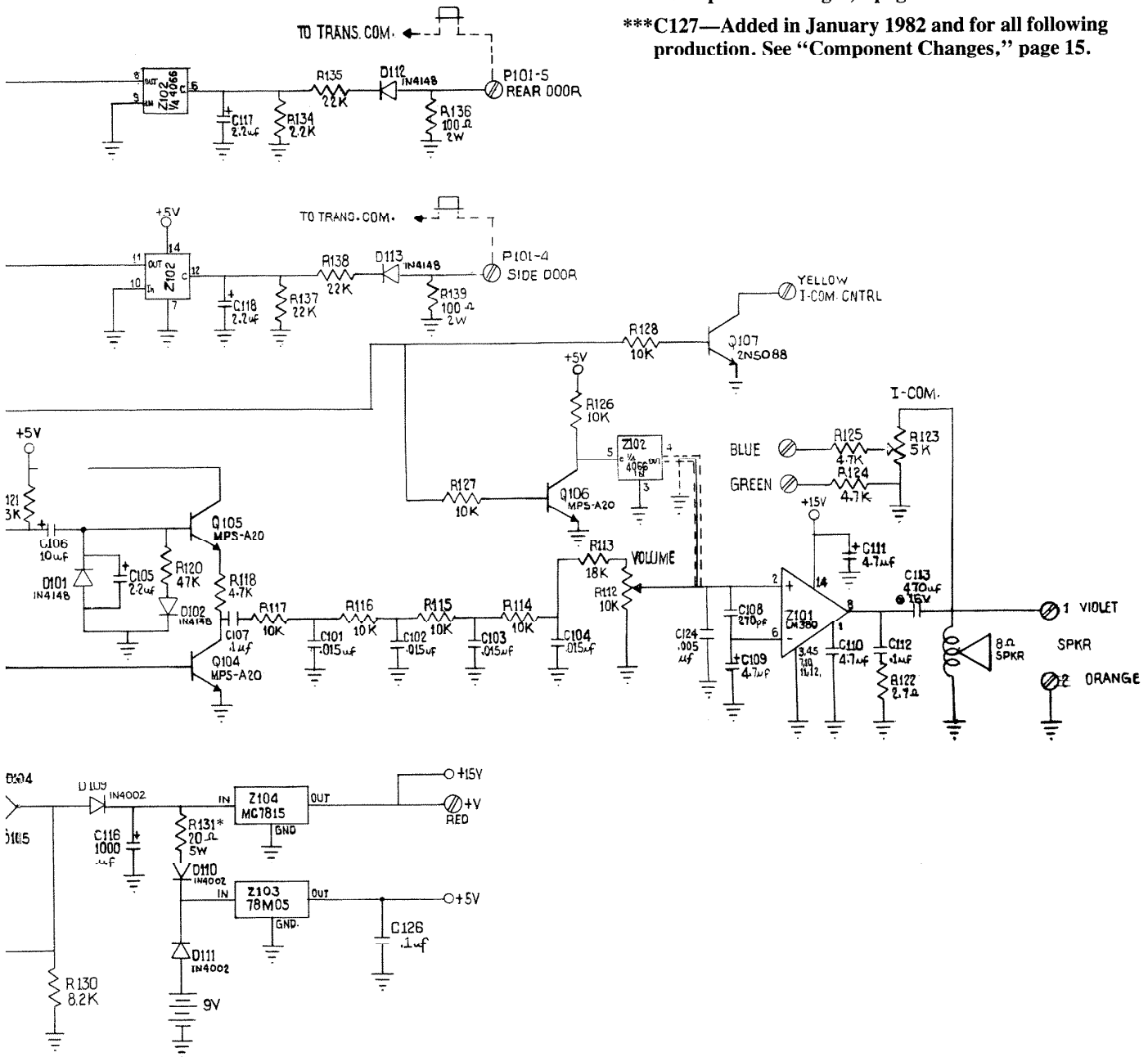
SCHEMATIC



*R131—Value was changed from 25Ω to 20Ω in January 1982 and for all following production. See “Component Changes,” page 15.

