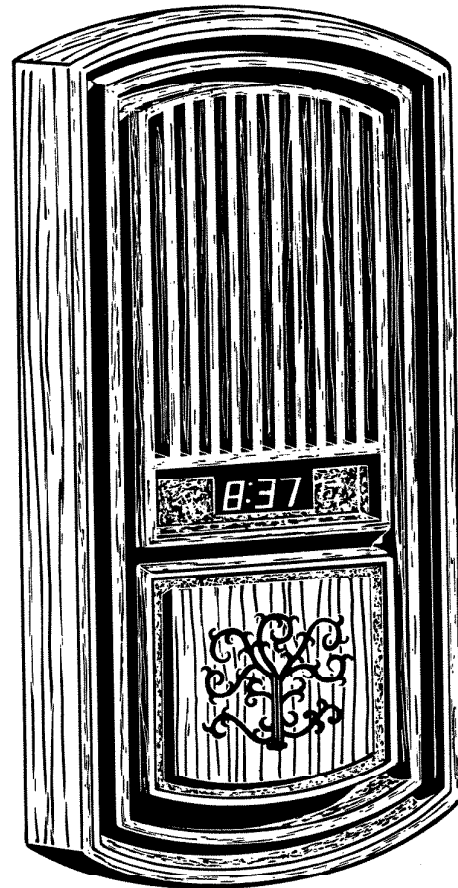
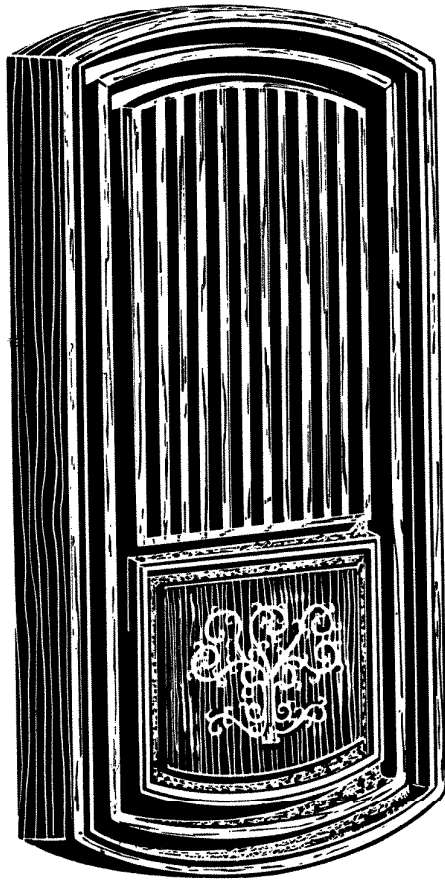


# SERVICE MANUAL

MODEL: LB-55, LBC-55 MUSICAL CHIMES

LB-55



LBC-55

## CONTENTS

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**NuTone**

## GENERAL SERVICE INFORMATION

The NuTone "Melody" and "Melody Time" electronic musical chimes offer a selection of keyboard—programmed tunes. The "Melody Time" chime also comes with a striking digital clock. Optional connections are provided for hook-ups to radio-intercoms and extension speakers.

The LB-55 and LBC-55 are the models currently being produced by NuTone. They use the 28-PIN 8021 Microprocessor programmed to execute the digital clock and

display functions in the LBC-55.

A CMOS transmission gate audio muting circuit is incorporated. This provides virtually complete hum and buzz suppression out of the audio amplifier by shunting its input to ground, except during the playing of a tune or striking of the clock.

The following table summarizes information pertaining to the LB-55, the LBC-55 and the chime models no longer in production.

MODEL NO.	FIRST MFG. DATE	CLOCK	SHORT TUNE	NO. TUNES	PC BOARD NO.		NUTONE MICROPROCESSOR PART NO.	INTEL MICROPROCESSOR PART NO.
					CHIME	DISPLAY		
LB-55	Jan 1980	No	No	25	37730	—	36709	8021
LBC-55	Jan 1980	Yes	No	15	37731	37720	36710	8021
<b>CHIMES NO LONGER IN PRODUCTION</b>								
LA-55	May 1979	No	Yes	25	37711	—	36705	8021
LAC-55	May 1979	Yes	Yes	25	37712	37710	36696	8022
LA-55 Revised	Aug 1979	No	Yes	25	37721	—	36705	8021
LAC-55 Revised	Aug 1979	Yes	Yes	25	37722	37720	36696	8022
LA-55 Special	June 1980	No	Yes	25	37742	—	36696	8022
LAC-55 Special	June 1980	Yes	No	25	37742	37720	36696	8022

The LAC-55 (revised) and LA-55 (revised) volume control circuit impedance was lowered by a factor of 10 to reduce the amount of hum and buzz coupled into the audio amplifier. In addition, an RC Filter was substituted for the Zener circuit used to derive the 60 Hz power line

synchronizing signal for the microprocessor.

The LA-55 (special) and LAC-55 (special) are hybrids that make use of the original 36696 (8022) microprocessor in a circuit very similar to the "B-Series." All previously incorporated revisions are included.

## CHIME INSTALLATION

### Location

1. Select a central location so the chime may be heard throughout the house (even with the Intercom System off, if so equipped).
2. Locate the NuTone chime where it can be seen as well as heard: position the chime on a wall at eye level. Models equipped with a digital clock should be located for easy viewing and operation.
3. Select pushbutton locations (this chime can accommodate 3-door operation).
4. If the home is multi-level or large ranch style, up to 3 (maximum) extension speakers (Model ISA-63) may

be used to provide adequate coverage. An extension speaker may be installed outside the front door (Model ISB-64 with pushbutton, IS-61, ISA-63 or IS-65).

5. When connected to NuTone Radio-Intercom or Stereo-Intercom System, chime will be heard at inside and patio intercom speakers.

**Important: If chime is wired to intercom system, chime tones may be heard at the intercom door speaker, provided the chime is wired according to the supplemental instructions for chime-intercom connections.**

## Wiring

Note: Wire chime to comply with local and state codes. Turn off house power when installing transformer and keep electricity off until all wire connections are made to the chime.

1. Mount supplied transformer to any junction or panel box. Attic location is not recommended. Connect the white and black wires from transformer to matching colors of house power supply. Use box and wire connectors. See Figure 1.
2. Label all wires. Run 18-22 gauge wire from transformer and pushbuttons to chime location; run these wires through the cable strap which is attached to the chime. See Figure 2.

**Note: When fastening chime wiring to wall stud and ceiling joists, be careful of possible shorts that may occur by allowing staples or clips to cut through the protective wiring insulation.**

3. If applicable, run NuTone IW-2 Cable (No. 22 twisted pair) from Intercom master station to chime location. Label wires.

4. If applicable, run NuTone IW-2 cable (No. 22 twisted pair) from remote speakers to chime location. Label wires.
5. Make wire connections to terminals shown as applicable. Refer to Figure 2.
6. Upon completion of installation, if the chime does not operate, recheck your installation with the preceding instructions and wiring diagram shown in Figure 2. If the chime still does not operate, check the push-button(s) for poor contact or loose connections.

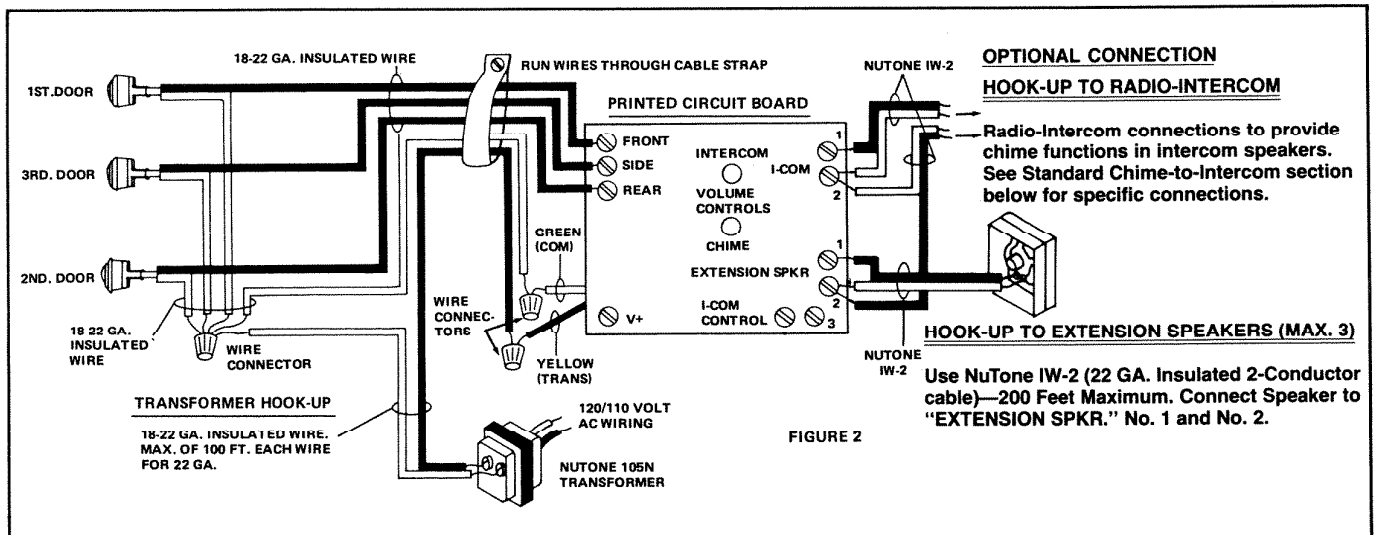
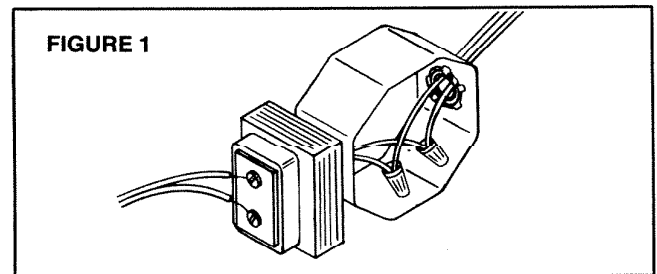


FIGURE 2

## Mounting Chime and Base Plate

1. Position chime base plate (attached to chime) in the desired location on the wall. Use the base plate as a template to mark the mounting holes and wiring hole. See Figure 3.
2. Cut out wiring hole and pull wires through hole in base plate.
3. Secure base plate to wall with appropriate hardware.
4. Latch chime to base plate with screw provided.

