

## PRINCIPLES OF OPERATION

The following paragraphs contain a brief explanation of phonograph operation. Use this text in conjunction with the troubleshooting charts and sequence of operation diagrams to isolate and correct malfunctions.

### JUNCTION BOX

The junction box distributes 110-volt power to phonograph components and supplies 6-volt ac, 30-volt ac, and 30-volt dc power required for phonograph operation. Power is controlled by toggle switch S1 located on the access door at the rear of the cabinet. Four 110-volt electrical receptacles J1 through J4 are provided for fluorescent lighting, the turntable motor, accessories, and service equipment. Service outlet J1 is not controlled by the power switch and has power at all times. This primary power circuit is protected by 8-amp fuse F4.

6-volt and 30-volt ac are applied to the phonograph harness through receptacle J5. Each secondary circuit is protected by an individual fuse F1, F2 and F3.

### RECORD CHANGER MECHANISM

The record changer mechanism holds 100 records and plays selections on command from the selection system. Identification and location of each major component is shown in figure 3-15. The purpose and description of each component is explained in the following paragraphs.

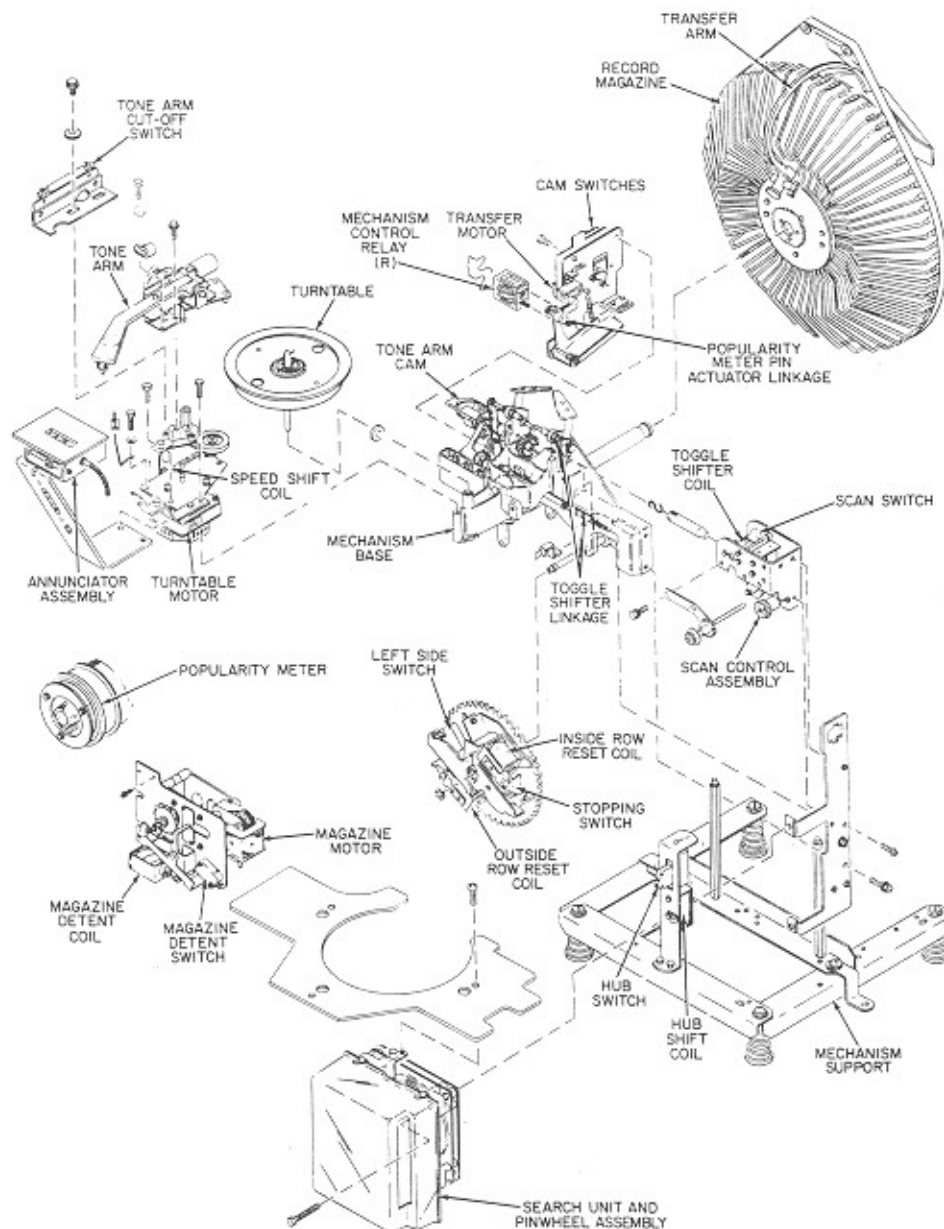


FIGURE 3-15. RECORD CHANGER MECHANISM MAJOR COMPONENTS

**Popularity Meter.** The popularity meter indicates the number of times each record selection is played. The meter consists of 100 2-1/8" long pins. The meter can register a total of 30 plays for each record. An integral plastic ring indicates 10 and 20 count points.

**Annunciator Assembly.** The annunciator assembly indicates the letter and number of the selection being played. It is mounted on the annunciator bracket located on the front of the record changer mechanism. The annunciator consists of a geared letter wheel, a geared number wheel and a solenoid-operated shutter mechanism.

**Magazine, Belt and Transfer Arm.** The record magazine stores 100 7-inch 33 or 45 rpm records in a circular cage. A seamless belt around the cage keeps records in position when they are at the bottom of the gripper bow bracket, above the cage. The rollers permit the transfer arm to clear the belt when removing and returning records to the magazine and also maintain belt tension.