**C120—Value was changed from 2.2uf to 10uf in April 1983 and for all following production. See “Component Changes,” page 15.

***C127—Added in January 1982 and for all following production. See “Component Changes,” page 15.



THEORY OF OPERATION

General

The Model LA-60/61 programmable musical door chime contains a microprocessor (Z105) which controls all the major functions of the chime. The user may enter or edit a tune, change the tempo of the tune or select a preprogrammed tune through the keyboard.

Refer to the Model LA-60/61 Musical Door Chime Schematic Diagram for the following discussion.

Keyboard and Encoder Circuit

The keyboard is arranged as a four (4) column by six (6) row matrix. When a key is pressed, the two "wires" are shorted at that X-Y point. The key closure is then detected by the keyboard encoder Z106. After a debounce period (determined by C120) has expired, a valid key closure is detected. This is indicated to Z105 by first presenting the binary equivalent of the key position on the data lines A through E. Second, the DA line (Z106, pin 13) goes high. Z105 senses this and then waits until the line goes low again before it reads the data on the encode data lines A through E (Z106, pins 19 through 15).

NOTE: The DA line of Z106 will remain high as long as a key is pressed. For this reason, Z105 does not read the data on Z106's data lines until the DA line goes from high to low.

NOTE: Z106 has only five row inputs, Y1 through Y5. Since six row inputs are needed to encode 24 keys (4 columns x 6 rows), external logic was introduced. The logic circuit which consists of Z108, Z107, D114, and R141 performs the function of a sixth row input to Z106.

When any key in the sixth row is pressed, the adjacent key in row Y5 is pulled low through D114. At the same time, the D-input (pin 9 on Z108) also goes low. When the debounce time has expired, the DA line which is also connected to the clock input of Z108 goes from low to high and puts a high on the \bar{Q} output (Z108, pin 12). The \bar{Q} output is ORed through Z107 with data line C of Z106 to allow the binary codes for 20, 21, 22, and 23 to be generated when a key in the sixth row is pressed.

Front, Side and Rear Door Pushbutton Circuits

The front door pushbutton circuit is also associated with the keyboard. When the front door pushbutton is pressed, the full wave AC voltage from the transformer is rectified by D115, applied to the voltage divider made up of R142 and R143, and filtered by C123. This provides approximately +5V to Z102, pin 13 (control input of transmission gate). Since Z102, pins 1 and 2 are wired in parallel with the tune test key on the keyboard, the tune in Z105's memory plays when the front door pushbutton is pressed. R144, a 100 ohm, 2 watt resistor is used to provide a complete circuit and limit the current through a lighted pushbutton's light bulb.

The rear and side door circuits operate similar to the front door circuit except that when Z102 is turned on as a result of a pressed pushbutton, Z105, pin 27 or 26 goes low. This indicates to Z105 that the rear or side door pushbutton has been pressed.

Power Supply

A bridge rectifier consisting of D103, D104, D105 and D106 supplies full wave rectified DC to the entire chime circuit. D109 is used to isolate the 120 Hz full wave DC from the filter capacitor so that it can be conditioned and used as a timing reference for the multiplexed display refresh.

Z104 and Z103 are monolithic voltage regulators used to supply constant voltages to parts of the circuit. Z104 is used to supply +15 volts to the audio amplifier Z101, while Z103 supplies +5 volts to the rest of the circuit. R131 is used to lower the input voltage to Z103 to keep its power dissipation within safe operating limits.

D111 is used to isolate the 9 volt standby battery power supply from the input to Z103 during normal operation when AC power is applied. D110 is used to keep the 9 volt battery from supplying power to Z104 when AC power has been removed.