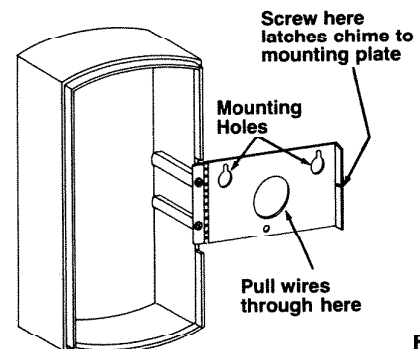


FIGURE 3

# OPERATION AND CHECKOUT

## Operational Features

First (front) door pushbutton will sound the tune; second (rear) door pushbutton will sound two notes; third (side) door pushbutton will sound one note.

Musical chime will be programmed by last two digits pressed. EXAMPLE: If you wished to play tune "21" and pressed "211", tune "11" would be played. If a number is programmed for which there is no tune, (example: "29") Westminster Chimes will be played.

If the chime power is turned off or there is an electrical power failure, the chime will require reprogramming when

it is turned back on or when electrical power is restored. Otherwise, each time the front door pushbutton is pressed, the chime will play Westminster Chimes until it is reprogrammed for another tune.

The digital clock if so equipped, will display "0:00" after a power outage has occurred. The clock will begin counting minutes and hours from that point. The time shown will be the elapsed time since power was restored. The time and the "clock strike" setting must then be reprogrammed.

## Operation Procedure

To operate the Music Chime, see Figure 4 and proceed as follows:

### TO SELECT A TUNE

- If chime is off, press CHIME ON.
- Press PROGRAM.
- Press number of desired tune shown in Tune List.
- Press TUNE TEST to make sure that chime is correctly programmed for the tune you wish to play.
- If you have made a mistake, press PROGRAM and repeat the above steps.
- Press CHIME OFF to turn off the chime.

To operate the optional digital clock, if so equipped, see Figure 4 and proceed as follows:

### TO SET THE TIME

- Press PROGRAM.
- Press the numbers of the time.
- Press SET TIME.
- If wrong time was entered, press PROGRAM and repeat the above steps.

### TO MAKE THE CLOCK STRIKE

- Press STRIKE ON.
- Set strike sequence by pressing  $\frac{1}{4}$ ,  $\frac{1}{2}$  or HOUR as desired.

### TO SILENCE CLOCK

- Press STRIKE OFF.

## TUNE LIST

LBC-55	LB-55
1. Anniversary Waltz	1. Alouette
2. Auld Lang Syne	2. Anniversary Waltz
3. Beethoven's Fifth	3. Auld Lang Syne
4. Bless This House	4. Battle Hymn of the Republic
5. Dixie	5. Beethoven's Fifth
6. For He's a Jolly Good Fellow	6. Bless This House
7. Happy Birthday	7. Dixie
8. Jingle Bells	8. For He's a Jolly Good Fellow
9. Rule Britannia	9. Greensleeves
10. Star Spangled Banner	10. Happy Birthday
11. Stars and Stripes Forever	11. Home On The Range
12. Take Me Out To The Ballgame	12. I've Been Working On The Railroad
13. The Marseillaise	13. Jingle Bells
14. Westminster Chimes (8 notes)	14. Joy To The World
15. Westminster Chimes (4 notes)	15. Mazel Tov
16. Yankee Doodle	16. My Wild Irish Rose
	17. 'O Sole Mio!
	18. Oh Tannenbaum
	19. Rule Britannia
	20. Star Spangled Banner
	21. Stars and Stripes Forever
	22. Take Me Out to the Ballgame
	23. The Marseillaise
	24. Westminster Chimes (8 notes)
	25. Westminster Chimes (4 notes)
	26. Yankee Doodle

## Checkout and Volume Adjustment

Check the chime volume (with the Radio-Intercom on, if applicable). The chime should be heard clearly through the extension speakers (or Intercom Speakers, if so equipped). If necessary, adjust the appropriate volume

control. The controls are accessible through a hole in the printed circuit board and can be adjusted with a small screwdriver. See Figure 2.

# Keyboard Test Aids

LB-55

Push "PROGRAM" and then this key switch to start the chime playing its entire tune memory (approx. 3 minutes & 45 seconds). This can only be reset by a 16 VAC power interruption. It may be useful to provide a test tune long enough for checking sound levels at remote speakers, etc., when only one person is available to troubleshoot a system.

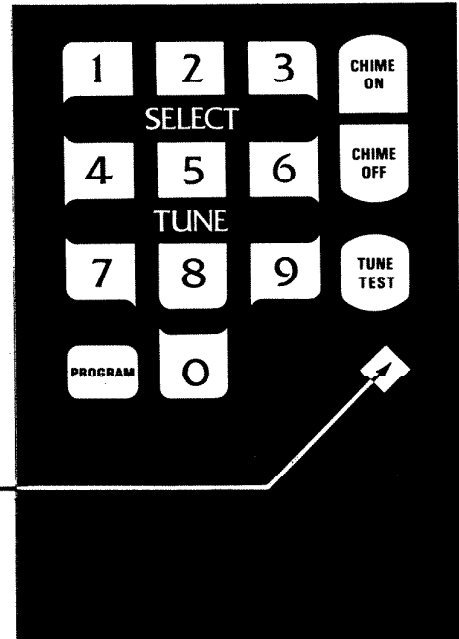


FIGURE 4

LBC-55

Clock hour strike test (strikes no. of times shown in hours digits)

Clock advance test (advances clock one minute for each push of button)

Local operation of SIDE DOOR tune

Local operation of REAR DOOR tune

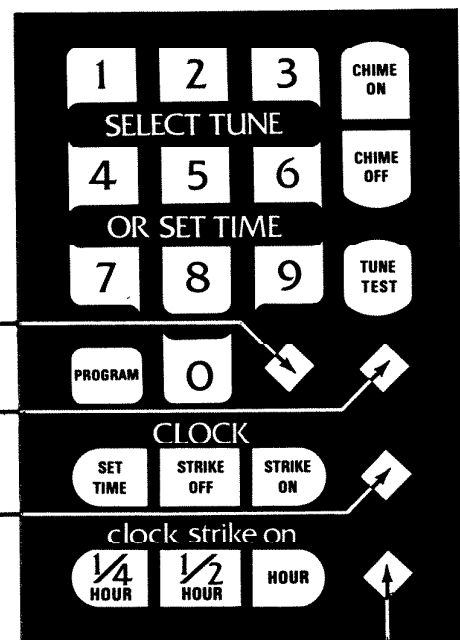


FIGURE 4

## ACCESSORY KITS

### KIT 5783A: Relay Kit For LBC-55

This kit is intended for applications where it is desired to separate the chime tune and clock strike audio so as to provide *chime tune audio only* to some speakers

(ie, front door extension speaker) and *chime tune plus clock strike audio* to other speakers (ie, inside extension speakers).

### KIT 5803A: Chime Door Speaker Board

This kit is used to connect an LBC-55 or LB-55 to a radio-intercom system DOOR SPEAKER for playing the chime signals through the DOOR SPEAKER. This

module is *not required* to accomplish this function with any of the IM-300 series radio-intercom masters.

## RFI Problems

Should any of the various electronic chime models experience radio frequency interference, the individual schematics indicate the addition of appropriate components depending on the part of the circuit involved.

All models, except the original LA-55 and LAC-55, have

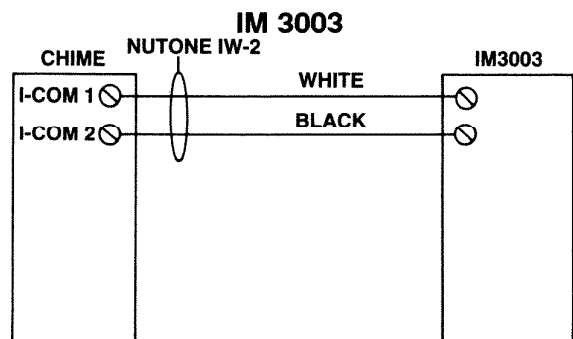
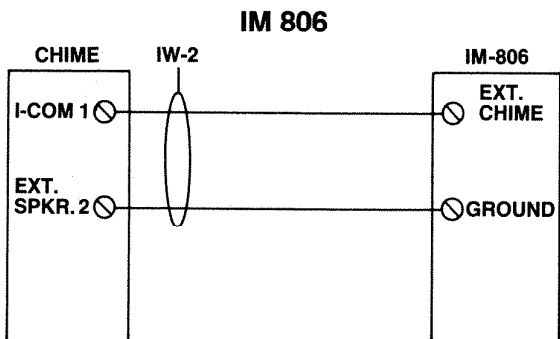
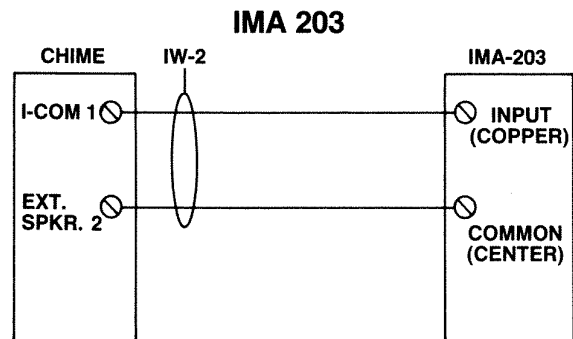
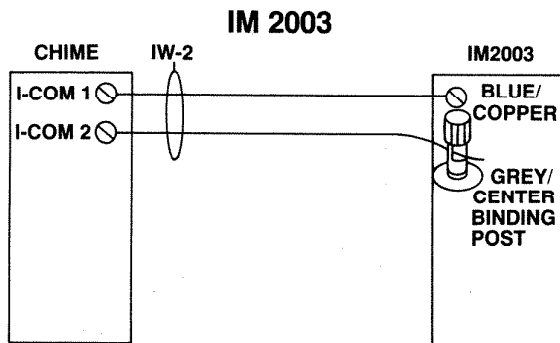
holes provided for installation of these components in the circuit board itself. RFI troubleshooting procedures should be undertaken in a manner similar to that for radio-intercom and other control circuits.