**Scan Control Assembly.** The scan control assembly contains a scan coil, a micro-switch and a mechanical linkage. The assembly is mounted on the search unit bracket. When the scan coil is energized, the scan switch closes and the magazine motor starts. The scan control assembly also controls the length of scanning after all selections have played.

**Search Unit and Pinwheel Assembly.** The search unit and pinwheel assembly is a component of the selection system. It pushes pins on a pinwheel assembly that correspond to record selections. Refer to the selection system description for a complete explanation of search unit components and operation.

**Stop Switch Assembly.** The stop switch assembly causes the record magazine to stop at the desired selection, determines which side of the record is to be played, and starts the transfer motor. It is mounted on the right side of the record changer mechanism directly behind the search unit.

**Magazine Motor and Detent Assembly.** This assembly operates the record magazine and popularity meter and locks the magazine in position. It is located at the center of the record changer mechanism, directly under the record transfer arm. The magazine motor and gear box, located behind the mounting plate, rotates the gears that operate the record magazine, stop switch gear, and popularity meter drive. The solenoid operated detent assembly locks the magazine in position.

**Cam Switch and Motor Assembly.** (See Figure 3-16) The cam switch and motor assembly consists of the transfer motor and gear box, a switch cam, and five cam switches. A nylon cam operates cam switches CS-1 through CS-5. The function of each switch is described in Table 3-4.

SWITCH	FUNCTION
CS-1	Controls turntable motor.
CS-2	Magazine motor interlock during record transfer stops record transfer in magazine.
CS-3	Operates outside row reset coil.
CS-4	Operates toggle shift and inside row reset coil holding circuit for cancel button.
CS-5	Stops record transfer over turntable.