R130, R129, C115, C114, C125, D107, and D108 are also associated with the power supply circuit. These components are used to condition and limit the full wave rectified AC power to supply a timing reference to Z105 for the time multiplexed display. Approximately 1.5 volts, peak-to-peak, 120 Hz square wave is provided to Z105, pin 2.

Display

LED 101 is a two digit time multiplexed display. This method was chosen to reduce the number of Z105's pins required to drive the display. Z105, pins 12 through 18, are used to supply the segment information to the display. Z109 is a Darlington buffer that provides greater current to the display segments than Z105 can deliver. Z105, pin 19, is used to select the digit that is displayed. When pin 19 is high, Q103 and Q101 are both turned on while Q102 is turned off. This allows current to flow through selected segments of the most significant digit. The segments that are turned on is determined by the state of the segment pins (Z105, pins 12 through 18). A high on one of these pins will turn the associated segment on, while a low will keep it turned off. When Z105, pin 19, is low, Q102 is turned on while Q101 and Q103 are turned off. This allows current to flow through the selected segments of the least significant digit while the segments of the most significant digit are turned off. During normal operation the digits are turned on and off fast enough (60 times per second) so both digits appear to be on continuously. If the display is operating properly, there should be a 60 Hz, 5 volt square wave at Z105, pin 19.

The decimal points on the display are used to indicate that a particular note is in the second octave. The decimal points are controlled by Z105, pin 11. This signal is buffered by R140, Q108, and R145. When Z105, pin 11, is low the decimal points are turned off; when the pin is high the decimal points should be on.

Microprocessor (Z105) Master Oscillator

Z105's master oscillator is controlled by X101, a 4.00 MHz crystal. C122 is used to offset an internal capacitance on pin 5. The waveform of the 4.00 MHz oscillator may be seen with an oscilloscope on Z105, pin 4.

NOTE: The oscilloscope probe must have an impedance of greater than 10 megohms and must have a capacitance of less than 13 pf.

Note Strike and Note Playing Circuit

The note strike circuit consists of R121, R120, C105, C106, D101, D102, and Q105. This circuit alters each note that is played to produce a strike and decay sound.

Before each note is played, Z105, pin 9, which is normally high, goes low. This essentially reverses the charge on C106 through D101. C105 is used to slow the initial charging of C106 to 'soften' the 'strike' sound of each note. When Z105, pin 9 goes back high, C106 begins to discharge through R120 and D102 since D101 is reverse biased. This discharge provides an exponentially decaying current at the emitter of Q105.

The note playing circuit, which consists of R118, R119, C107, and Q104, uses the decaying current produced by the note strike circuitry to produce an exponentially decaying square wave voltage at the collector of Q103.

Tone Shaping Circuitry

The tone shaping circuitry consists of R114, R115, R116, R117, C101, C102, C103, and C104. These components form a four-pole lowpass filter which helps to remove much of the high order harmonic content of the square wave.

