



FEDERAL SIGNAL CORPORATION  
Electrical Products Division

# **MODEL 300SCW-1**

## ***SelectTone® Command***



PLEASE SEE UPDATED DOCUMENTS FOR REFERENCE ONLY

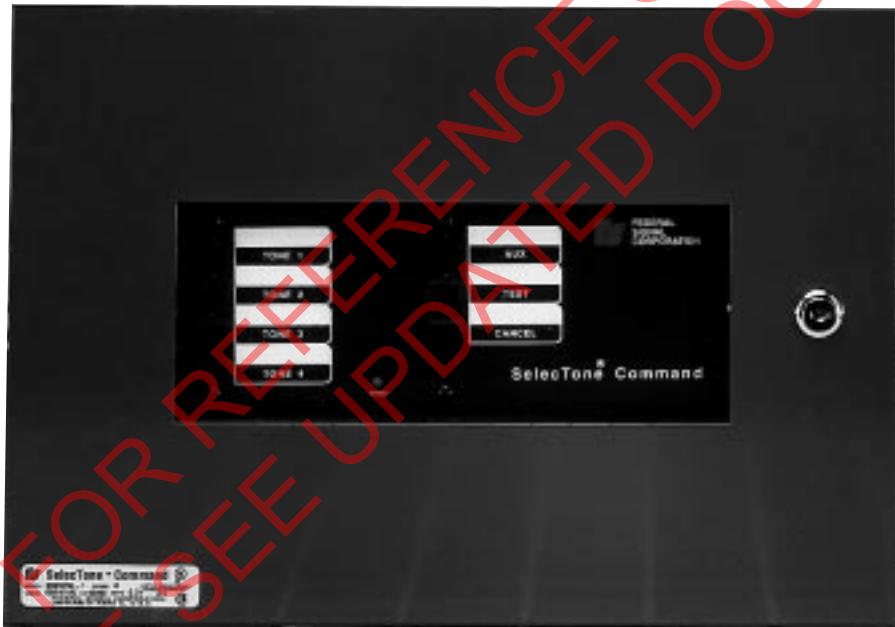
### **INSTALLATION AND SERVICE INSTRUCTIONS**



FEDERAL SIGNAL CORPORATION  
Electrical Products Division

# **MODEL 300SCW-1**

## ***SelectTone® Command***



### **INSTALLATION AND SERVICE INSTRUCTIONS**

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## LIMITED WARRANTY

*The Signal Division, Federal Signal Corporation (Federal), warrants each new product to be free from defects in material and workmanship, under normal use and service, for a period of two years on parts replacement and one year on labor from the date of delivery to the first user-purchaser.*

*During this warranty period, the obligation of Federal is limited to repairing or replacing, as Federal may elect, any part or parts of such product which after examination by Federal discloses to be defective in material and/or workmanship.*

*Federal will provide warranty for any unit which is delivered, transported prepaid, to the Federal factory or designated authorized warranty service center for examination and such examination reveals a defect in material and/or workmanship.*

*This warranty does not cover travel expenses, the cost of specialized equipment for gaining access to the product, or labor charges for removal and re-installation of the product. Lamps, flash tubes, or batteries are not covered under warranty.*

*This warranty does not extend to any unit which has been subjected to abuse, misuse, improper installation or which has been inadequately maintained, nor to units which have problems relating to service or modification at any facility other than the Federal factory or authorized warranty service centers.*

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**FEDERAL SIGNAL CORPORATION**

Electrical Products

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# SECTION I

## GENERAL DESCRIPTION

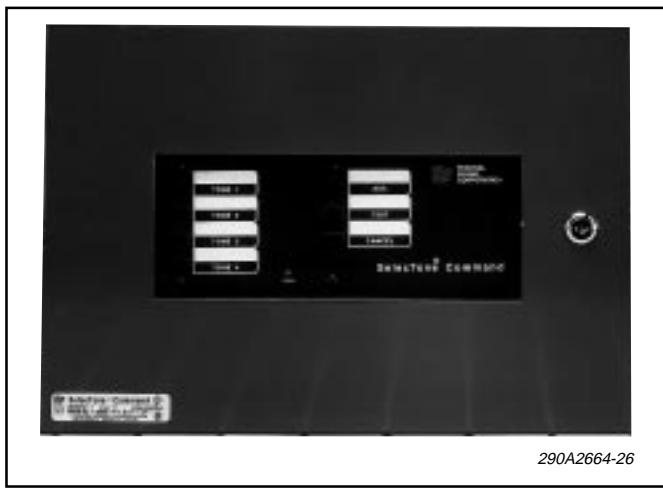


Figure 1-1. Model 300SCW-1 SelectTone® Command.

### 1-1. GENERAL.

The Model 300SCW-1 SelectTone® Command (figure 1-1) is a UL listed and CSA certified central control device that is capable of generating up to four different tone signals on an audio line that is connected to remote speaker/amplifiers in a SelectTone System. The 300SCW-1 can control signal lines to Federal Signal Models 300GC, 300GCX, 300X, 302GC, 302GCX, 302X, and 50GC speaker/amplifiers and to other devices. It can also operate with standard speakers designed for 25Vrms line operation (15 watts max.). The 300SCW-1 has public address (PA) capability, allowing voice messages or instructions to be announced over the SelectTone system through an optional Model MNC-1 Microphone. The unit can also be used to play background music generated from an external source over the SelectTone system.

The Model MNC-1 microphone is a hand held, noise canceling microphone that is ideal for use as a local microphone.

The Model 300SCW-1 may be installed in indoor (NEMA 1) or other protected installations only. It can be mounted on any horizontal surface using #10 screws, appropriate for the type of mounting surface material, and the four mounting holes in the 300SCW-1's housing (see figure 1-2).

The Model 300SCW-1 can be used for a variety of prioritized signaling purposes, such as playing background music, auxiliary fire alarm, evacuation alarm, start and dismissal, paging, and other emergency warning applications. The system can be automated if external devices such as heat detectors, switches or program clocks are connected to the remote control inputs. Additional advantages of the Model 300SCW-1 include economical system expansion along with long term system flexibility.

The Model 300SCW-1 generates and amplifies tone and audio signals and applies them through signal lines to the remote SelectTone devices in the system. A Model 300CK Connector Kit is required in each SelectTone device to connect the SelectTone devices to the signal line. Speakers designed for 25 volt operation can connect directly to the 25 volt output. The 300SCW-1 has provisions for up to four SelectTone tone modules of the user's choice. The tones are designated as Tone #1, Tone #2, Tone #3, and Tone #4. Each tone can be manually activated locally by its associated push button switch on the control panel or by a contact closure at the associated remote control input. Whenever a tone is activated, either locally or remotely, its associated control panel push button LED illuminates to indicate that the tone has been activated. The LED remains lit until the tone is deactivated and the contact closure is removed. All 300SCW-1 controls are located on the control panel.

### 1-2. CHASSIS DESCRIPTION.

The Model 300SCW-1 is assembled in a red, powder-coated steel cabinet approximately 16.23" wide by 4.06" deep by 11.23" high with a hinged front cover. The cover contains a window through which the pushbutton switches can be seen. The cover is secured to the housing through a hinge and key operated lock. Space is provided along the right side of the enclosure for storage of the optional MNC-1 microphone. Along the left side of the enclosure are two field wiring compartments, baffled off from the printed circuit board area. Access to these compartments is gained by removing the fastening screw from the control panel, allowing it to open on a hinge. One compartment is for the connection of the Class II power and signal lines, and the other is for the connection of the Class I power lines. These areas are provided with knock-outs to allow the external wiring to enter the unit through appropriate installer supplied bushings.

The switch printed circuit board is attached to the control panel with four screws. A wiring assembly connects the switch board to the main printed circuit board. The main printed circuit board is attached to a subplate with eight screws. The control panel switches are designated as TONE 1 through TONE 4, AUX, TEST and CANCEL.

The tone corresponding to each can be labeled in the white area next to the switch with a china marker. In the event a tone or message changes, the marking can be removed by lightly rubbing with a rag dampened with water.

### 1-3. CONTROL CIRCUITRY.

A. The control circuitry in the 300SCW-1 has a built-in priority level feature. If a given tone is already sounding when a higher priority tone is locally or remotely activated, the higher priority tone automatically overrides the lower priority tone. However, the push button LED for the lower priority tone remains lit to indicate that the lower priority tone remains activated. When the higher priority tone is deactivated, the LED in its push button goes out and the lower priority tone resumes sounding. Pressing cancel will deactivate any currently active tones. The local microphone has the highest priority. All of the tones have priority by number sequence and all have priority over remote PA and background music.

Since Tone #1 has priority over all other tones, the "Slow Whoop" (TM9) tone module is frequently installed in the Tone #1 position as a "Fire" signal. Whenever the 300SCW-1 is activated, and is not in the test mode, a built-in relay causes a set of normally closed contacts to open and normally open contacts to close, which makes it possible to send an alarm signal to other emergency services or circuits. Check with local codes for specific requirements regarding the types of tones to use.

B. The "TEST" pushbutton switch permits the testing of tones without activating the remote SelecTone devices. While a test is being conducted, the tone under test is heard from the monitor speaker inside the enclosure only. The "TEST" switch also cancels false alarms. Whenever this pushbutton is pressed, the LED remains illuminated to remind the operator to press the reset button after the test is complete or the false alarm is corrected.

C. The "CANCEL" pushbutton will reset all the manually activated signaling functions of the 300SCW-1. It also provides a momentary dry contact

closure to facilitate remote resetting of any other alarm circuit. The contact stays closed as long as the "CANCEL" pushbutton is depressed. Resetting of remote activation will not occur if the closure occurring at the remote input has not been removed.

### 1-4. POWER.

#### WARNING

In order to prevent power to the 300SCW-1 from being turned off accidentally, the unit does not have a power switch. Before performing any installation or maintenance, ensure that power is disconnected.

The control panel has a green LED to indicate the presence of primary power. The 300SCW-1 can be operated from either a 120VAC, 240VAC or a 24VDC power source. The AC power is connected via a terminal block located in the Class I wiring compartment, and the 120/240 volt operation must be manually switched internally while 24VDC connects via the terminals in the Class II wiring compartment.

### 1-5. AUDIO INPUTS.

A microphone can be connected directly to the 300SCW-1 via two modular jacks provided on the right side of the unit, inside the cover. These inputs have the highest priority. However, there are screw terminal provisions for a low level, low impedance audio signal to be input in the Class II wiring compartment of the unit, which allows audio to be coupled from a telephone system (PBX) with the proper interface equipment supplied by the phone company. This input is designed to also allow the direct connection of a low impedance remote microphone with separate PTT (priority below the tones). An RCA jack is provided in the same area of the unit to couple standard 1 volt audio signal from a background music source such as a radio receiver, CD player or a tape player.