TABLE 3-4. CAM SWITCH FUNCTIONS

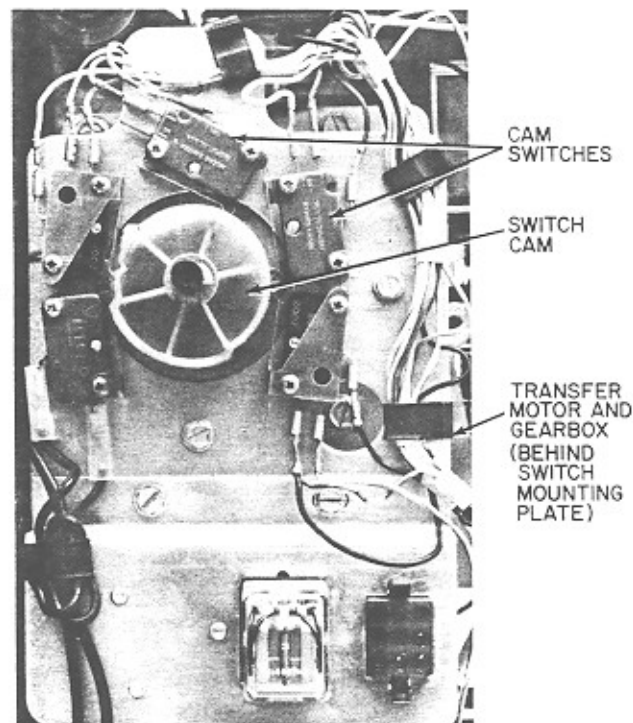


FIGURE 3-16. CAM SWITCH AND MOTOR ASSEMBLY COMPONENTS

**Tone Arm Assembly.** The tone arm assembly plays records after they are positioned on the turntable by the record transfer arm. The tone arm contains a stereo cartridge with a diamond stylus that is designed to track at four to five grams pressure. The stylus plugs into the cartridge for easy replacement. A seven-pin receptacle on the tone arm assembly mates with a plug to connect the cartridge to the preamplifier via 4-conductor shielded cable.

**Turntable Motor and Plate Assembly.** The turntable motor and plate assembly consists of the turntable motor and associated components necessary to rotate the turntable. The turntable motor rotates a rubber idler wheel, mounted on a spring-loaded idler arm. The idler wheel contacts the inner rim of the record turntable. The turntable has heavy mass to reduce wow and flutter. Its upper surface is coated with a rubberized material to prevent records from slipping and to avoid record damage.

**Automix.** Automix operation enables the phonograph to play both 33 and 45 rpm records in any order. Automix components consist of a speed shift coil, a hub shift coil and a trip wire and switch on the turntable hub.

## SELECTION SYSTEM

The selection system provides a means for the customers to choose desired selections after credit is established. The selection system consists of a selector assembly and a search unit. The purpose and description of each selection system component is explained in the following paragraphs.

**Selector Assembly.** (See figure 3-17) The selector assembly is located above the title panel. It contains three pushbutton switch banks, a latch coil, a select pulse and latch relay, and a start relay. The pushbutton switch banks are designated A through K (no I), L through V (no O), and 1 through 0. Each pushbutton completes a circuit to a corresponding search unit commutator segment.

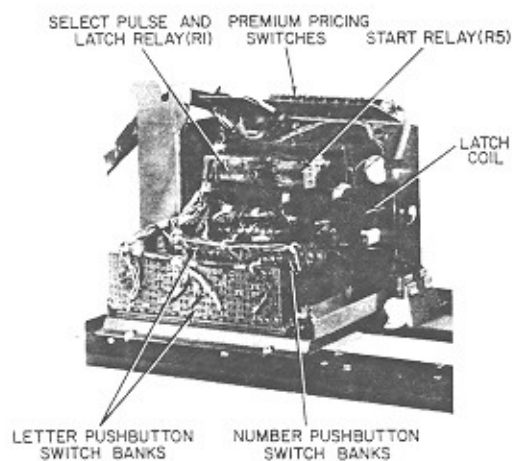


FIGURE 3-17. SELECTOR ASSEMBLY COMPONENTS

The latch coil mechanically latches the pushbutton switches until the search unit pushes a pin in the pinwheel assembly. Select pulse and latch relay R1 controls power to the latch coil. A delay in relay drop out due to a diode in parallel with the relay coil determines the length of the select pulse to the search unit. The select pulse permits the scan coil, credit cancel coil, and select coil to operate.

Start relay R5 completes the circuit to the search unit when both a number and letter pushbutton are operated. It also performs an interlock function in the number pushbutton circuit.

**Search Unit.** (See figure 3-18) The search unit pushes pins that correspond to record selections. These pins are detected by the record changer mechanism stop switch pawl. The search unit is located on the record changer mechanism right side. The front side of the search unit printed circuit board represents the 10 numbers in the phonograph selection system. The rear side represents the 20 letters.