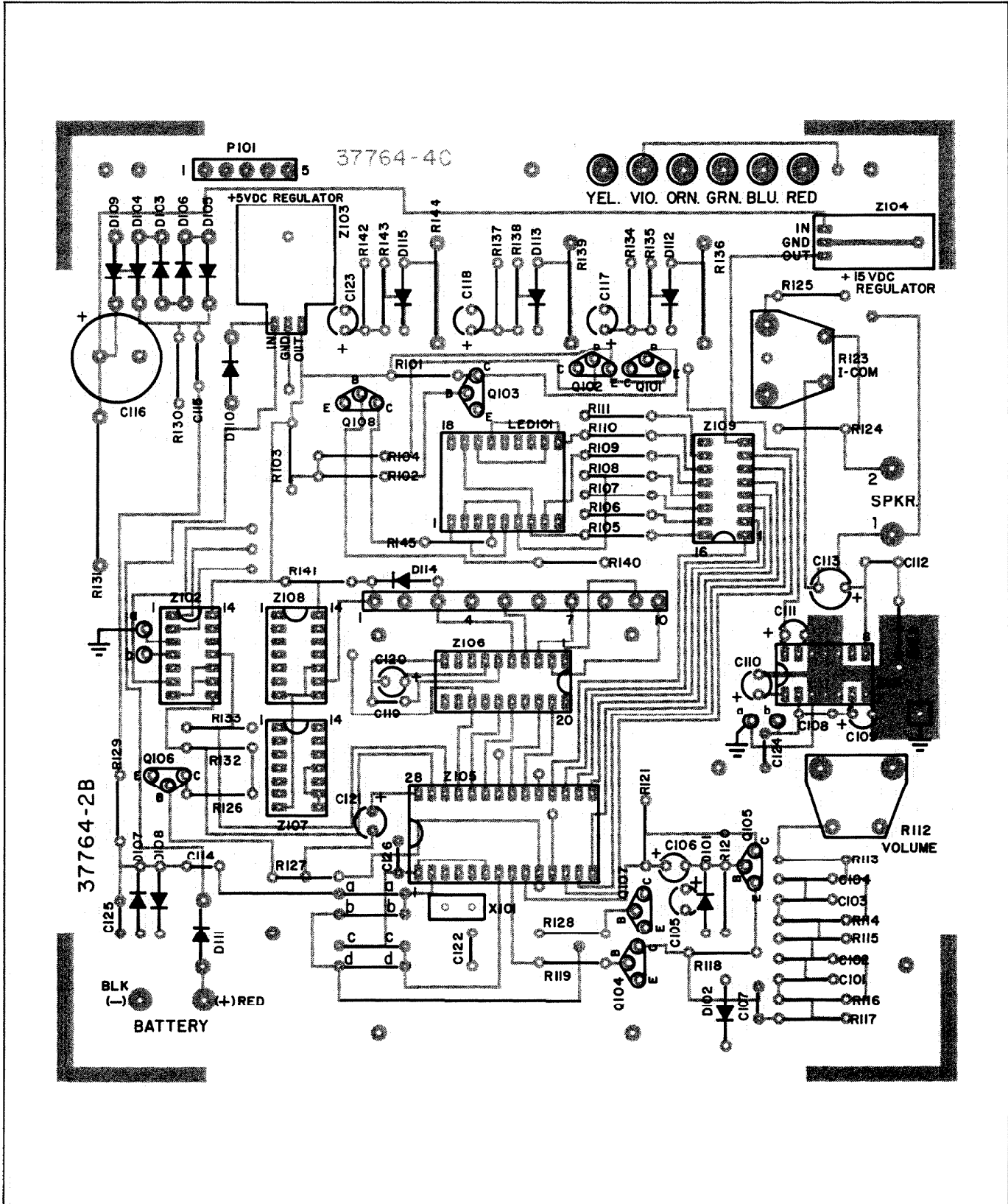
Audio Muting and I-COM Control Circuitry

The audio muting and the I-COM control line are both controlled by Z105, pin 10. The audio muting circuit which consists of R127, R126, Q106, and $\frac{1}{4}$ of Z102, is used to keep the input to the audio amplified at ground when a tune is not being played. This prevents any 60 Hz power line hum from being induced into the audio amplified while the chime is idle. When the chime is not playing a tune, Z105, pin 10, is low. This keeps Q106 turned off which turns Z102 on and keeps the input to the audio amplifier at ground. Before a tune starts to play, Z105, pin 10, goes high turning Z102 off which allows the amplifier to operate normally. After the tune has finished playing, Z105, pin 10, returns low and mutes the amplifier input.

The open collector output of the I-COM control is also controlled by Z105, pin 10.