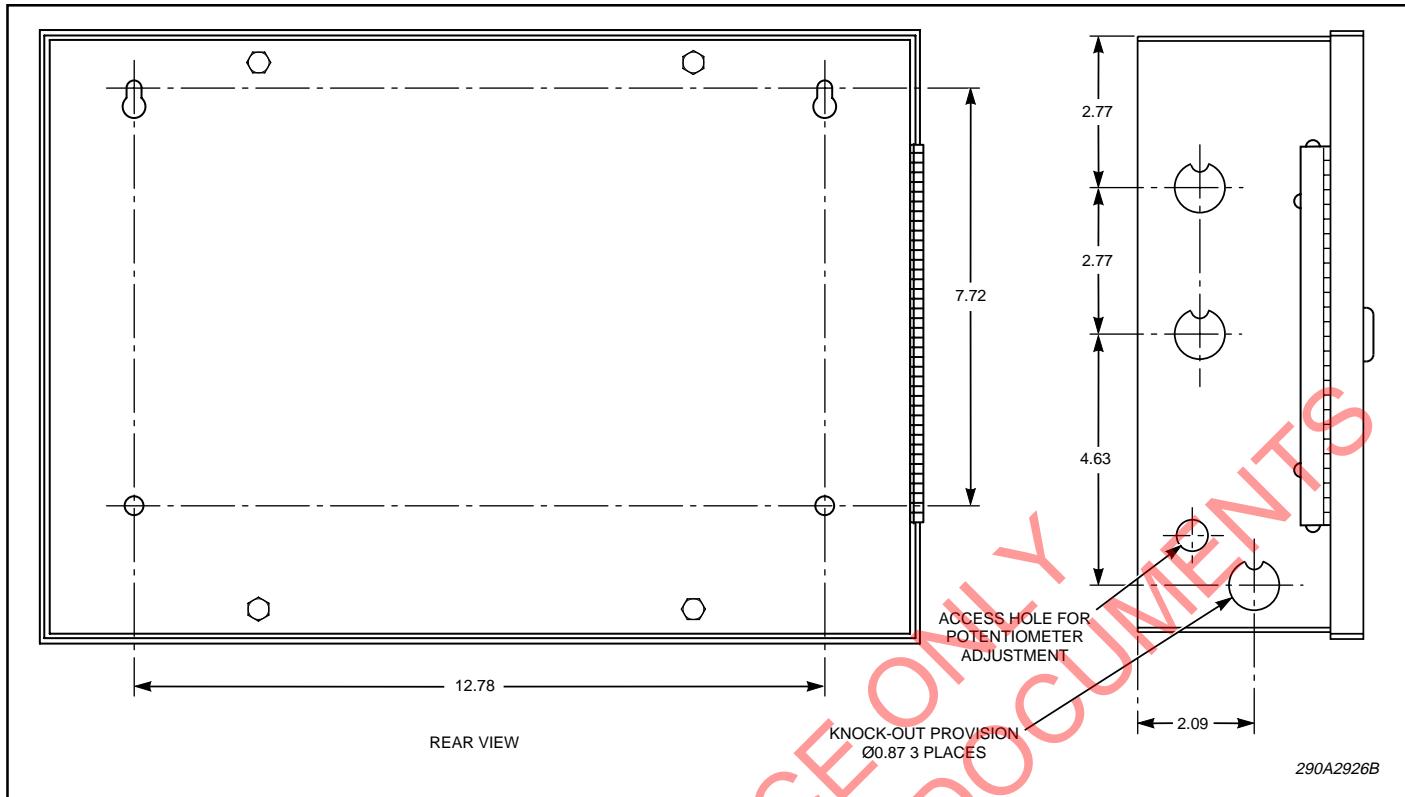


Figure 1-2. 300SCW-1 Installation Dimensions.

## SECTION II

### SPECIFICATIONS

#### 2-1. POWER INPUT.

A. Input Voltage .....	120/240V,50-60HZ
B. Standby Current .....	50MA 120VAC
	25MA 240VAC
C. Operating Current .....	210MA(MAX)
D. Power Consumption .....	26 Watts(MAX)

#### 2-2. EMERGENCY POWER SOURCE INPUT.

A. Input Voltage .....	22-32 VDC
B. Standby Current .....	90MA
C. Operating Current .....	760MA

#### 2-3. AUDIO INPUT.

A. Local PA (Use optional Model MNC-1 microphone)	
Input Impedance .....	5k Ohms
Input Voltage .....	16MVRms (MAX)
B. Remote Mic.	
Input Impedance .....	5k Ohms
Input Voltage .....	16MVRms (MAX)
C. Aux. Input	
Input Impedance .....	5k Ohms
Input Voltage .....	500MVRms (MAX)

#### 2-4. AUDIO OUTPUTS.

A. Output Impedance	
Unbalanced Sig. line .....	25 Ohms (MAX)
Unbalanced Sig. Line Standby .....	120 Ohms
Balanced Sig Line .....	40 Ohms (MAX)
Low Level Sig. Out .....	600 ohms
B. Output Voltage Levels No Load (<3% THD)	
Unbalanced Sig. Line .....	9Vrms
Balanced Sig. Line .....	17Vrms
Low Level Sig. Out .....	1Vp-p
C. Output Voltage Levels Max Load (<3% THD)	
Unbalanced Sig. Line .....	8Vrms(25 Ohm load)
Balanced Sig. Line .....	15Vrms(40 Ohm load)
Low Level Sig. Line .....	1Vp-p (600 Ohm load)
D. Tone Output Levels No Load (sq. wave)	
Unbalanced Sig. Line .....	12Vrms
Balanced Sig. Line .....	25Vrms
Low Level Sig. Line .....	1Vp-p
E. Tone Output Levels Max Load (sq. wave)	
Unbalanced Sig. Line .....	12Vrms (25 Ohm load)
Balanced Sig. Line .....	20Vrms (40 Ohm load)
Low Level Sig. Line .....	0.56Vrms (600 Ohm load)
F. Audio Frequency Response Balanced Sig. Line	
40 Ohms max load, From 250Hz to 80KHz (Reference 1KHz) .....	-3db
40 Ohm max load, From 450Hz to 60KHz (Reference 1KHz) .....	-1db
No load, From 100Hz to 90KHz (Reference 1KHz) .....	-3db
No load, From 200Hz to 60KHz (Reference 1KHz) .....	-1db

G.	Signal To Noise Ratio (<3% THD)	
	Local PA .....	60db
	Remote Mic .....	40db
	Aux Input .....	80db
H.	Audio Distortion From Aux Input to Balanced Sig.	
	Line Output (40 Ohm load) .....	2%

**2-5. INTERNAL SPEAKER.**

Sound Level At 1 Meter .....	65db
------------------------------	------

**2-6. REMOTE TONE ACTIVATION CIRCUIT.**

Type .....	Dry Contact Closure
Line Impedance .....	100 Ohms (MAX)
Circuit Current .....	50MA Max (12VDC)

**2-7. REMOTE MIC. ACTIVATION CIRCUIT (PTT).**

Type .....	Dry Contact Closure
Line Impedance .....	100 Ohm (MAX)
Circuit Current .....	10MA Max (12VDC)

**2-8. RELAY CONTACT CLOSURE OUTPUTS.**

Tone 1, Tone 2, Tone 3, Tone 4, Sig. Out, Aux., Test and Cancel Relays	
Type .....	Dry Contact Closure
Rating .....	24VDC, 1A, Resistive

**2-9. FUSE.**

F1 .....	Type GMC-1 1A, 250V
F2 .....	Type GMC-1/2 1/2A, 250V

**2-10. UL LISTED.**

File .....	E61713
Standard .....	UL 813 Commercial Audio Equipment

**2-11. CSA CERTIFIED.**

**2-12. PHYSICAL.**

Weight .....	13.4 lb. (6.08 kg.)
Dimensions (HWD) .....	16.23" x 11.25" x 4.06"

# SECTION III

## INSTALLATION

### WARNING

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

### SAFETY MESSAGE TO INSTALLERS

Peoples lives depend on your safe installation of our products. It is important to follow all instructions shipped with the products. This device is to be installed by a trained electrician who is thoroughly familiar with the National Electric Code and will follow the NEC guidelines as well as local codes.

The selection of the mounting location for the device, its controls and routing of the wiring is to be accomplished under the direction of the Facilities Engineer and the Safety Engineer. In addition, listed below are some other important safety instructions and precautions you should follow:

- Read and understand all instructions before installing or operating this equipment.
- Do not connect this unit to the system when power is on.
- All effective warning speakers produce loud sounds which may cause, in certain situations, permanent hearing loss. You should take appropriate precautions such as wearing hearing protection.
- After installation, test the sound system to ensure proper operation.
- All effective warning speakers produce loud sounds, which may cause, in certain situations, permanent hearing loss. The device should be installed far enough away from potential listeners to limit their exposure while still maintaining its effectiveness. The OSHA Code of Federal Regulations 1910.95 Noise Standard provides guidelines which may be used regarding permissible noise exposure levels.
- Show these instructions to your Safety Engineer and then file them in a safe place and refer to them when maintaining and/or reinstalling the unit.
- Establish a procedure to routinely check the sound system for proper activation and operation.
- Consult the authority having jurisdiction in your area regarding the proper use and installation of this product.

### 3-1. SIGNAL LINES.

A. The signal lines transfer the tone signals and verbal messages from the 300SCW-1 to the remote SelecTone devices. In order to reduce the possibility of cross talk, hum and static noise pick up, the signal lines must be twisted pair, shielded audio cable. In the majority of systems use AWG 18 shielded twisted pair audio cables.

### CAUTION

Unacceptable voltage drops may cause improper signal voltage to be applied to the remote signal device if too small diameter cable is used, reducing the signal's sound output level. Only use a cable having wire diameter greater than 22AWG.

B. Federal does not recommend that new or existing telephone lines be used as signal lines in a SelecTone system for the following reasons:

1. Interference from other services or systems, or interference from the system to other services.
2. Cross talk, interference or hum induced by other telephone lines.
3. Extended downtime because of the second party involvement required to service the lines.
4. The additional cost of installation, interfacing devices and monthly charges as opposed to a one-time cost of performing the installation.

### 3-2. MODEL 300SCW-1 SIGNAL CONNECTIONS.

### CAUTION

Crosstalk can occur between signal lines and power lines, causing confusing messages, which interfere with the emergency warning capability of this equipment.