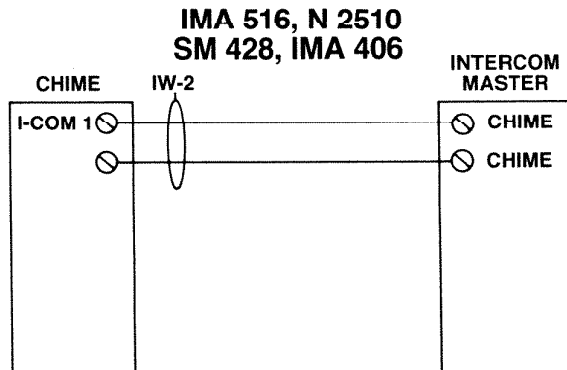
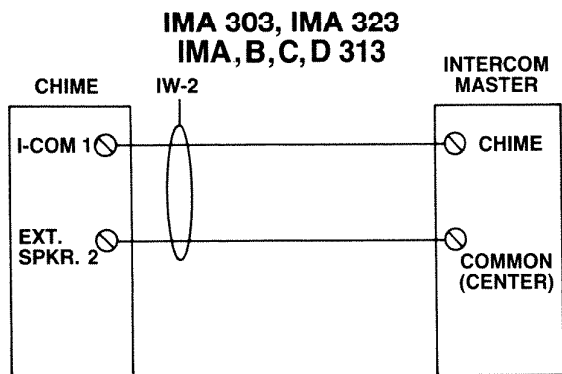
## CHIME TO INTERCOM CONNECTIONS

You can connect the LB-55 or LBC-55 to a NuTone Radio-Intercom as shown in the diagrams below. The inside/patio speakers will receive chime functions. Except in the IM-2003 and IM-3003 Series Intercoms, the chime will override radio and intercom. In the IM-2003 and IM-3003 Intercoms the radio and intercom are muted (silenced) when the chime is playing.

To adjust the chime's volume over the radio-intercom, use a screwdriver to turn the recessed control on the circuit board. See Figure 2.

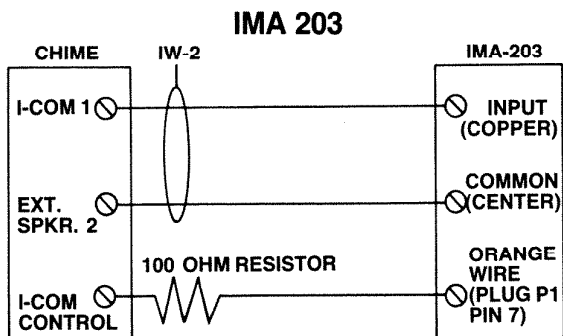
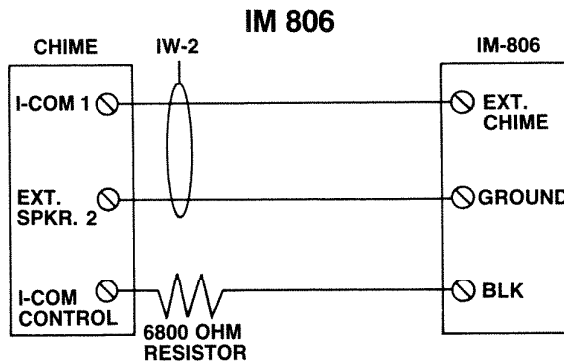
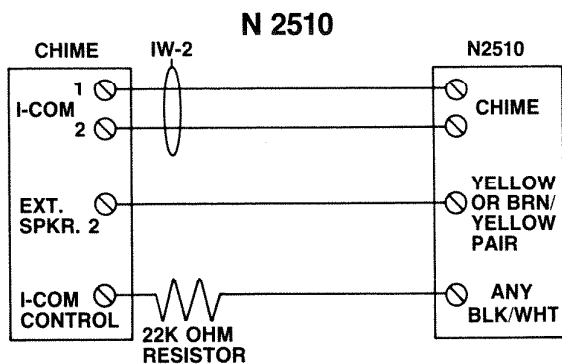
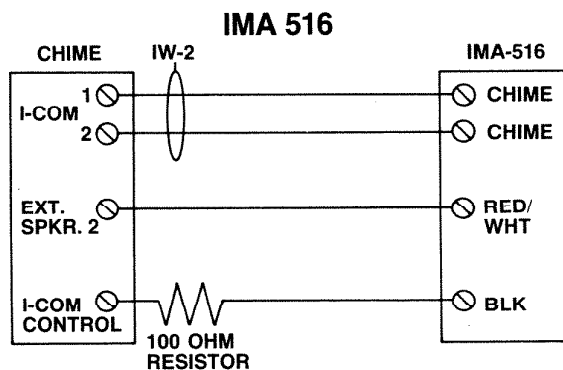
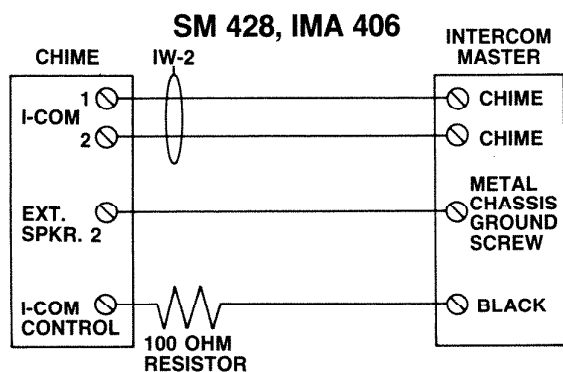
If you wish the door speakers as well as the inside/patio speakers to receive the chime, use optional kit 5803A and follow wiring information included with kit.



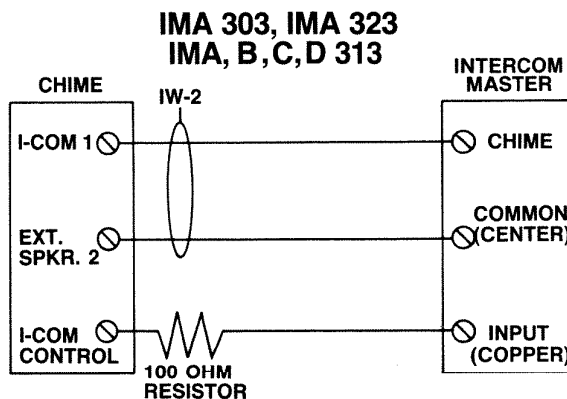


If you wish the radio and intercom to be muted, connect chime to intercom as shown in the following diagrams.

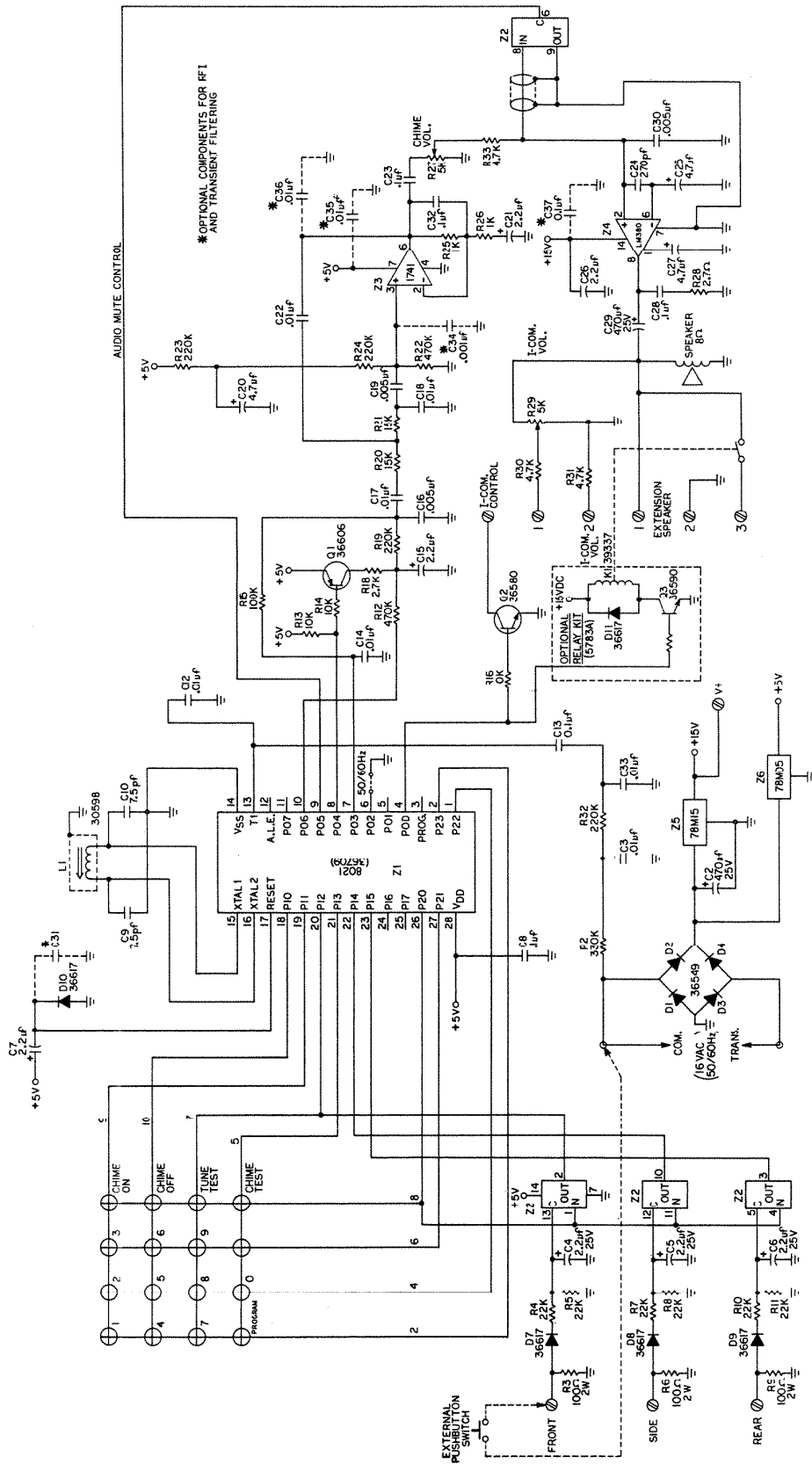
The IM 2003 and IM 3003 intercoms automatically mute radio and intercom and require no additional wiring.