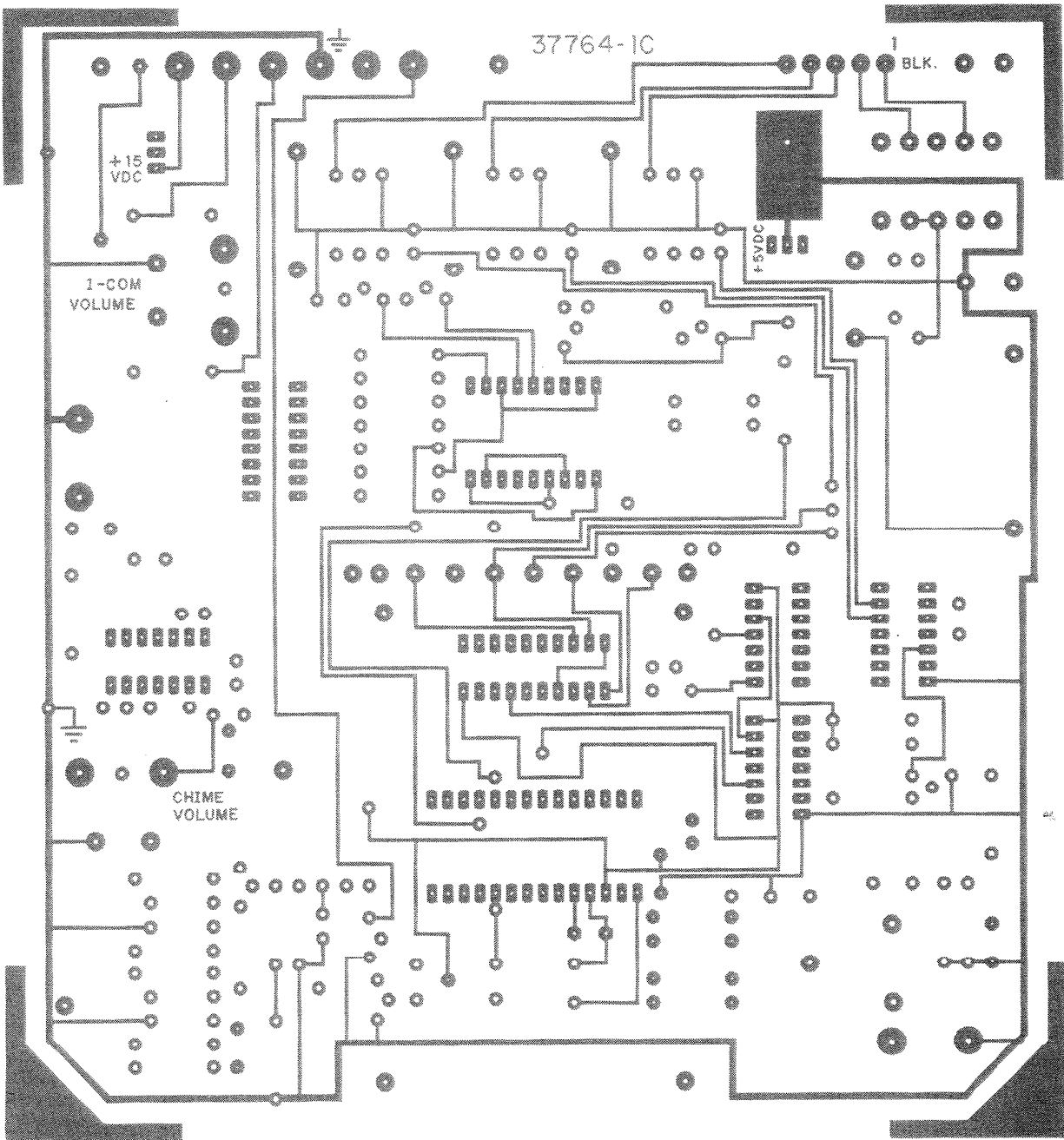
P.C. BOARD LAYOUTS

Model LA-60/61 Printed Circuit Board



VIEW SHOWING COMPONENT CONNECTION (37764-2B)
AND TOP PC FOIL PATH (37764-4C)