Do not install signal lines in the same conduit with power lines. Avoid routing signal lines on cable trays with high voltage power lines.

To connect the signal lines of the SelecTone system to the 300SCW-1, connect a color coded shielded twisted pair of audio cables having conductors no smaller than 18 AWG to SIG. HI (TB1-2) and COM (TB1-1) terminals on TB1 (see figure 3-1).

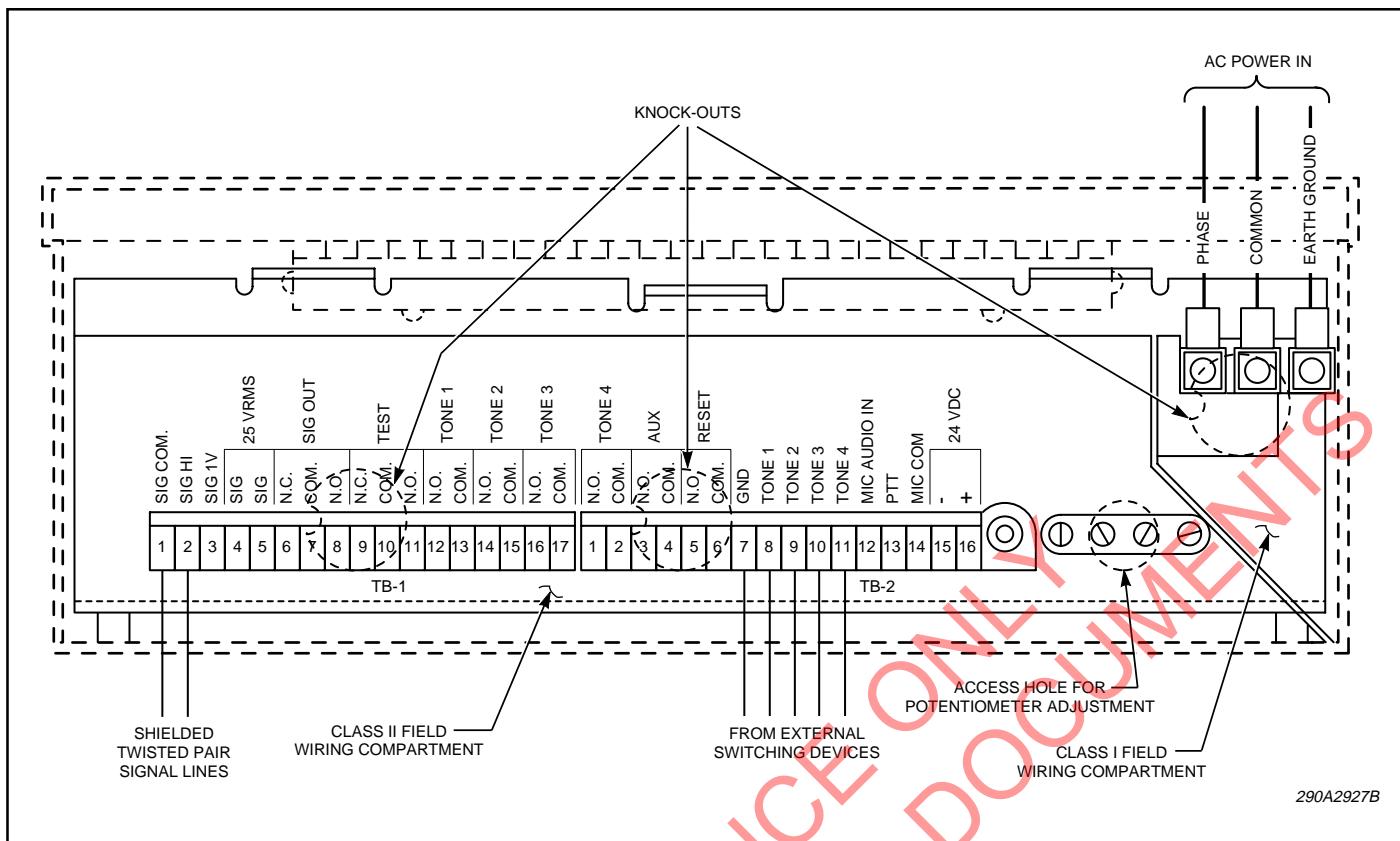


Figure 3-1. Model 300SCW-1 Side View.

Every remote SelecTone signaling device in the system will be connected in parallel to these lines. When connecting the remote devices in parallel to the signal lines, observe the correct polarity and install wire nuts over the connections.

### **3-3. CONNECTION TO REMOTE DEVICES.**

Physically install the remote SelecTone device(s); follow the installation instructions packed with the device.

A. *300GC, 300GCX, 300X, 302GC, 302GCX, 302X and 50GC.*

A 300CK Printed Circuit Connector Board is required to connect a 300GC, 300GCX, 300X, 302GC, 302GCX, 302X or 50GC to the signal lines. The 300CK properly terminates the signal lines to the amplifier in the 300GC, 300GCX, 300X, 302GC, 302GCX, 302X and 50GC. As shown in the figure 3-2, connect the blue wire on the 300CK to the COM. wire from the 300SCW-1. Connect the yellow wire on the 300CK to the SIG. HJ wire from the 300SCW-1.

### B. 25 Vrms Signal Line Application.

The 300SCW-1 has provision for connecting 25 Vrms line operated speakers to its output. Connect the 25 Vrms line at terminals TB1-4 and TB1-5 of terminal block TB1 (see figure 3-3). Connect the speakers in parallel to this line using 25 Vrms line

~~tap. This output is to be used only if there is no SelectTone system devices connected across TB1-1 and TB1-2. This output is not switched like SelectTone system output across terminal TB1-1 and TB1-2.~~

### C. *Low Level Audio Output.*

The 300SCW-1 also has provision for 1 volt peak to peak audio output that can be coupled to the audio input of another amplifier. This low level output is available across terminals TB1-1 and TB1-3 (see figure 3-4). It can also be connected to an analog fiber optic transmitter so that audio can be transmitted over a fiber optic link in an electrically noisy environment.

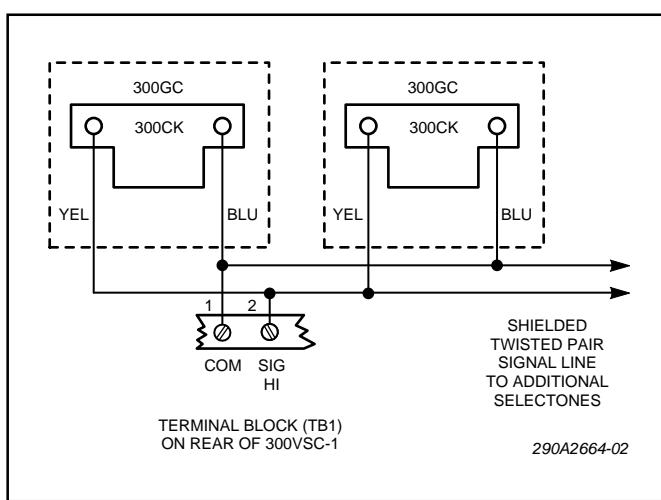


Figure 3-2. 300CK Connections.

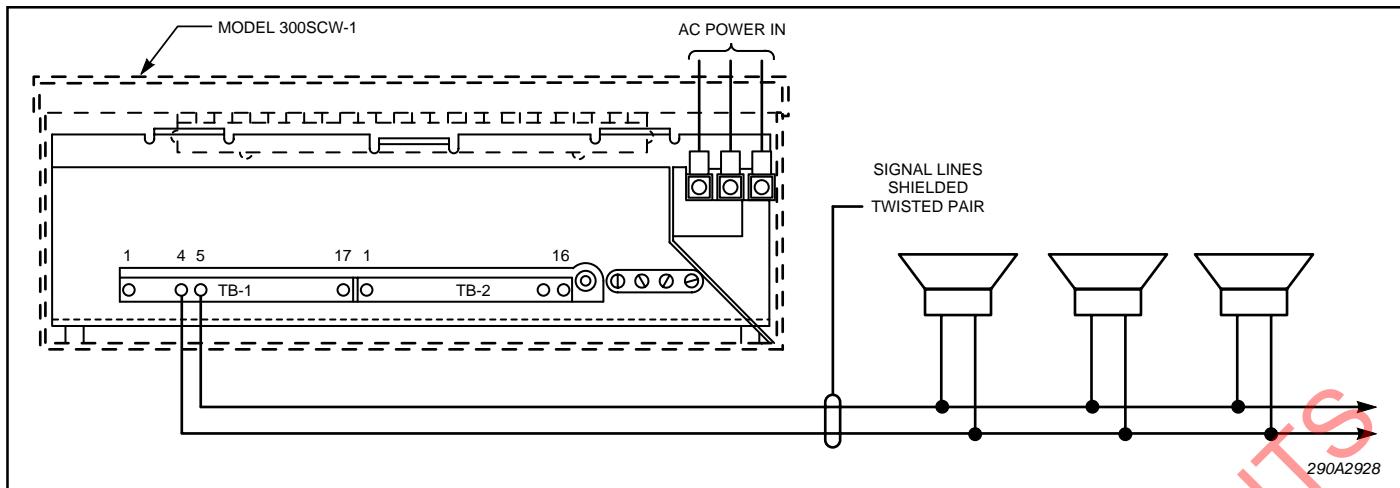


Figure 3-3. 25Vrms Connections.

### 3-4. POWER CONNECTIONS.

The two basic methods of supplying power to a SelecTone system are 120VAC 50/60HZ Local Power and 24VDC Central Power. The following paragraphs describe each method along with the advantages and disadvantages of each.

#### A. Local Power (see figure 3-5).

In this system, power is supplied to each remote SelecTone device by connecting it to 120VAC supply in the immediate vicinity of the device.

#### CAUTION

Improper installation could render this system inoperable, interfering with the warning nature of this product. The installation must conform to applicable local and/or National Electrical codes.

If an emergency power source is required, central power system as described below should be employed.

#### B. Central Power (See figure 3-6).

##### 1. General.

In the central power system all of the remote amplifier power lines are connected in parallel to one or more centrally located power sources of either 24VAC or 24VDC.

##### 2. Advantages of the Central Power System.

a. The entire system may be independent of local line voltage.