DOOR SPEAKER CONTROLLED BY "DOOR ON/OFF" SWITCH ON IMA-203 MASTER

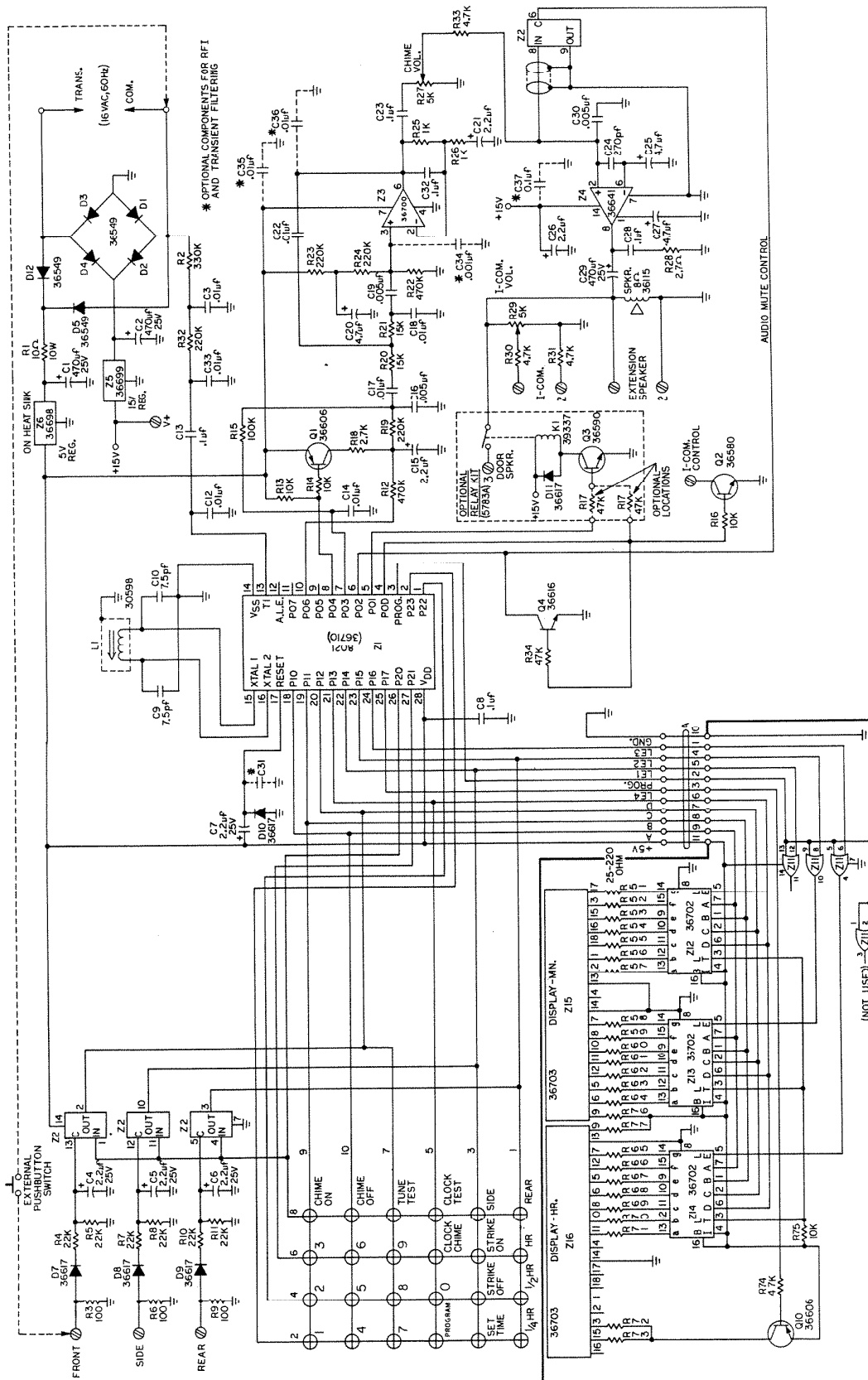


## LB-55



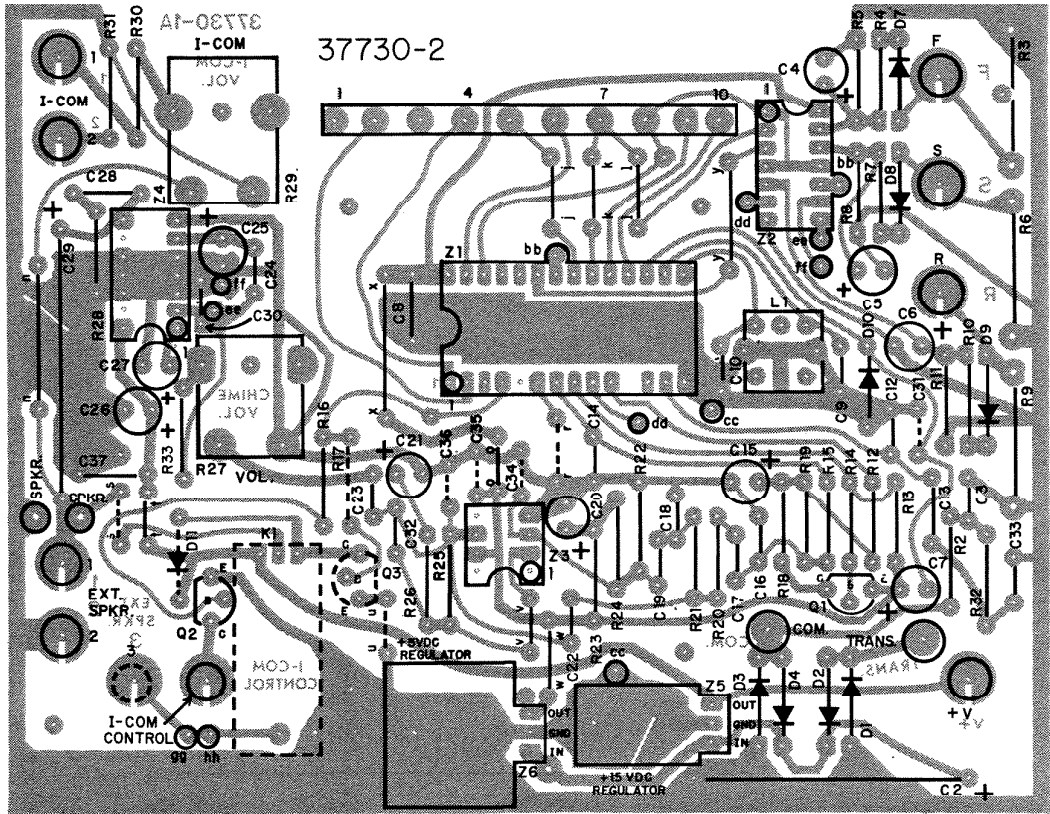


# LBC-55

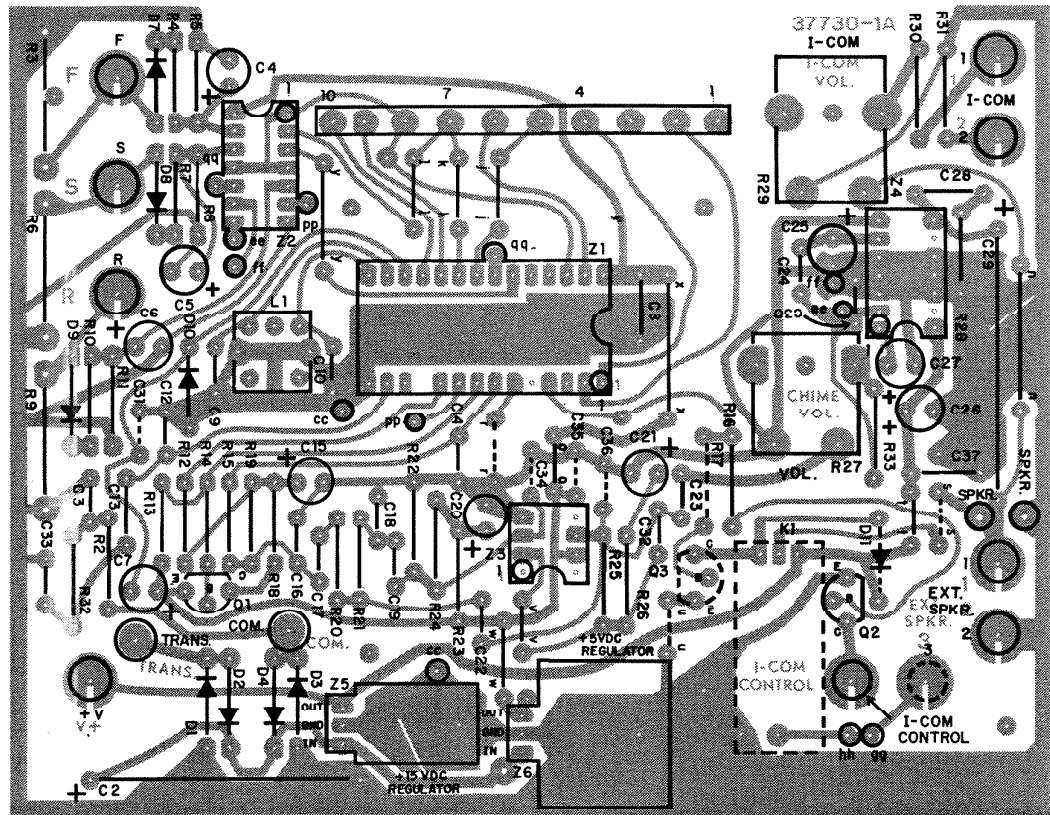


# PC BOARD LAYOUTS

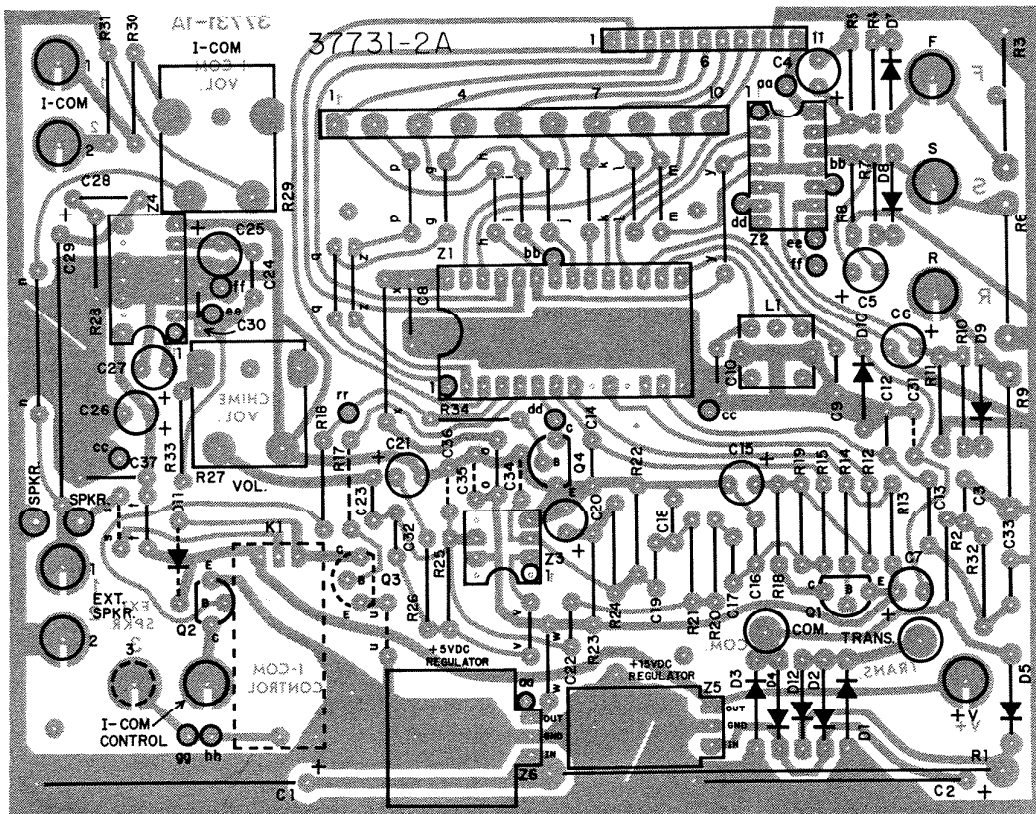
**LB-55  
COMPONENT  
SIDE  
(37730)**



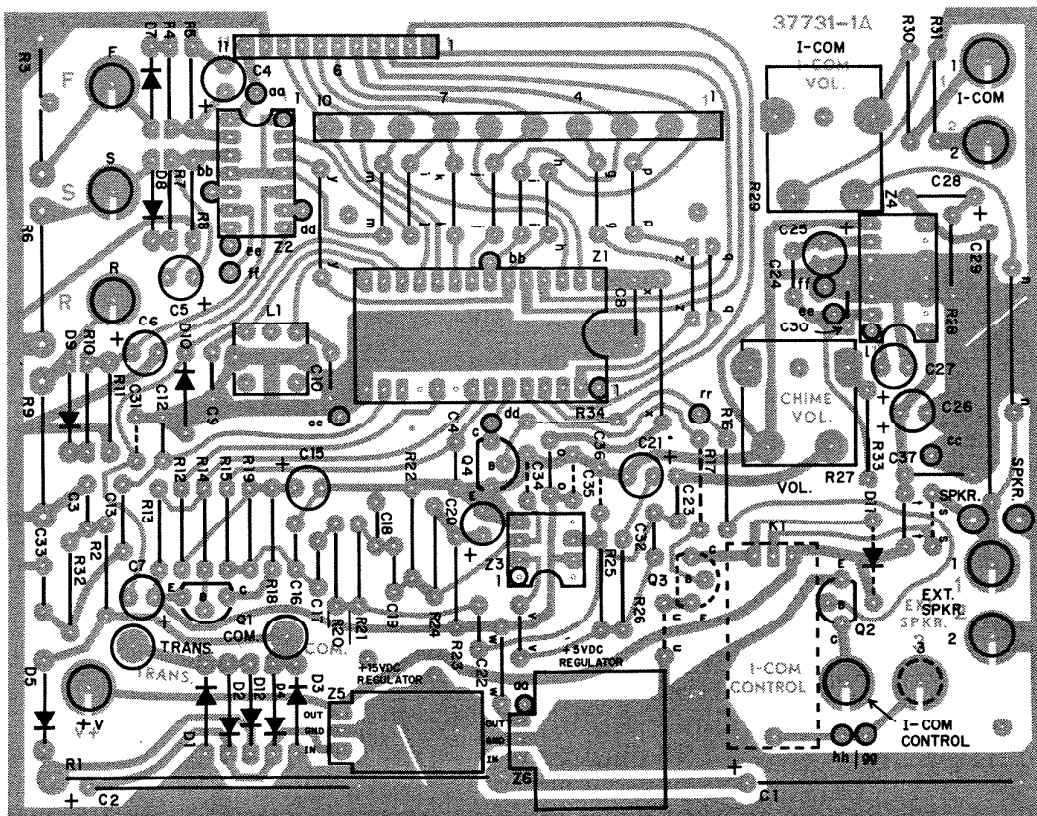
**LB-55  
PC PATTERN  
SIDE  
(37730)**



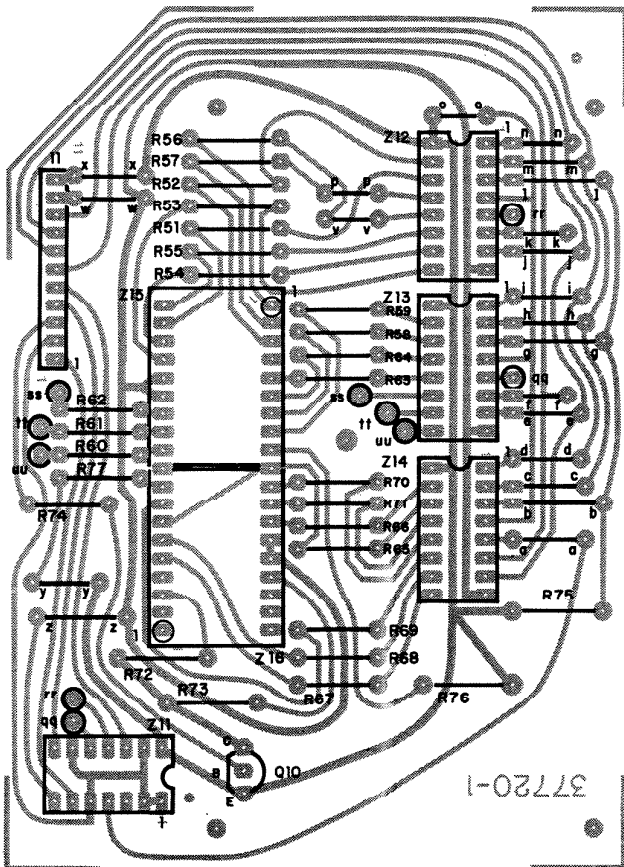
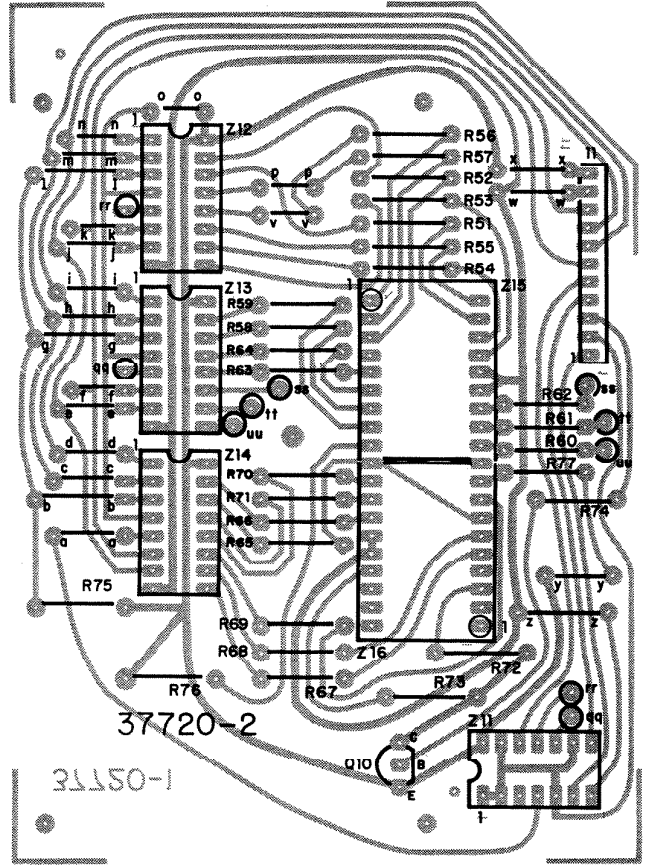
**LBC-55  
COMPONENT  
SIDE  
(37731)**



**LBC-55  
PC PATTERN  
SIDE  
(37731)**



LBC-55 CLOCK BOARD  
COMPONENT SIDE  
(37720)



LBC-55 CLOCK BOARD  
PC PATTERN SIDE  
(37720)

# THEORY OF OPERATION

## Microprocessor

---

The microprocessor (Z1) and its associated components are the heart of the system. Inductor L1, capacitors C9 and C10 and internal chip capacitance form a resonant circuit for Z1's clock oscillator. This provides all the timing signals for processor internal operation. The oscillator is adjusted for a frequency of 3.00 MHz. The Automatic Latch Enable (A.L.E.) output pin of Z1 is a divide by 30 function of the oscillator (100 KHz). It can be used as a reference in oscillator frequency adjustment.