Model LA-60/61 Printed Circuit Board



VIEW SHOWING BOTTOM PC FOIL PATH
(37764-1C)

REPLACEMENT PARTS LIST

Capacitors: Value In Micro (10⁻⁶) Farads. Other Specifications As Noted

Resistors: Value In Ohms $\pm 5\%$, $\frac{1}{4}$ Watt, Carbon Except As Noted

K=Kilo=1,000

M=Mega=1,000,000

Ref. No.	Nuflone Part No.	Description
		(*) Used in LA-60 Only (**) Used in LA-61 Only
	42625-000(*)	Chime Assy. Complete
	42626-000(**)	Chime Assy. Complete
	42627-000(*)	Chime Cover & Frame Assy.
	42628-000(**)	Chime Cover & Frame Assy.
	35259-000	Door
	36115-000	Speaker—5", 8 Ohm
	39708-003	Screw #6-20x $\frac{3}{8}$ Ph. Slit. Pan "25" Speaker Mtg—3 Req'd.
	31984-000	Cable Clamp
	39759-015	Screw #6-20 x $\frac{1}{2}$ Ph. Slit. Pan "25" Speaker Mtg. & Cable Clamp Attach.
	47848-000	Instruction Sheet
	48753-000	Song Book and Operator's Manual
	29907-000	Transformer Assy. (Ref. —105N)
	16119-007	Screw #6 x 15 Slit. Rd. "A" For Cover To Base (1 Only)
	42635-000	Socket Assy.—5 Position
	42634-000	Base Assy.
	35258-000	Base
	35265-000	Terminal Strip—5 Line
	35266-000	Terminal Strip
	42632-000	P. C. Board Assy.— Chime Complete
		DIODES
D101, D102 D107, D108 D112—D115 D103—D106 D109—D111	36617-000 36549-000	Silicon Switching, 50 MA DC75 PIV IN914 Texas Inst. IN4148 Silicon Rectifier .1 Amp DC 100PIV Type IN4002
		RESISTORS
R101, R114— R117, R126, R127, R128 R102, R118, R124, R125, R140 R103 R104 R105—R111 R112 R113 R119, R121, R132, R133, R141 R120 R122 R123 R129, R130 R131* R134, R135, R137, R138, R142, R143 R136, R139, R144 R145	33082-103 33082-472 33082-681 33082-222 33082-820 34088-000 33082-183 33082-332 33082-473 33082-027 34066-000 33082-822 33030-112 33082-223 33028 101 33082-181	10K 4.7K 680 2.2K 82 10K $\pm 30\%$, 1/10 Watt, 255° Rotation 18K 3.3K 47K 2.7 5K $\pm 30\%$, 1/10 Watt, 255° Rotation, CTS Corp. Type U201R503B 8.2K 25, 5W Wirewound 22K 100, 2W Wirewound 180