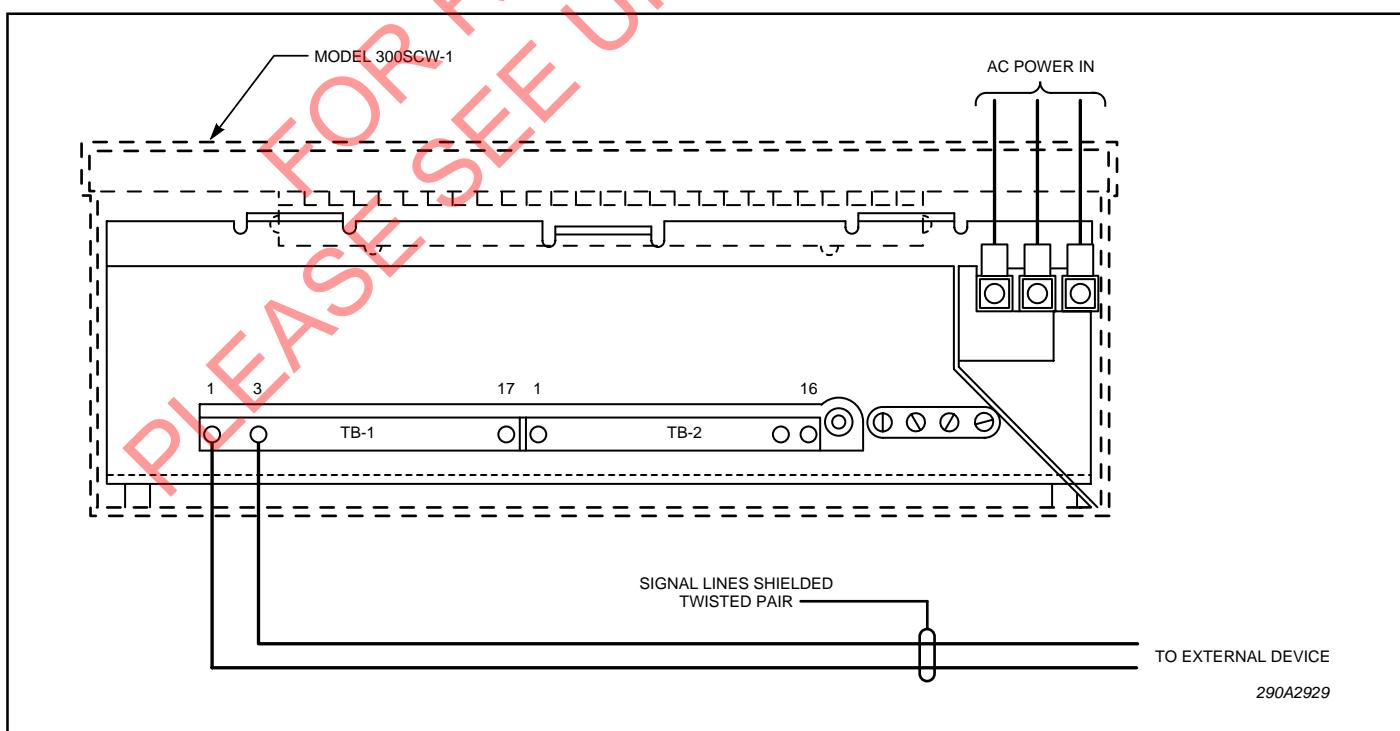


Figure 3-4. Low Level Auto Output Connections.

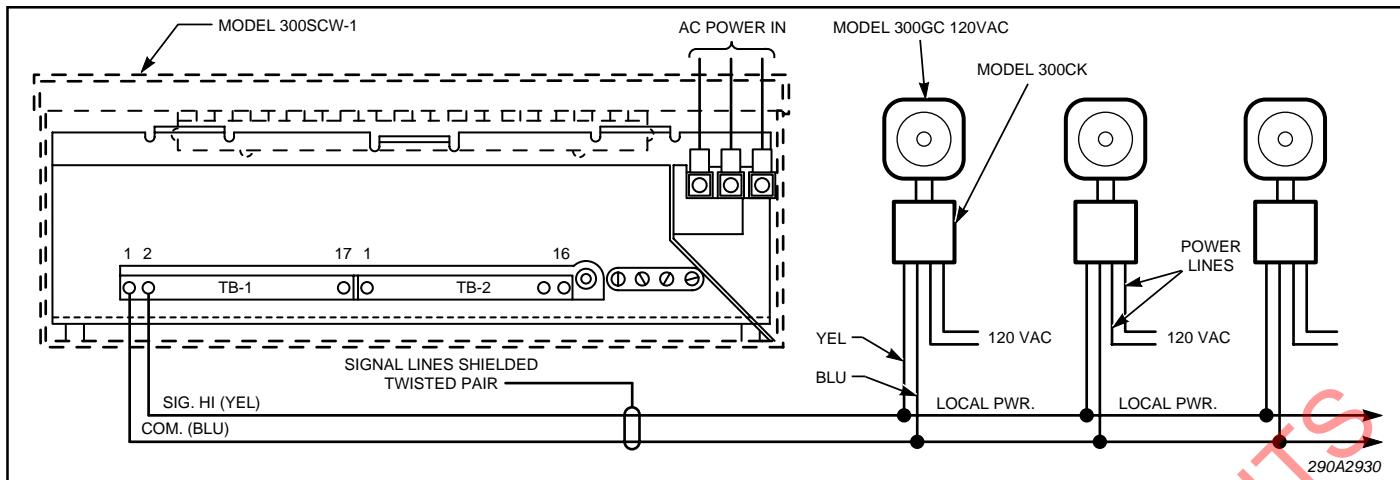


Figure 3-5. Typical Local Power System.

- b. The entire system can be switched to an emergency standby power source in the event of a power failure.
- c. The central power system has the added advantage that an auxiliary power supply, such as the Federal Model PS300 can be used to power the remote devices in the SelecTone system. If the PS300 is used, it is not necessary to switch the power source if a power failure occurs.

### 3. Disadvantages of Central Power System.

- a. Heavy power lines are required from the power source to the remote devices in the

system. The size of the power lines is dependent upon the number of amplifiers and the total distance of the power loop in order to minimize the voltage drop while a tone signal is being generated.

b. Future expansion is limited by the current capacity of the power source and the power lines that were initially installed.

c. Central power installations must comply with local electrical codes. Most power circuits are Class I circuits. Therefore, conduit will probably be required. Installation costs are higher than a local power system.

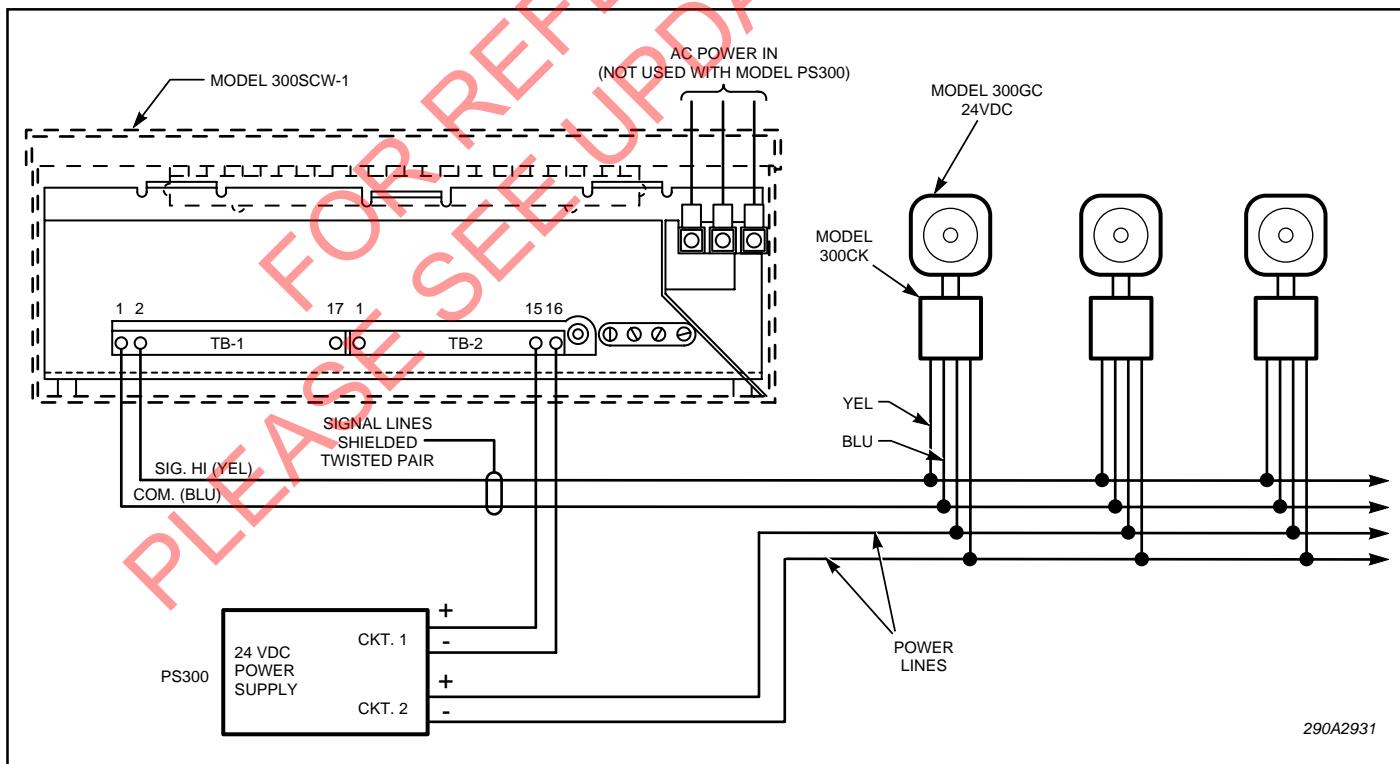


Figure 3-6. Typical Central Power System.

### C. 300SCW-1 Power Connections.

#### DANGER

Installation with the system power on could cause serious injury or death. Do not perform any installation or maintenance on this system when power is on. Since the 300SCW-1 does not have a power switch, ensure that the power is disconnected before proceeding.

#### WARNING

This device is to be installed by a trained electrician who is thoroughly familiar with the national electrical code and local codes and will follow the guidelines.

#### CAUTION

Cross talk, interference, or hum can be induced in signal lines, causing poor audio output or confusing messages, which interferes with the emergency warning capability of this equipment. Do not install power lines in the same conduit as signal lines.

Operating power is connected to 300SCW-1 through the 3-position field wiring terminal block located in the Class I wiring compartment (see figure 3-1). The knock-out should be removed and provided with a bushing through which the power lines can be routed into the field wiring compartment. The 300SCW-1 is factory set for 120VAC 50/60Hz operation. If 240VAC operation is required, open the control panel and slide the voltage selector switch S 1 located near line fuses on the mother board to the 240VAC position.