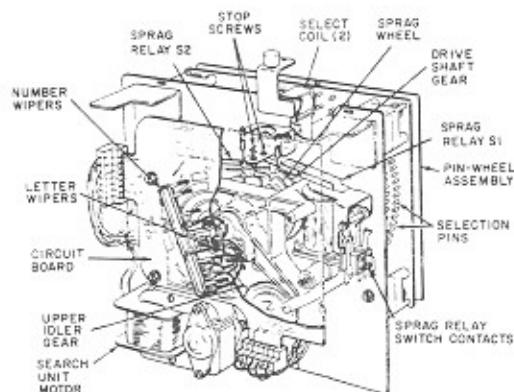


FIGURE 3-18. SEARCH UNIT MAJOR COMPONENTS

The search unit motor drives search wipers, a sprag wheel, drive gears, and select coil arm assembly. The motor is energized after the letter and number pushbuttons are latched on the selector assembly. When a selection is made, the search unit motor rotates the number and letter wipers on the circuit board. Each wiper searches the commutator board until the wiper blades find the hot segments that represent the desired selection. When the number wiper runs onto the "hot" segment, sprag relay S1 is energized. Sprag relays S1 and S2 keep the wiper assemblies from moving beyond the "hot" segments.

When relay S1 is energized, the large tooth at the end of the relay armature engages a notch in the sprag wheel, quickly stopping the wiper assembly. The hot side of the selection circuit is then transferred from the number side of the circuit board to the letter side by search unit relay R2.

The letter wiper continues to rotate a short distance on the rear of the board. When the letter wiper runs onto the "hot" segment sprag relay S2 is energized. Relay S2 operates in a similar manner to S1, quickly stopping the letter wiper on the commutator segment. Relay S2 also deenergizes the search unit motor and energizes one of the two select coils that have been positioned by the pinwheel assembly.

The select coil plunger pushes one of the pins in the pinwheel assembly, corresponding to the chosen selection. The pinwheel assembly contains two rows of 100 1/2-inch long pins, mounted in a circular pattern. The inside row corresponds to right side selections while the outside row corresponds to left side selections. The pin is reset by a reset coil, mounted on the record changer mechanism stop switch.

The stop screws provide an adjustment of the clearance between the armature teeth of their respective sprag relays and the sprag wheel high points when the relays are deenergized.

## CREDIT AND PRICING SYSTEM

The credit and pricing system validates coins deposited in the phonograph coin slot and establishes credit for record play. The system consists of a slug rejector and coin switches, pricing switches, a credit unit, and a total play counter. The identification and location of each component is shown in figure 3-19. The purpose and description of each major component is explained in the following paragraph.

Slug Rejector and Coin Switches. The slug rejector takes good coins and rejects slugs and bad coins. It takes nickels, dimes, quarters and half-dollars.

The coin switches establish credit in the credit unit. They are located at the bottom of the slug rejector. They are operated by the coins as they fall into the cash box. A good coin moves the switch lever, closing the switch and completing a circuit to the credit unit commutator board.

Pricing Switches. The dual shaft pricing switch permits the phonograph to operate with various pricing combinations. It consists of two wafer switch decks located on the service control panel. The three-position switch deck (6, 7, 8) controls power to the credit unit fixed and adjustable credit stop coils. The five position switch deck (1 through 5) completes circuits to the credit unit commutator board. A mechanism service switch mounted on the service panel enables the record changer mechanism to be scanned independently of the selection system for service and maintenance. A bonus relay and 15¢ price adapter are required for some special pricing combinations.