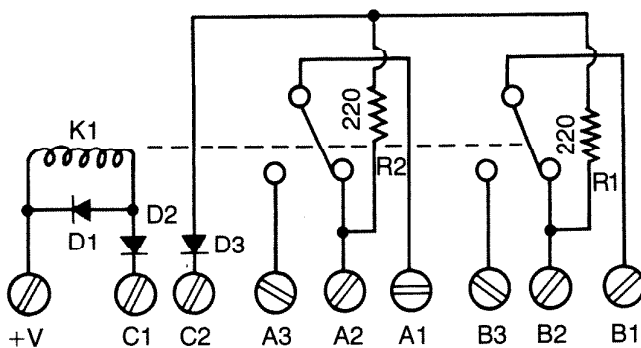
Ref. No.	Nuflone Part No.	Description
		CAPACITORS
C101—C104	35055-108	.015 $\pm 10\%$, 100WVDC Polyester Film
C105, C117, C118, C120,* C121, C123	35091-120	2.2 $\pm 20\%$, 50WVDC Electrolytic
C106	35091-102	10 $\pm 20\%$, 25WVDC Electrolytic
C107, C112 C114, C119	35076-110	.1 $\pm 20\%$, 12WVDC Ceramic
C108	35100-124	270pf $\pm 10\%$, 500WVDC Ceramic
C109, C110	35091-119	4.7 $\pm 20\%$, 35WVDC Electrolytic
C111	35091-122	470 $\pm 20\%$, 16WVDC Electrolytic
C113	35100-127	.1 +80% -20%, 100V Ceramic
C115	35091-121	1000 +30% -10% 35WVDC Electrolytic
C116	35100-162	27pf $\pm 10\%$, 500WVDC Ceramic
C122	35100-138	.005 $\pm 20\%$, 100WVDC Ceramic
C124	35076-110	.1 $\pm 20\%$, 12 WVDC Ceramic
C-126	35100-138	.005 $\pm 20\%$, 100WVDC Ceramic
C-127*		
		TRANSISTORS
Q101, Q102	36615-000	PNP Silicon, Fairchild Semi Conductor #TEH-0224 National Semi P/P 67-72
Q103—Q106		NPN Silicon, Texas Inst.
Q108	36613-000	TIS98, Motorola MPSA20
Q107	36580-000	Noise, Texas Inst. SKA-4220 Motorola Inc. SPS-1216 National Semi-Conductor SMO-7329, 2N5088
		I. C. SOCKETS
	39747-000	28 Pin
	39863-000	9 Pin
		INTEGRATED CIRCUITS
Z101	36641-000	Audio Amp, National Semiconductor LM380N
Z102	36658-000	Quad Analog RCA CD4066AE or CD4066BE
Z103	36698-000	5V Regulator Motorola Inc. MC78M05CT
Z104	36727-000	15V Regulator Motorola Inc. MC7815CT
Z105	36725-000	Microprocessor
Z106	36728-000	20 Key Encoder National Semiconductor #74C923N
Z107	36644-000	NorGate, RCA CD4001BE
Z108	36730-000	Dual Type D Flip-Flop Motorola #MC14013BCP
Z109	36729-000	Display Driver Motorola #MC1413P
		*See "Component Changes," page 15.

Schematic Symbol	NuTone Part No.	Description
LED 101	36726-000	NUMERICAL DISPLAY 2 Digit L.E.D. Com. Anode Monsanto # MAN6710
X101	39866-000	CRYSTAL 4.0 MHZ, Quartz
	39737-000	KEYBOARD Texas Inst. # 11K5131
	35269-000 11159-000	HEAT SINK Thermalloy Inc. # 6073B-SE3 Hex Nut #4-40 Mtg. of Heat Sink

Schematic Symbol	NuTone Part No.	Description
P101	39865-000	POST CONNECTOR 5 position, AMP Inc. # 640385-5;
	42636-000 35267-000	BATTERY CONNECTOR ASSEMBLY Battery Connector Assembly Battery Connector
	68186-000 48785-000 39708-003 35264-000	MISCELLANEOUS Spacer (4 Req'd.) Keyboard Label Screw #6-20 x 3/8 Ph. Slit. Pan "25" (5 Req'd.) Mtg. P.C. Board Lens, W.H. Brady Co. Name Plate Division

ADDENDUM

Door Speaker Relay Schematic



Component Changes

Schematic Symbol	Date of Change	Description of Change
C120	April, 1983	NuTone part. no. 35091-120 (Electrolytic—2.2uf) replaced by NuTone part no. 35091-102 (Electrolytic—10uf).
C127	January, 1983	Added NuTone part no. 35100-138 (.005—Ceramic).
R131	January, 1982	NuTone part no. 33030-112 (25Ω, 5W) replaced by NuTone part no. 33030-113 (20Ω, 5W).