If it is desired to use 24 VDC either as a primary or auxiliary source of power, connect the "+" terminal of 24 volt DC power supply to the terminal TB2-15 (+24 VDC) and "-" terminal of the 24 VDC power supply to the terminal TB2-16 of the TB2 terminal block located in the Class II field wiring compartment of the 300SCW-1.

### 3-5. CONNECTIONS TO REMOTE SWITCHES.

The 300SCW-1 tones can be activated remotely by any normally open low current switch contacts having a current capacity of at least 50 ma inductive. Figure 3-7 illustrates the connection of switch contacts to the 300SCW-1. S1, S2, S3 and S4 represents remote switch contacts such as those found in flow switches, program clocks, heat detectors, and smoke detectors. The remotely activated tone sounds as long as the activating contacts remain closed.

### 3-6. TONE MODULE INSTALLATION.

#### WARNING

Installation or maintenance on 300SCW-1 when power is on can result in serious injury or death. Do not perform any installation or maintenance to the system when power is on.

The 300SCW-1 can accommodate up to four SelectTone modules of the user's choice. To install the tone modules insert them into the desired receptacles on the printed circuit board as shown in figure 3-7. The receptacles for TONE #1 module and TONE #2 module are located on the mother board. Receptacles for TONE #3 module and TONE #4 modules are located on the card that plugs into the mother board.

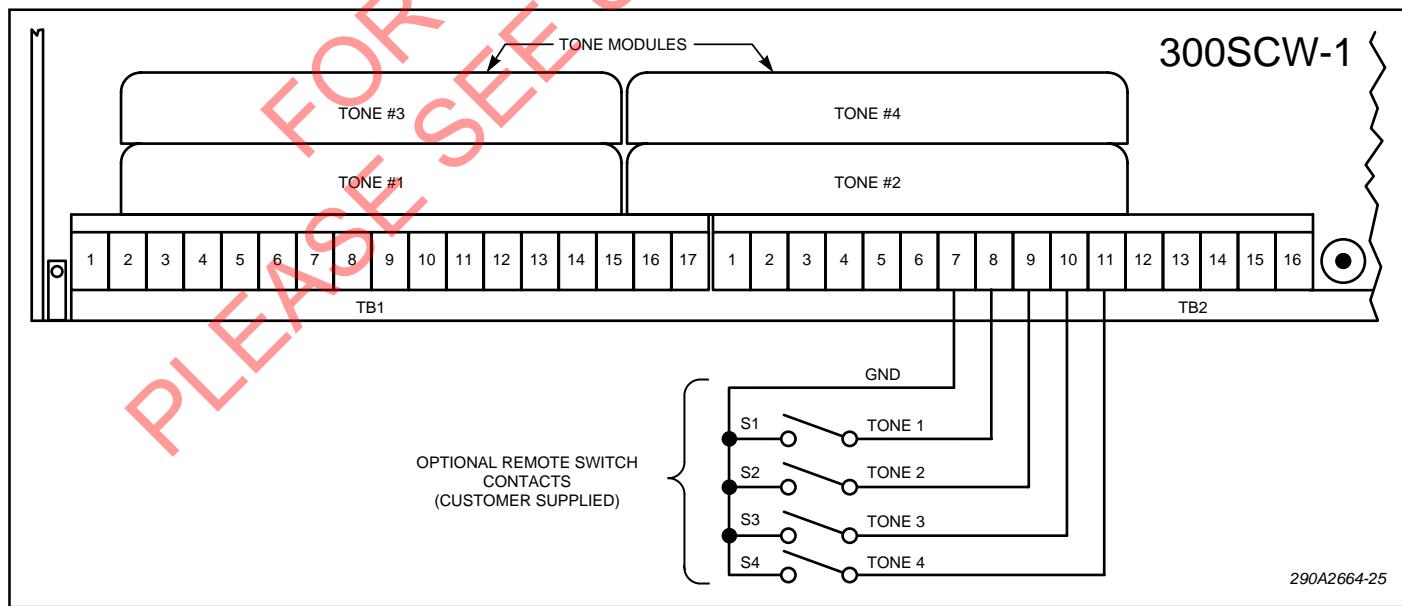


Figure 3-7. Model 300SCW-1 Rear View (Cover Removed).

# SECTION IV

## CIRCUIT DESCRIPTION

### 4-1. GENERAL.

The electronic circuitry in the 300SCW-1 consists primarily of priority control circuits, tone control circuits, audio preamplifiers and a power amplifier. The unit also contains all of the necessary switching circuitry for the control of PA, remote PA and background music. All of the electronic circuitry is mounted on two printed circuit boards. The operation of the tone modules will not be described because they are not an integral part of the 300SCW-1. However, the effect of the signal(s) from the tone module(s) will be discussed. When reading the following paragraphs, refer to the 300SCW-1 schematic diagram (figure 4-1) and the Switch Board Schematic diagram (figure 4-2).

### 4-2. TONE CONTROL CIRCUITS.

#### A. Tone Activation Circuits.

The operation of the activation circuitry of all four tones is identical. Therefore, only the operation of the TONE #1 activation circuit will be discussed.

TONE #1 is activated by pressing the local, TONE 1 push button located on the control panel or when remote switch contacts, connected to TB2-7 and TB2-8, are closed, energizing K5 and the output relay K2. Simultaneously, the switch contacts close the TONE 1 red LED circuit and the LED illuminates. When K5 energizes, the "A" contacts apply +12 VDC to the TONE #1 module installed in lower left tone R51 receptacle. The tone module then generates TONE #1 and applies it through R51, C28, R56, pre ampC28, R56, IC9A, IC9A, C31, IC7A level control R59, C39, analog multiplexer IC6 pin 2, 3 and C10 to the input pin 9 of the power audio amplifier IC3. After the tone is amplified, it is applied through C25 to the Monitor Speaker and via C27 through the closed K2A contacts of relay K2 to the SIG. HI terminal TB1-2 of terminal block TB1.

#### B. Priority Level Control.

The contacts of the Tone Control Relays are connected so that TONE #1 has priority over all other tones; TONE #2 has priority over TONE #3 and TONE #4, etc.

Figure 4-3 is a simplified schematic diagram of the relay tone control contact circuit. When all tone control relays are de-energized, as shown in figure 4-3, the tone control contacts K5A, K3A, K7A,

and K8A are connected in series to the +12 volt source. Therefore, any one of the four tones can be activated. However, after a given tone has been activated, no lower priority tone can be initiated. For example, TONE #2 is activated when K3 is energized causing K3A to apply +12 VDC to the TONE #2 tone module via J7-3. As shown in figure 4-4, when K3 applies +12 VDC to TONE #2 tone module, the circuit to K7A and K8A is open. As a result, if either K7 or K8 is energized, TONE #2 continues to sound. However, if TONE #1 is activated, K5 energizes and K5A applies +12 VDC to TONE #1 tone module via J5-3, while opening the circuit to TONE #2 and all other tones. Consequently, TONE #1 overrides TONE #2 even though TONE #2 relay K3 is energized.

#### C. Public Address (PA) Switching.

##### 1. Local PA.

As shown in schematic diagram figure 4-1, whenever local microphone, push-to-talk (PTT) switch is pressed, pin 2 of opto-isolator IC1A is grounded which in turn applies a low at pin 13 of IC4 inverter 'F'. This causes IC4-12 to go high. The IC4-12 pin is connected to Priority Encoder IC5 pin 4. The Priority Encoder, IC5 accepts highs at seven of the eight available inputs and produces a three-bit parallel binary coded output at IC5-6 (most significant bit-msb), IC5-7, and IC5-9 (Least significant bit-Lsb). The value of binary coded output is between 0 and 7 (000 and 111 binary). The higher the priority, the higher the value. When more than one input to IC5 is present, the output assumes the binary code of the highest priority input. IC5-4 is highest priority input, so when this pin goes high, the highest priority value 7 (binary 111) produced by IC5 at pins 6, 7 and 9 is applied to pins 9, 10 and 11 of Analog Multiplexer IC6. When the local microphone push-to-talk button is pressed, the audio signal from the microphone is coupled to the input of the pre-amplifier IC8-A pin 2 via C3 and R22. The output of the pre-amplifier IC8A is connected to the Analog Multiplexer pin 4 via C30, level control R58 and C38. When a binary code 111 is applied to the multiplexer pins 9, 10 and 11, the analog switch between pins IC6-4 and IC6-3 closes and applies higher level local microphone audio from the IC8A pre-amplifier to the audio input of the power amplifier IC3. The Priority Encoder IC5-15 normally stays high. However, when any one of its seven inputs goes high, IC5-15 goes low. This low is applied to the base of Q2. This causes Q2 to turn on and energize the Signal Output relay K2, to apply amplified local microphone audio signal to the signal line connected at TB1-2.