An additional timing reference is supplied to the T1 input of Z1. This is the 60 Hz power line frequency signal supplied from the power supply circuit.

Z1 contains the entire chime operating program in its Read Only Memory (ROM). The ROM capacity is 1024 bytes in the microprocessor (8021) chip. The program contains an endless loop of instructions which Z1 sequentially executes one step at a time, over and over again.

Z1 cycles through the part of the program that scans the input circuitry (keyboard, front, side and rear inputs) looking for a change in the status of any switch function. If a change, such as a key being depressed, is sensed, Z1, at the appropriate part of the program services the detected command.

Tune numbers are entered through the keyboard and stored in on-chip Random Access Memory (RAM). When the "TUNE TEST" command is detected by Z1, the tune play portion of the program is accessed and the appropriate tune program data is transferred one byte at a time from ROM to RAM. Output from Z1 port P03 is an on/off signal of 50 percent duty cycle at a frequency equal to the frequency for that particular note in the tune being played.

The on/off signal continues for a programmed length of time corresponding to the appropriate note duration. This time period is measured by an internal counter in Z1 using the 60 Hz power line reference signal. At the end of a sequence of notes, i.e., the end of a tune, the program shifts back to the "idle" mode and Z1 searches for another command from the input circuit.

A clock strike sound is generated similar to the playing of a tune but the "strike sound" command comes from a special part of the program which operates as a digital clock for time of day indication. This clock also receives its timing information from the 60 Hz power line.

## Strike Circuit

---

At the beginning of each note to be played a Strike Pulse is generated at Port P04. This turns on Q1 charging up capacitor C15. This charge becomes the supply voltage source for the succeeding cycles of the audio frequency on/off switching signal from Port P03. As the voltage across C15 discharges, the peak voltage of the audio frequency waveform decays until finally the amplitude decreases to zero. This accomplishes a decay envelope for the audio output from the chime. The decay rate can be changed from one tune to another by switching resistor R12 in and out of the circuit.

## Audio Filter

---

The audio filter has as its input a sawtooth type waveform. An active filter, in association with passive

RC filtering, shapes this waveform to remove both low and high frequency components and act as a band pass filter ahead of the power amplifier stage. This gives the notes a more pure and pleasing sound.

## Audio Amplifier

---

This circuit is a conventional audio power amplifier using a 36641 Integrated Circuit (Z4). It is designed to drive the 8 ohm chime speaker with additional extension speakers.

## Outputs

---

There are 6 output terminals included in the chime circuit. *Extension Speaker 1 and 2* are used to drive up to three extension 16 ohm speakers. Terminal 1 is the high side of the output and 2 is chime circuit ground.

**I-COM CONTROL** is the collector of an NPN transistor which switches this terminal to ground whenever a tune is being played or a clock strike is occurring. It is normally used to control muting of a radio-intercom system but could be put to other uses as well.

**I-COM 1 & 2** are a low level audio output from the audio amplifier used for driving the chime circuit inputs of radio-intercom systems. Connection is made to both 1 and 2 on balanced intercom systems. I-COM 1 and Extension Speaker 2 are used for unbalanced intercom systems. (See pages 6-7, "Chime-to-Intercom Connections.")

**EXTENSION SPEAKER 3** terminal is not connected in normal use. It is used with an accessory relay kit where it is desired to provide separate speaker lines for chime and clock strike audio and chime only audio. This might be desired for an outside chime extension speaker near a door. The relay is energized only on chime tune playing.

## Power Supply

---

The power supply operates from a 16 VAC source (105-N or 301-N transformer). It contains both +5 VDC and +15 VDC regulators. All circuitry is supplied from the regulated +5 VDC except the audio amplifier and optional relays which are powered by the +15 VDC regulator.

An RC filter is used to provide a clean 60 Hz sine wave sync signal to Z1.

## Inputs

---

The keyboard is scanned as an X Y matrix. A logic low signal is sequentially applied to the rows of the keyboard and the columns are examined by Z1, Port P20-P23 to see if switch closures have occurred. The Front, Side and Rear inputs are activated by standard, or lighted, door chime pushbutton switches. A control voltage is generated to turn on one of the CMOS transmission gates (Z2). The outputs of these gates are connected across their appropriate places in the X Y keyboard matrix to activate playing of the correct tune.

## Display

The display serves two functions. As numbers are entered through the keyboard, they are displayed on the LED indicators. Also, the digital clock program displays its time of day status on these LED's.

The appropriate type of data to be displayed (tune entry or time of day) is determined by the program. The actual data is transferred from Z1 to the Display Module through Port P10-P17. Data is supplied in Binary Coded Decimal (BCD) format on a one-digit-at-a-time basis. Digit select and latch strobe signals are provided for storing the data in the display module latch/decoder/digit driver IC's.

## TROUBLE-SHOOTING GUIDE

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
1. Chime Inoperative	1a. No 120 VAC 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 16 VAC power from transformer secondary.	1bb. Check for open circuit in wiring from transformer secondary to chime terminal. Replace defective transformer.
	1c. Chime programmed OFF on Program Key Pad.	1cc. Program ON.
	1d. Pushbutton(s) stuck.	1dd. Check all pushbuttons, repair or replace as necessary.
	1e. Chime used in multiple chime hookup application.	1ee. The 55 Series chime may <i>NOT</i> be used in multiple chime hookup applications. These chimes will accept up to three (3) extension speakers.
	1f. Incorrect wiring.	1ff. Check specific wiring diagram.
	1g. Incorrect value (volts and/or watts) transformer.	1gg. Use NuTone 105N or 301N transformer.
2. Chime Operates Intermittently when Operated by Callers.	2a. Dirty and/or corroded contacts on pushbutton.	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 number 42069-000.
3. Chime Operates Unwanted Intermittently	3a. Intermittent short at pushbutton and/or in wiring possibly 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. Volume Too High or Low	4a. Misadjusted chime volume control.	4aa. Adjust chime volume control with small screwdriver. Volume control is located on printed circuit board to rear of chime.
5. Low/Weak Volume From Extension Speaker(s)	5a. Incorrect value (volts and/or watts) transformer.	5aa. Use NuTone 105N or 301N transformer.
	5b. More than three (3) extension speakers used.	5bb. No more than three (3) extension speakers may be used—including the door speaker.
6. Hum in Extension Speaker	6a. Non-use of twisted pair wire—NuTone Model No. IW-2.	6aa. Use only NuTone IW-2 twisted pair wire.
	6b. Extension speaker wiring paralleling AC house wiring within 12 inches.	6bb. Do not parallel this speaker wire with any AC wiring. This wire may cross AC wiring at 90 degree angles.

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
	6c. Defective speaker or wrong value speaker (in ohms).	6cc. Replace with correct speaker.
	6d. Defective chime printed circuit board.	6dd. Replace defective printed circuit board.
7. Difficulty Being Experienced with Proper Operation of Electronic Chime with Radio-Intercom	7a. Incorrect wiring.	7aa. See appropriate radio-intercom troubleshooting manual.
8. LBC-55 Clock Chime Sounds 1/4, 1/2 and/or Hour Strike Through Door Speaker.	8a. Non-use of NuTone clock kit, part #5783A-000.	8aa. Install NuTone kit, part #5783A-000 which provides the feature of switched audio output for driving an outside door speaker, or any other speaker, where chime tones only are desired.
9. LBC-55 Chime Clock Loses Time.	9a. If house power is lost, clock will restart at 0:00.	9aa. Reset clock time.
	9b. Defective (intermittent) transformer—possibly located in high temperature attic area.	9bb. Replace defective transformer, locate in non-high temperature area or use high temperature transformer. NuTone part number 42069-000.
	9c. Defective PC assembly.	9cc. Replace PC assembly.
10. LBC-55 Clock does not strike on the 1/4, 1/2, and/or hour.	10a. Strike programmed OFF on Program Key Pad.	10aa. Program STRIKE ON.
	10b. Wrong strike selected.	10bb. Select proper strike time.
	10c. Defective PC assembly.	10cc. Replace PC assembly.
11. Chime Loses Program.	11a. If house power is lost, chime will return to an 8-note Westminster chimes.	11aa. Check other clocks in home. Check to see if chime has lost program and returned to Westminster chimes. Reprogram chime.
	11b. Defective (intermittent) transformer possibly located in high temperature attic area.	11bb. Replace defective transformer. Locate transformer in non-high temperature area or use high temperature transformer NuTone part number 42069-000.
	11c. Defective chime printed circuit board	11cc. Replace defective printed circuit board.
12. Low or Distorted Audio	12a. +5 volt or +15 volt regulators not within limits.	12aa. Voltage measurements Measure output voltage of 5 volt regulator. VOUT = +5 VDC ± 0.2 VDC Measure output voltage of 15 volt regulator. VOUT = +15 VDC ± 1.0 VDC If the voltage is out of limits, replace the regulator.
	12b. Defective audio circuitry.	12bb. Audio tests To test the chime audio circuits without playing a tune, use a 400 Hz test tone. Disable the audio muting circuit by shorting the control input of the transmission gate to ground with a test lead. LB-55: Z2 pin 6 to ground or Z1 pin 9 to ground using test lead. LBC-55: Short transistor Q4 collector to emitter with test lead. Amplifier Gain—Connect AC voltmeter across audio output. Adjust the CHIME VOLUME control for maximum undistorted output. VOUT = 1.80 VRMS Min. this reading should be taken when the audio amplifier integrated circuit is relatively cool.