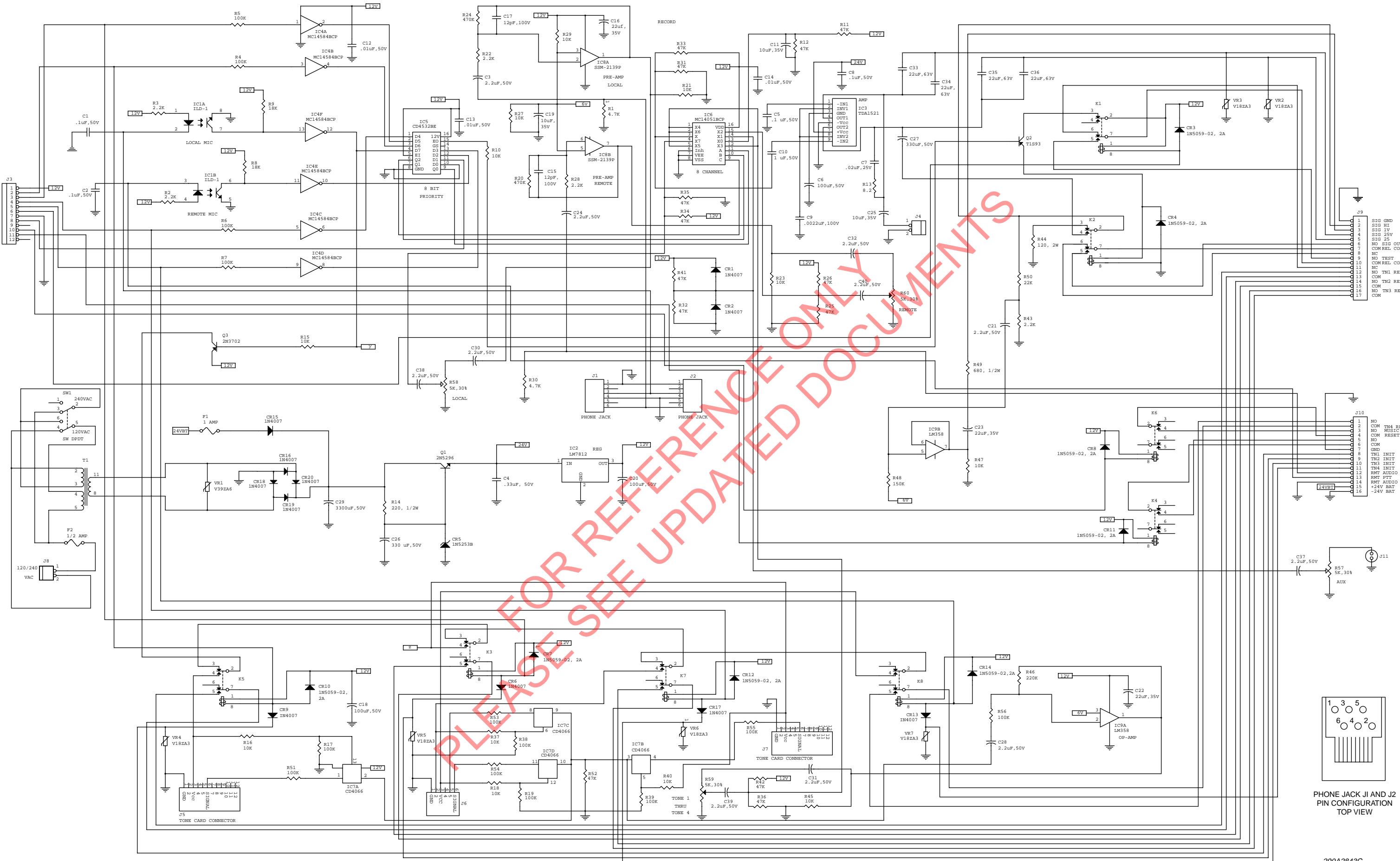


Figure 4-1. Model 300SCW-1 Mother Board Schematic Diagram.

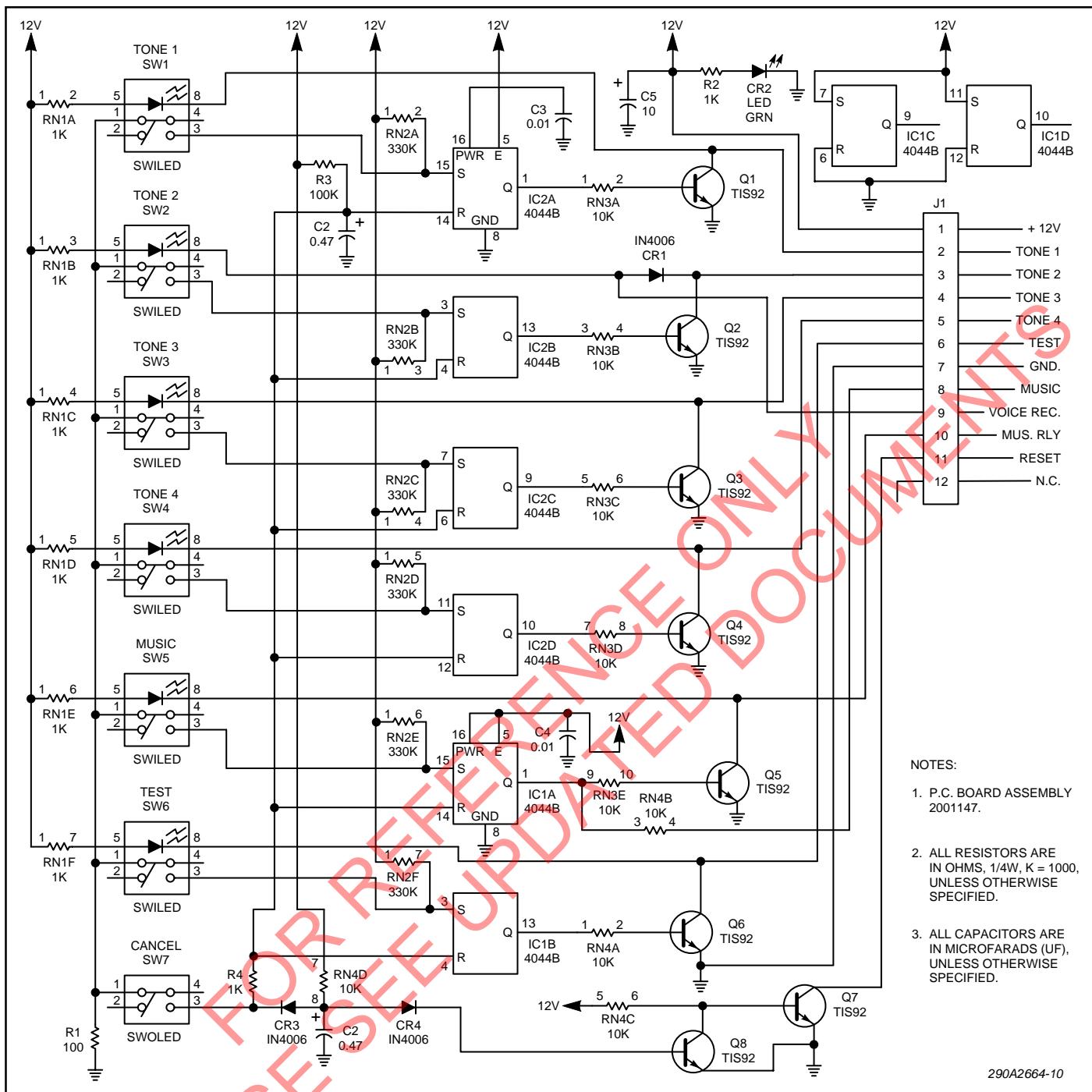


Figure 4-2. Switch Board Schematic.

When the local microphone push-to-talk switch is pressed, the high generated by inverter IC4F is also applied to the base of transistor Q3 through resistor R15. This causes Q3 to turn off, thus removing the +12 VDC source to the tone circuits and giving priority to local PA over all tones.

## 2. Remote PA.

Remote PA operation is similar to that of local PA, except that the priority code produced by IC5 is 010 (value 2). Depressing the remote PTT switch applies a low to opto isolator IC1B pin 3. This

causes a low to be applied to the input of the inverter IC4E at pin 11. As a result, a high is applied to the input pin 12 of the Priority Encoder IC5. The Priority Encoder IC5 produces an output binary code 010 (of value 2) and applies it to the Analog Multiplexer IC6. The analog switch in IC6 between input pin IC6-15 and IC6-3 closes. The remote PA audio input signal coupled to TB2-12 is applied to the remote PA pre amplifier IC8B pin 6 through C24 and R28. The pre-amplified remote PA audio signal is coupled to the input of the power amplifier IC3-9 through C32, level control R60, C40, the analog switch between pins IC6-15 and IC6-3 and capacitor C10. This signal is

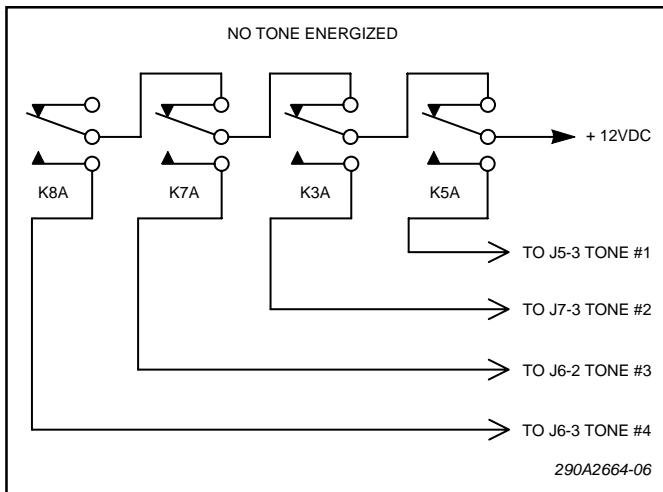


Figure 4-3. Tone Control Relays (No Tone Activated).

then amplified and applied to the signal lines at TB1-2 as described earlier. The remote PA has priority only over the background music. Activation of any one of the tones or local PA will override remote PA.

#### D. Background Music (AUX - IN).

The 300SCW-1 also has provision for playing background music over SelecTone speaker/amplifiers, if desired. This is the lowest priority feature. Local PA, all four tones and remote PA will override background music. When the AUX push button is depressed, the associated red LED illuminates and a high is applied to pin 11 of the Priority Encoder IC5. As a result, a binary code 001 (value 1) is applied to Analog Multiplexer IC6 control inputs. This causes a music source input, connected at RCA jack J11 at the rear of the 300SCW-1, to be connected to the input pin of power amplifier IC3 through level control R57, C37, analog switch between IC6-14 and IC6-3 and C10. This music audio signal is then amplified and applied to the remote SelecTone speaker/amplifiers via signal lines as described earlier.

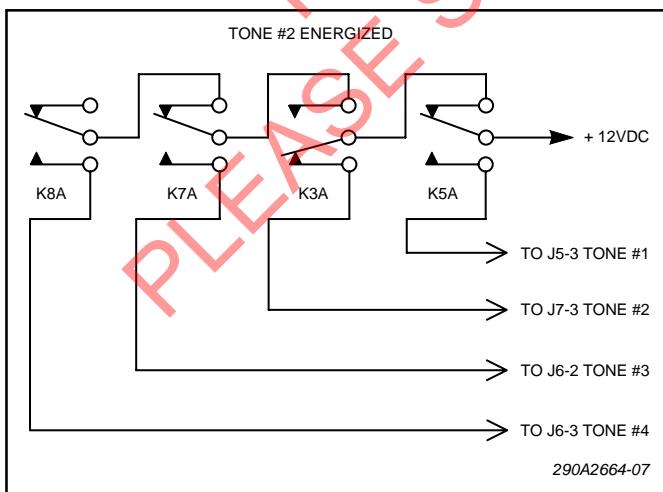


Figure 4-4. Tone Control Relays (Tone 2 Activated).

#### E. Test Circuit.

The TEST circuit allows the testing of the 300SCW-1 functions such as local PA, all the tones, remote PA, and background music, without activating the remote SelecTone devices. This circuitry also cancels false alarms.

A tone is tested by first pressing the TEST push button switch at the control panel of the 300SCW-1 and then pressing the appropriate tone push button. When the tone push button is pressed, the tone module for the selected tone operates as described previously in this section. As shown in the schematic diagram 4-2, pressing of TEST push button sets the associated flip-flop IC1B and turns Q6 on by providing base drive through resistor RN4A. Transistor Q6 simultaneously energizes the red LED associated with TEST push button and relay K1 as shown on schematic diagram 4-1. When K1 is energized, the normally closed contact K1A opens and disables the audio output relay K2 by removing +12 VDC source from its relay coil. Consequently, the Audio Amplifier output is not connected to the SIG. HI terminal TB1-2. Therefore, the tone signal is not applied to remote SelecTone devices. However, the circuitry between the Audio Amplifier and Monitor Speaker is not disconnected, so the tone is still being sounded from the Monitor Speaker.

#### F. Cancel Circuit.

The CANCEL circuit allows the operator to reset any of the locally (manually) activated functions, such as TEST, tones or background music. As shown in the schematic diagram 4-2, when a function button is pressed at front control panel, a low is applied to the 'S' pin of the associated flip-flop. This sets the flip-flop. The output of that flip-flop goes high and provides base drive to the output transistor, which turns on the red LED and the relay associated with that function. When signaling or testing is completed, pushing the CANCEL button momentarily resets all functions to their stand-by condition. When the CANCEL push button is pressed momentarily a low is applied simultaneously to the reset pins of all of the flip-flops through resistor R1 and R4. This causes all the set flip-flops to reset and remove the base drive signals from the associated output transistors. Consequently, all of the energized relays will de-energize and all the illuminated red LEDs will extinguish.

#### G. Power Supply.

The power supply is the source of regulated +24 VDC necessary for the operation of audio power amplifier of 300SCW-1. The power supply also

provides +12 VDC necessary for the operation of all the electronics circuitry in the 300SCW-1. This +12 VDC source supplies DC operating voltage to all the tone modules. The power supply is capable of operating from either 120/240 VAC or 24 VDC.

The power supply uses a step down transformer, T1, with a full wave bridge rectifier. Formed by CR16, CR18, CR19, CR20. The rectified output is filtered by C29, R14 and C26. Zener diode CR5 develops a stable reference voltage for the base of the regulator Q2. The regulated +24 VDC is present on the emitter of Q1. This regulator supplies 24 VDC to the input pin of 12 VDC regulator IC2. The +12 VDC output from the IC2 regulator is further filtered by C20 and distributed to all of the electronics circuitry operating at 12 VDC. MOV, VR1 is connected in parallel with the secondary of T1 to reduce transients and noise that could cause damage to the electronic circuitry.

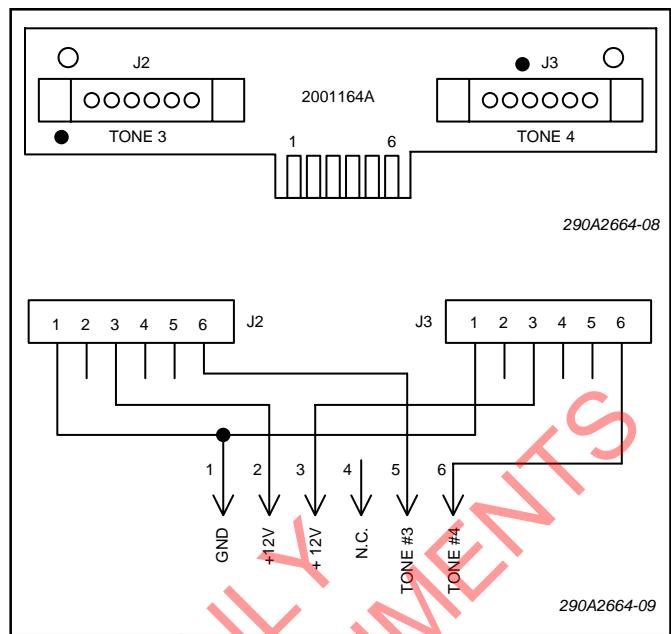


Figure 4-5. Tone Card Connector and Schematic.

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## SECTION V SERVICE

### WARNING

Always insure that the power to the 300SCW-1 is turned off before opening the control panel.

### CAUTION

This service information is for qualified personnel only. To avoid electric shock, do not perform any servicing other than changing fuses, unless qualified to do so. Refer all servicing to qualified service personnel.

### 5-1. GENERAL.

#### WARNING

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

#### SAFETY MESSAGE TO MAINTENANCE PERSONNEL

Listed below are some important safety instructions and precautions you should follow:

- Read and understand all instructions before operating this system.
- Any maintenance to the sound system must be performed by a trained electrician in accordance with NEC guidelines and local codes.
- Any maintenance to the sound system must be done with power turned off.

Most of the components used in the Model 300SCW-1 are standard electronic parts. Conse-

quently, they can be obtained from almost any radio or electronic outlet.

The factory will service your equipment or provide assistance with technical problems that cannot be handled satisfactorily locally.

Any units returned to Federal Signal for service, inspection, or repair, must be accompanied by a Return Material Authorization. The R.M.A. can be obtained from the local Distributor or Manufacturer's Representative.

At this time a brief explanation of the service requested or the nature of the malfunction should be provided.

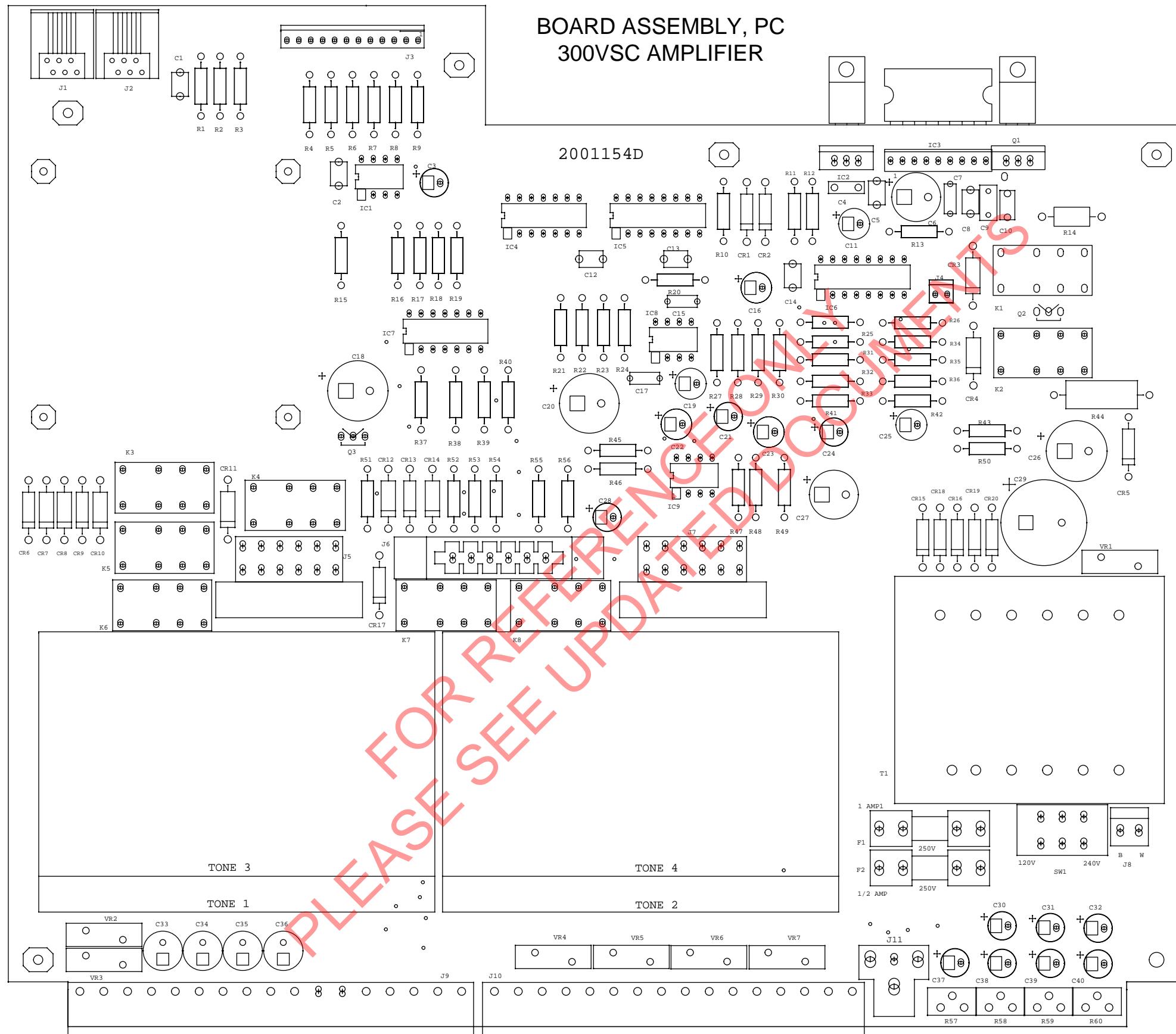
Address all communications and shipments to:

Electrical Products  
Service Department  
Signal Division  
Federal Signal Corporation  
2645 Federal Signal Drive  
University Park, IL 60466-3195

### 5-2. REPLACEMENT PARTS.

Description	Part Number
Mother board	2001154
Switch board	2001147
Tone card con. board	2001164
Fuse F1 250V, 1AMP, GMC-1A	148A155-01
Fuse F2 250v, 1/2AMP, GMC-1/2A	148A155
Connector Plug, TB-1 17 position	140A332-17
Connector Plug, TB-2 16 position	140A332-16