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
	12c. Misadjusted Intercom Volume Control	12cc. Intercom Output Adjust the CHIME VOLUME control for adequate volume at the chime speaker. Adjust the INTERCOM VOLUME control for a suitable volume for the radio intercom system.
13. Hum in intercom speaker when chime signal is fed through intercom system.	13a. Non-use of twisted pair wire—NuTone Model No. IW-2	13aa. Use NuTone IW-2 twisted pair wire.
	13b. Extraneous hum between chime and intercom master.	13bb. Form a pick-up coil of 4 to 7 turns of insulated 22 GA. wire around the speaker bell as shown in Figure 5. If volume adjustment is required, increase number of turns in pick-up coil to raise volume.

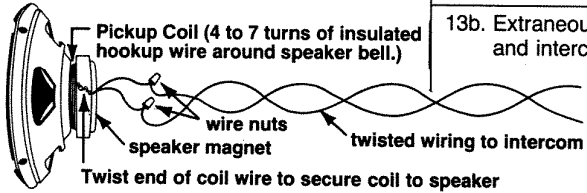
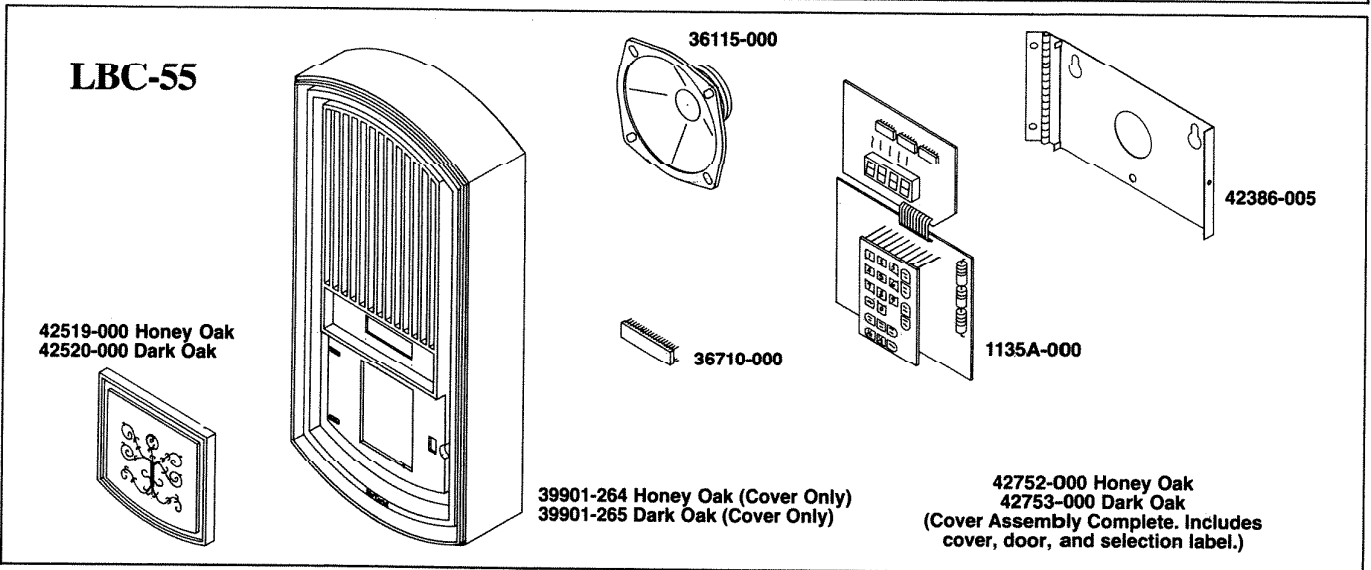
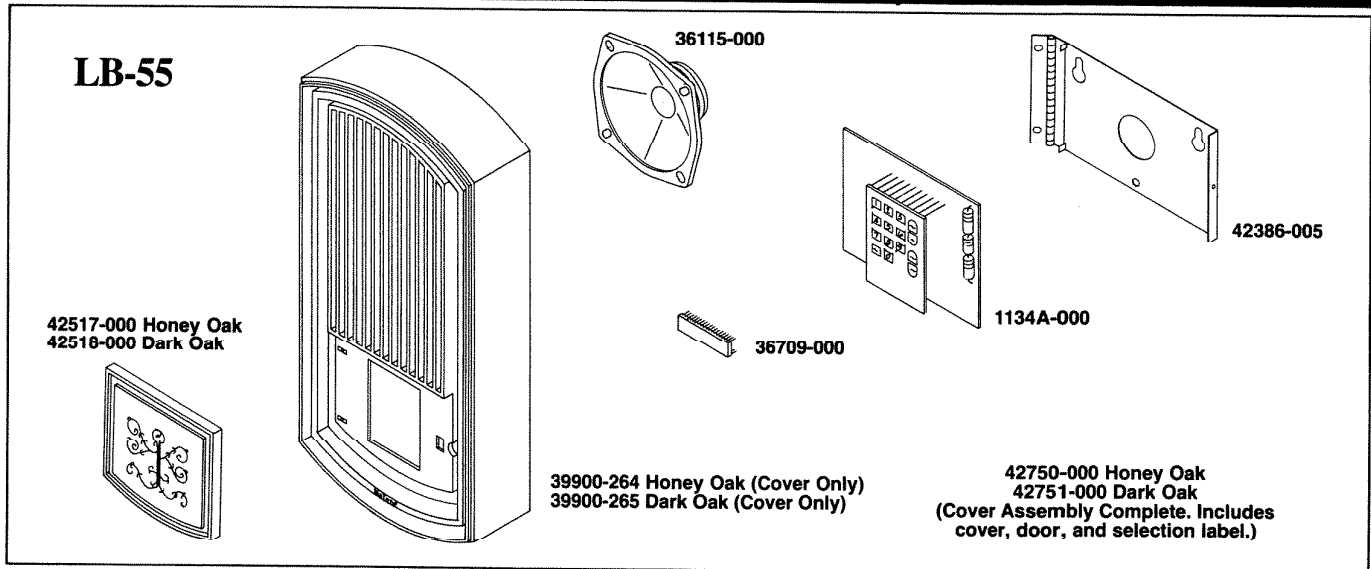


FIGURE 5

## EXPLODED VIEW DRAWINGS





# REPLACEMENT PARTS LIST

Capacitors: Value In Micro (10<sup>-6</sup>) Farads. Other Specifications As Noted  
 Resistors: Value In Ohms ± 5%, ¼ Watt, Carbon Film Except as Noted  
 K = Kilo = 1,000 M = Mega = 1,000,000

## Model LB-55—Chime Only

Schematic Symbol	NuTone Part No.	Description
	(*) Used in LB-55 dark oak only (**) Used in LB-55 honey oak only	
	42750-000**	Chime Cover Assy., Complete
	42751-000*	Chime Cover Assy., Complete
	39900-264**	Cover
	39900-265**	Cover
	42517-000**	Door Assembly
	42518-000*	Door Assembly
	43040-000	Chime P.C. Board Assembly, Complete
	48936-000	Label-Melody Selection
	1134A-000	P.C. Board Assembly, Less Microprocessor
<b>Diodes</b>		
D1-D4	36549-000	Silicon Rectifier .1 Amp DC 100 PIV Type IN4002
D5, D6	Not Used	
D7-D10	36617-000	Silicon Switching, 50 MA DC 75 PIV IN914 Texas Inst. IN4148
<b>Capacitors</b>		
C1	Not Used	
C2	35068-129	470 + 100% - 10%, 25WVDC Electrolytic
C2 (Alternate)	35068-127	470 + 100% - 10%, 25WVDC Electrolytic
C3	35076-107	.01 ± 20%, 50WVDC, Ceramic
C4-C7	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C8	35076-106	.1 ± 20%, 25WVDC, Ceramic
C9, C10	35101-135	7.5PF, 500WVDC, Ceramic
C11	Not Used	
C12	35076-107	.01 ± 20%, 50WVDC, Ceramic
C13	35076-106	.1 ± 20%, 25WVDC, Ceramic
C14	35076-107	.01 ± 20%, 50WVDC, Ceramic
C15	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C16	35100-138	.005 ± 20%, 100WVDC, Ceramic
C17, C18	35076-107	.01 ± 20%, 50WVDC, Ceramic
C19	35100-138	.005 ± 20%, 100WVDC, Ceramic
C20	35091-103	4.7 + 100% - 10%, 25WVDC Electrolytic
C21	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C22	35076-107	.01 ± 20%, 50WVDC, Ceramic
C23	35076-110	.1 ± 20%, 12WVDC, Ceramic
C24	35100-124	270PF ± 10%, 500WVDC Electrolytic
C25	35091-103	4.7 + 100% - 10%, 25WVDC Electrolytic
C26	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C27	35091-103	4.7 + 100% - 10%, 25WVDC Electrolytic
C28	35055-103	.1 (+ 80% - 20% 100V), Polyester

Schematic Symbol	NuTone Part No.	Description
C29	35068-129	470 + 100% - 10%, 25WVDC Electrolytic
C29 (Alternate)	35068-127	470 + 100% - 10%, 25WVDC Electrolytic
C30	35100-138	.005 ± 20%, 100WVDC, Ceramic
C31	Not Used	
C32	35076-110	.1 ± 20%, 12WVDC, Ceramic
C33	35076-107	.01 ± 20%, 50WVDC, Ceramic
<b>Resistors</b>		
R1	Not Used	
R2	33082-334	330K
R3	33028-101	100, 2W Wire Wound
R4, R5	33082-223	22K
R6	33028-101	100, 2W Wire Wound
R7, R8	33082-223	22K
R9	33028-101	100, 2W Wire Wound
R10, R11	33082-223	22K
R12	33082-474	470K
R13, R14	33082-103	10K
R15	33082-104	100K
R16	33082-103	10K
R17	Not Used	
R18	33082-272	2.7K
R19	33082-224	220K
R20, R21	33082-153	15K
R22	33082-474	470K
R23, R24	33082-224	220K
R25, R26	33082-102	1K
R27	34066-000	5K ± 30%, 1/10 Watt 255° Rotation CTS Corp. Type U201R503B
R28	33082-027	2.7
R29	34066-000	5K ± 30%, 1/10 Watt 255° Rotation CTS Corp. Type U201R503B
R30, R31	33082-472	4.7K
R32	33082-224	220K
R33	33082-472	4.7K
<b>Integrated Circuits</b>		
Z1	36709-000	Microprocessor Intel Corp. #8021
Z2	36658-000	Quad Bilateral Switch Motorola Inc. MC14066BCP RCA CD4066AE or CD4066BE
Z3	36700-000	OP-AMP Motorola Inc. MC1741CPI
Z4	36641-000	Audio Amp National Semi-Conductor LM380N
Z5	36699-000	15V Regulator Motorola Inc. MC78M15CT
Z6	36698-000	5V Regulator Motorola Inc. MC78M05CT