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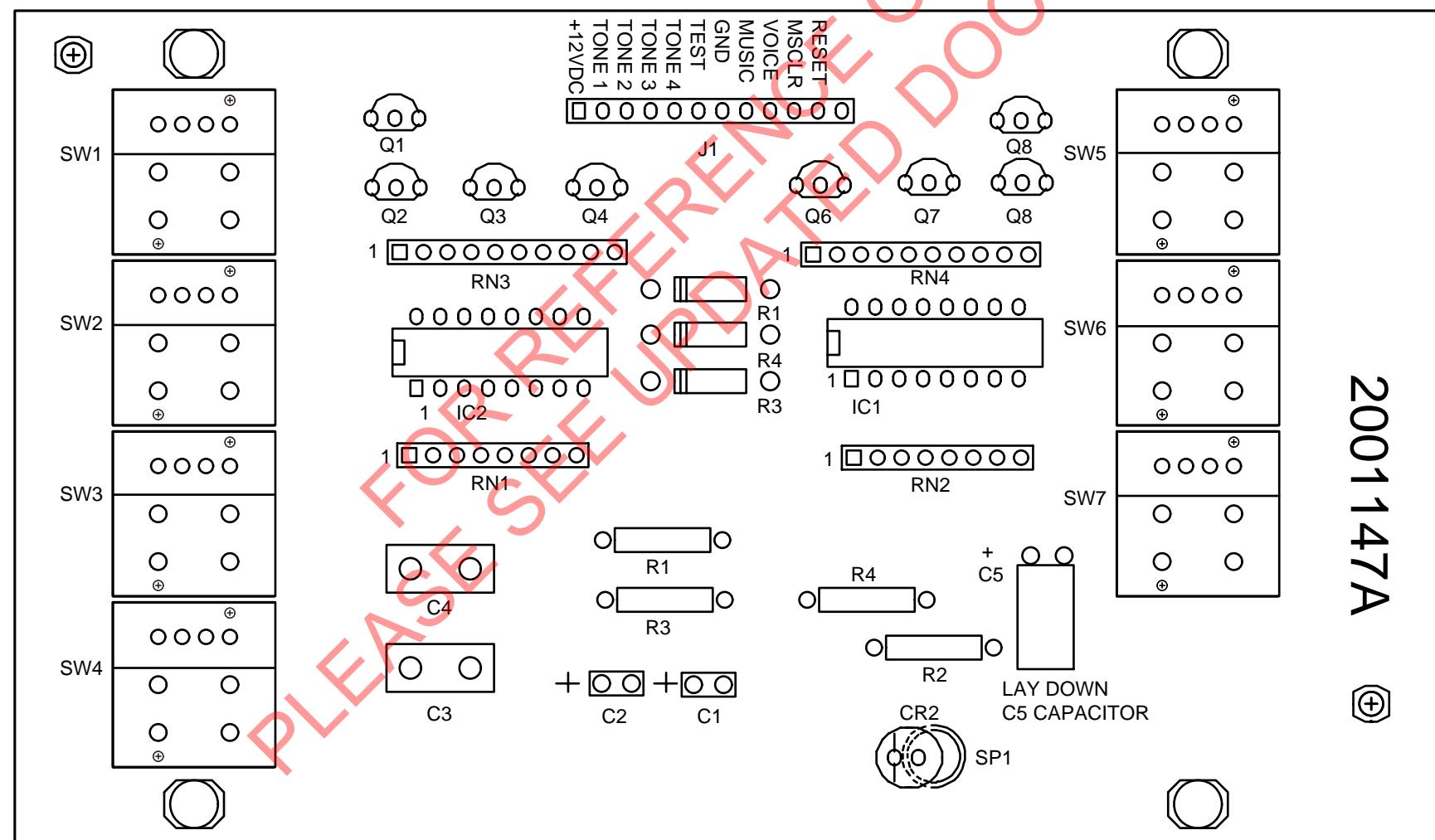
*Figure 5-1. Model 300SCW-1 Mother Board Parts Location.*

**PARTS LIST**  
**MODEL 300SCW-1 MOTHER BOARD**

IDENT. NO.	PART NO.	DESCRIPTION				
C1, C2, C5, C9, C10, C12, C13, C25, C34	107A1001-03	CAPACITOR, MONO .1, 50V	J1, J2	142121	JACK, PHONE	
C3, C28, C30, C35, C36, C37, C43, C44, C45, C46, C47, C48, C49	108A142	CAPACITOR, LYTIC 2.2, 25V	J3	140A235-04	HEADER, 12 POSITION	
C4	107A907	CAPACITOR, MONO .33, 50V	J4	140A235	HEADER, 2 POSITION	
C6, C15, C27, C31	108A143	CAPACITOR, LYTIC 10, 35V	J5, J7	139A290	CONNECTOR, EDGE	
C7, C21, C23	108A146	CAPACITOR, LYTIC 100, 16V	J6	139A151	CONNECTOR, EDGE, 6 POSITION	
C8	107A261	CAPACITOR, DISC .02, 25V	J8	139A289-17	HEADER, 17 POSITION	
C11	107A402	CAPACITOR, MYLAR.0022, 100V	J9	139A289-16	HEADER, 16 POSITION	
C14, C16, C19, C20, C22	107A1026	CAPACITOR, MONO .01, 50V	J10	142A123	JACK, RCA	
C17, C24	107A232	CAPACITOR, DISC 12pf, 100V	J11	140S02	HEADER, 2 POSITION	
C18, C26, C29	108241	CAPACITOR, LYTIC 22, 35V	K1, K2, K3, K4, K5, K6, K7, K8	131A130-01	RELAY, 12 VOLT	
C32, C33	108A153	CAPACITOR, LYTIC 330, 50V	PCB1	130537D	PCB, 300VSC	
C38	108A251	CAPACITOR, LYTIC 3300, 50V	Q1, Q4	125A447	TRANSISTOR, MPS-A05	
C39, C40, C41, C42	108A245	CAPACITOR, LYTIC 22, 50V	Q2	125B415	TRANSISTOR, 2N5296	
CR1, CR2, CR3, CR4, CR5, CR7, CR9, CR10, CR11, CR13, CR16, CR20, CR22, CR23, CR25	115A119	DIODE, 1N4007	Q3	125B133	TRANSISTOR, TIS93	
CR18, CR19, CR21	115B301	DIODE, 1N5059	Q5	125A113	TRANSISTOR, 2N3702	
CR12	115A242	DIODE, 1N5253B	RN1, RN2	100A825	RESISTOR, NW 5 X 47K OHM, 2%	
CR28	115A601	BRIDGE, RECT, BFW-50	RN3	100A817	RESISTOR, NW 5 X 10K OHM, 2%	
FC1, FC2, FC3, FC4	144A125	CLIP, FUSE	R1, R31	100A298	RESISTOR, CF 4.7K OHM 5%, 1/4W	
F1	148A155-01	FUSE, 1 AMP	R2, R3, R24, R26, R29, R39	100A225	RESISTOR, CF 2.2K OHM 5%, 1/4W	
F2	148A155	FUSE, 1/2 AMP	R4, R5, R6, R7, R47, R49	100A262	RESISTOR, CF 100K OHM 5%, 1/4W	
IC1	128A208	IC, ILD-1, OPTO ISO, DUAL	R8, R9, R11	100A258	RESISTOR, CF 18K OHM 5%, 1/4W	
IC2	128A066	IC, MC7812, 12V REG.	R10, R16, R28, R30, R37, R42, R44, R45, R46, R50	100A257	RESISTOR, CF 10K OHM 5%, 1/4W	
IC3	128258	IC, TDA1521, AMP	R12, R32, R36, R51	100A226	RESISTOR, CF 150K OHM 5%, 1/4W	
IC4, IC7	128A059	IC, MC14584B, INV	R13, R22, R35	100A230	RESISTOR, CF 82K OHM 5%, 1/4W	
IC5	128A060	IC, 4532BE, 8 BT	R14, R43	100A215	RESISTOR, CF 1 MEG OHM 5%, 1/4W	
IC6	128A062	IC, 4051, 8 CHANNEL	R15, R27, R44	100A249	RESISTOR, CF 470K OHM 5%, 1/4W	
IC8	128A043-02	IC, LM555C, TIMER	R17, R18, R20, R23, R25, R34, R42	100A228	RESISTOR, CF 47K OHM 5%, 1/4W	
IC9	128A267	IC, 2139, DUAL OP AMP	R19	100A234	RESISTOR, CF 8.2 OHM 5%, 1/4W	
IC10	128A159	IC, 7805UC, 5V REG.	R21	100A308	RESISTOR, CF 220 OHM 10%, 1/2W	
IC11	128A045	IC, LM358, DUAL OP AMP	R33	100A213	RESISTOR, CF 220K OHM 5%, 1/4W	
			R38	105A278	POTENTIOMETER, 50K OHM	
			R40	100A259	RESISTOR, CF 22K OHM 5%, 1/4W	
			R41	100A605	RESISTOR, CF 120 OHM 10%, 2W	
			R48	100A313	RESISTOR, CF 680 OHM 10%, 1/2W	
			R49, R50, R51, R52	105A248	POTENTIOMETER, 5K OHM	
			S1	122279	SWITCH, DPDT	
			T1	120B255	TRANSFORMER, 24VAC	
			VR1, VR2, VR3, VR4, VR5, VR6	114A103	VARISTOR, 18V	
			VR7	114A102	VARISTOR, 39V	

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IDENT. NO.	PART NO.	DESCRIPTION	IDENT. NO.	PART NO.	DESCRIPTION
C1	107A645	CAPACITOR, TANT .47 35V	Q7	125B132	TRANSISTOR, TIS92
C2	107A645	CAPACITOR, TANT .47 35V	Q8	125B132	TRANSISTOR, TIS92
C3	107A1026	CAPACITOR, MONO .01 50V	RN1	100A809	RESISTOR NETWORK, 7X1K, 2%
C4	107A1026	CAPACITOR, MONO .01 50V	RN2	100A826	RESISTOR NETWORK, 7X330K, 2%
C5	108A143	CAPACITOR, LYTIC 10 35V	RN3	100A802	RESISTOR NETWORK, 5X10K, 2%
CR1	115A119	DIODE, 1N4007	RN4	100A802	RESISTOR NETWORK, 5X10K, 2%
CR2	147A112-02	LED, GREEN	R1	100A240	RESISTOR, CF 100 OHM 5% 1/4W
CR3	115A119	DIODE, 1N4007	R2	100A233	RESISTOR, CF 1K OHM 5% 1/4W
CR4	115A119	DIODE, 1N4007	R3	100A262	RESISTOR, CF 100K OHM 5% 1/4W
IC1	128A067	IC, 4044B, R-S LATCH	R4	100A233	RESISTOR, CF 1K OHM 5% 1/4W
IC2	128A067	IC, 4044B, R-S LATCH	SP1	230A151	SPACER, PLASTIC, #6
J1	140308-12	HEADER, 12 POSITION	SW1	122A297	SWITCH, SPDT, RED LED
PCB1	130531A	PCB, 300VSC SWITCH	SW2	122A297	SWITCH, SPDT, RED LED
Q1	125B132	TRANSISTOR, TIS92	SW3	122A297	SWITCH, SPDT, RED LED
Q2	125B132	TRANSISTOR, TIS92	SW4	122A297	SWITCH, SPDT, RED LED
Q3	125B132	TRANSISTOR, TIS92	SW5	122A297	SWITCH, SPDT, RED LED
Q4	125B132	TRANSISTOR, TIS92	SW6	122A297	SWITCH, SPDT, RED LED
Q5	125B132	TRANSISTOR, TIS92	SW7	122A297-01	SWITCH, SPDT
Q6	125B132	TRANSISTOR, TIS92			



290A2845

Figure 5-2. Model 300SCW-1 Switch Board Parts Location.