Schematic Symbol	NuTone Part No.	Description
<b>Transistors</b>		
Q1	36606-000	PNP Silicon, Motorola Inc. MPS K71 MPS-A70 (B = 150 - 300)
Q2	36580-000	NPN Silicon, Texas Inst. SKA-4220 Motorola Inc. SPS-1216 National Semi-Conductor SMO-7329, 2NS088
<b>Transformer</b>		
L1	30598-000	Oscillator, Toko America Inc. RWR-42209N General Instrument of Taiwan TEX3227
<b>Keyboard</b>		
	39737-000	Texas Instrument 11KS131
	48414-000	Keyboard Label
<b>Heat Sink</b>		
	38961-000	AAVID #5070B
	52776-039	Screw #6 x 1/4" Ph. Rd. "M" Heat Sink Mounting
	11077-003	Hex Nut #6-32 Heat Sink Mounting
<b>IC Sockets</b>		
	39747-000	Amp #640362-3, Preferred
	39815-000	Alternate Socket
<b>General</b>		
	48417-000	Instruction Sheet
	48884-000	Instruction Sheet Supplement
	31826-000	Cable Clamp
	68186-000	Spacer, Keyboard Standoff
	36115-000	Speaker, 5", 8 OHM
	52820-015	Screw #8 Ph. Pan Hd "A" for Mounting Speaker
	51862-000	Transformer Assembly, Model 115N
	1136A-000	Screw #6 - 20 x 1/16" Ph. Slit. Pan Head #25 Terminals
	39854-000	P.C. Board Insulator and Wiring Diagram
	42386-005	Mounting Plate Assembly
	52789-015	Screw #6 x 3/8" Ph./Slit. Pan #25 Mounting Plate Assembly to Cover
	52798-007	Screw #6 - 32 x 3/8" Sltd. Pan HD "23". Cover Closing.

## Model LBC-55— Chime With Digital Clock

Schematic Symbol	NuTone Part No.	Description
(*) Used in LBC-55 dark oak only (**) Used in LBC-55 honey oak only		
	42752-000**	Chime Cover Assy., Complete
	42753-000*	Chime Cover Assy., Complete
	39901-264**	Cover
	39901-265*	Cover
	42519-000**	Door Assembly
	42520-000*	Door Assembly
	42959-000	P.C. Board Assemblies, Complete
	1135A-000	P.C. Board Assemblies, Less Microprocessor
	48937-000	Label-Melody Selection
<b>CHIME P.C. BOARD (PARTS)</b>		
<b>Diodes</b>		
D1-D5	36549-000	Silicon Rectifier .1 Amp DC; 100 PIV Type IN4002
D6	Not Used	
D7-D10	36617-000	Silicon Switching, 50MA DC; 75 PIV IN1914 Texas Inst. IN4148
D11	Not Used	
D12	36549-000	Silicon Rectifier .1 Amp DC; 100 PIV Type IN4002
<b>Capacitors</b>		
C1, C2	35068-129	470 + 100% - 10%, 25WVDC Electrolytic
C1, C2 (Alternate)	35068-127	470 + 100% - 10%, 25WVDC Electrolytic
C3	35076-107	.01 ± 20%, 50WVDC, Ceramic
C4-C7	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C8	35076-106	.1 ± 20% 25WVDC, Ceramic
C9, C10	35101-135	7.5PF, 500WVDC, Ceramic
C11	Not Used	
C12	35076-107	.01 ± 20%, 50WVDC, Ceramic
C13	35076-106	.1 ± 20%, 25WVDC, Ceramic
C14	35076-107	.01 ± 20%, 50WVDC, Ceramic
C15	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C16	35100-138	.005 ± 20%, 100WVDC
C17, C18	35076-107	.01 ± 20%, 50WVDC, Ceramic
C19	35100-138	.005 ± 20%, 100WVDC, Ceramic
C20	35091-103	4.7 + 100% - 10%, 25WVDC Electrolytic
C21	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C22	35076-107	.01 ± 20%, 50WVDC, Ceramic
C23	35076-110	.1 ± 20%, 12WVDC, Ceramic
C24	35100-124	270PF ± 10%, 50WVDC Electrolytic
C25	35091-103	4.7 + 100% - 10%, 25WVDC Electrolytic
C26	35091-111	2.2 + 100% - 10%, 25WVDC Electrolytic
C27	35091-103	4.7 + 100% - 10%, 25WVDC Electrolytic

Schematic Symbol	NuTone Part No.	Description
C28	35055-103	.1 + 80% - 20%, 100V, Polyester
C29	35068-129	470 + 100% - 10%, 25WVDC Electrolytic
C29 (Alternate)	35068-127	470 + 100% - 10%, 25WVDC Electrolytic
C30	35100-138	.005 ± 20%, 100WVDC, Ceramic
C31	Not Used	
C32	35076-110	.1 ± 20%, 12WVDC, Ceramic
C33	35076-107	.01 ± 20%, 50WVDC, Ceramic
<b>Resistors</b>		
R1	33054-000	10, 10W Wire Wound
R2	33082-324	330K
R3	33028-101	100, 2W Wire Wound
R4, R5	33082-223	22K
R6	33028-101	100, 2W Wire Wound
R7, R8	33082-223	22K
R9	33028-101	100, 2W Wire Wound
R10, R11	33082-223	22K
R12	33082-474	470K
R13, R14	33082-103	10K
R15	33082-104	100K
R16	33082-103	10K
R17	Not Used	
R18	33082-272	2.7K
R19	33082-224	220K
R20, R21	33082-153	15K
R22	33082-474	470K
R23, R24	33082-224	220K
R25, R26	33082-102	1K
R27	34066-000	5K ± 30%, 1/10 Watt 255° Rotation CTS Corp. Type U201R502B
R28	33082-027	2.7
R29	34066-000	5K ± 30%, 1/10 Watt 255° Rotation CTS Corp. Type U201R502B
R30, R31	33082-472	4.7K
R32	33082-224	220K
R33	33082-472	4.7K
R34	33082-473	47K
<b>Integrated Circuits</b>		
Z1	36710-000	INTEL Corp. #8021
Z2	36658-000	Quad Bilateral Switch Motorola Inc. MC14066BCP RCA CD4066AE or CD4066BE
Z3	36700-000	OP-AMP Motorola Inc. MC1741CPI
Z4	36641-000	Audio Amp National Semi-Conductor LM 380N
Z5	36699-000	15V Regulator Motorola Inc. MC 78M15CT
Z6	36698-000	5V Regulator Motorola Inc. MC 78M05CT
<b>I. C. Socket</b>		
	39747-000	Amp #640362-3 (Preferred)
	39815-000	Alternate

Schematic Symbol	NuTone Part No.	Description
<b>Transistors</b>		
Q1	36606-000	PNP Silicon, Motorola Inc. MPS-K71 (Yellow) MPS-A70 (B = 150-300)
Q2	36580-000	NPN Silicon, Texas Inst. SKA-4220 Motorola Inc. SPS-1216 National Semiconductor SMO-7329, 2N5088
Q3	Not Used	
Q4	36613-000	NPN Silicon, Texas Inst. T1S98, Motorola MPSA20
<b>Transformer</b>		
L1	30598-000	Oscillator, TOKO America Inc. RWR-42209N General Instrument of Taiwan TEX3227
<b>Keyboard</b>		
	39737-000	Texas Instrument 11KS131
	48415-000	Keyboard Label
<b>Heat Sink</b>		
	38961-000	AAVID #5070B
	52776-039	Screw #6 x 1/4" Ph. Rd. "M" Heat Sink Mounting
	11077-003	Hex Nut #6-32 Heat Sink Mounting
<b>DISPLAY P.C. BOARD (PARTS)</b>		
<b>Resistors</b>		
R51-R73	33082-221	220
R74	33082-472	4.7K
R75	33082-103	10K
R76, R77	33082-221	220
<b>Transistors</b>		
Q10	36606-000	PNP Silicon, Motorola Inc. MPS-K71 (Yellow) MPS-A70 (B = 150-300)
<b>Integrated Circuits</b>		
Z11	36701-000	Quad—2 Input or Gate Motorola Inc. MC14071BCP
Z12-Z14	36702-000	Decoder-Driver Motorola Inc. MC14511BCP
Z15, Z16	36703-000	2 Digit L.E.D. Numerical Display Monsanto, Man 6740
<b>Ribbon Cable</b>		
	32672-009	11 Conductor Spectra-Strip "J" Series C&M Corp.

Schematic Symbol	NuTone Part No.	Description
<b>GENERAL</b>		
	68185-000	Lens
	68186-000	Spacer, Keyboard Standoff
	1136A-000	Screw, #6-20 x 7/16" Ph./Slit. Pan HD #25 Terminals
	36115-000	Speaker 5", 8 OHM
	52820-015	#8 x 3/8" Ph. PAN HD "A" Speaker Mounting
	42386-005	Mounting Plate Assembly
	52789-015	Screw—#6 x 3/8" Ph./Slit. Pan HD #25—Mounting Plate Assembly to Cover
	52798-007	Screw #6 - 32 x 5/8" Sltd. Pan Head "23" Cover Closing
	39854-000	P.C. Board Insulator and Wiring Diagram
	51862-000	Transformer Assembly, Model 115N.
	48417-000	Instruction Sheet
	48884-000	Instruction Sheet Supplement
	31826-000	Cable Clamp
	1142A-000	Screw #6 x 3/8" Ph. Slit. Pan #25—Mounting Clock and Insulator

# NuTone

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