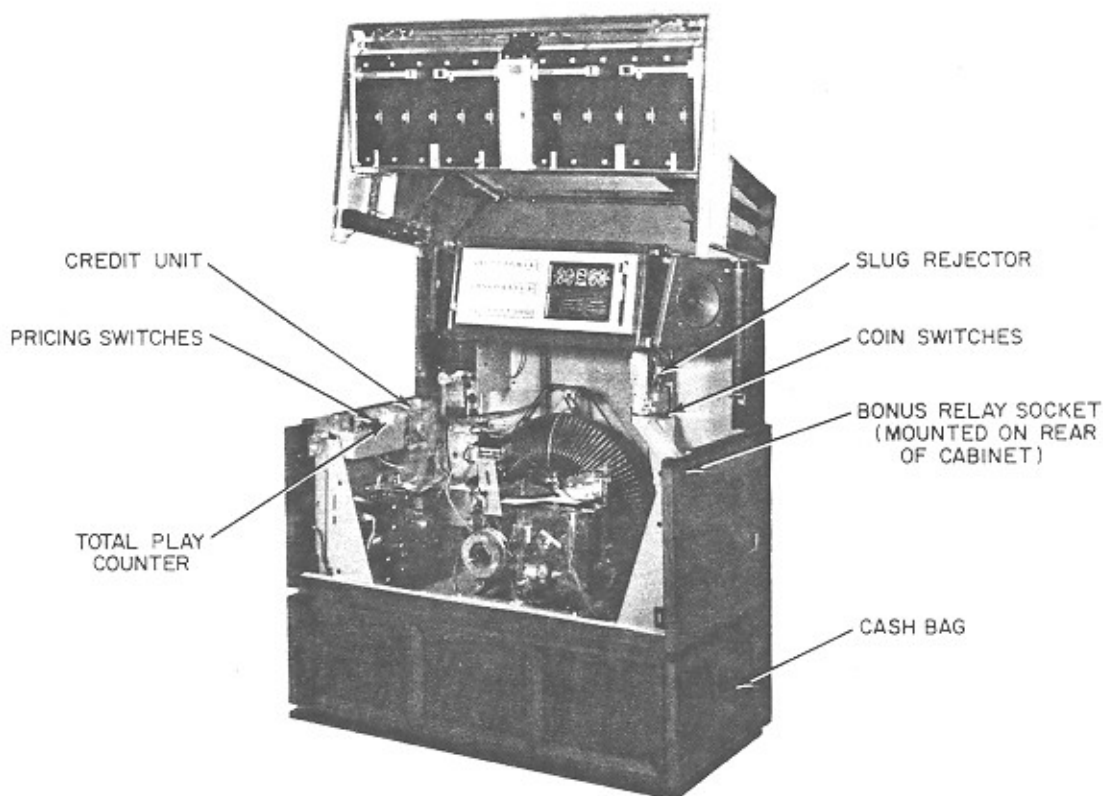


FIGURE 3-19. CREDIT AND PRICING SYSTEM COMPONENTS

Credit Unit. (See figure 3-20). The credit unit is actuated by the coin switches and registers the value of coins deposited. It is operated by means of solenoids. Credit information is given to the phonograph electrical control system by contact wiper and commutator board. Clockwise rotation of the contact wiper accumulates credit and counter-clockwise rotation removes credit.

Credits are accumulated when the credit coil is energized by a coin switch (See figure 3-22). A pawl engages the front credit wheel and credit stop arm and rotates them clockwise. This rotation is limited when the stop arm engages a "stop screw" or "stop coil" plunger.

Stop screw allows 2 through 9 steps.

Fixed credit stop coil allows 1 step.

Adjustable credit stop coil allows 2, 3 or 4 steps.

The front credit wheel, rear cancel wheel, and contact wiper assembly are mounted on the same shaft and rotate together.

Credits are removed when the cancel coil is energized by making a selection (See figure 3-21). A pawl engages the cancel wheel and cancel stop arm and rotates both counterclockwise. The rotation is limited when the stop arm engages a "stop screw" or cancel "stop coil" plunger.

Stop screw allows 1 through 6 steps.

Adjustable cancel stop coil allows 1, 2 or 3 steps.

The cancel wheel, credit wheel and contact wiper are mounted on the same shaft and are rotated together.

The contact wipers operate credit lights on phonograph. They also tell the phonograph selection system if enough coins have been deposited to allow a standard price selection or a premium price selection.

See page 2-8 for complete instructions on price changing.

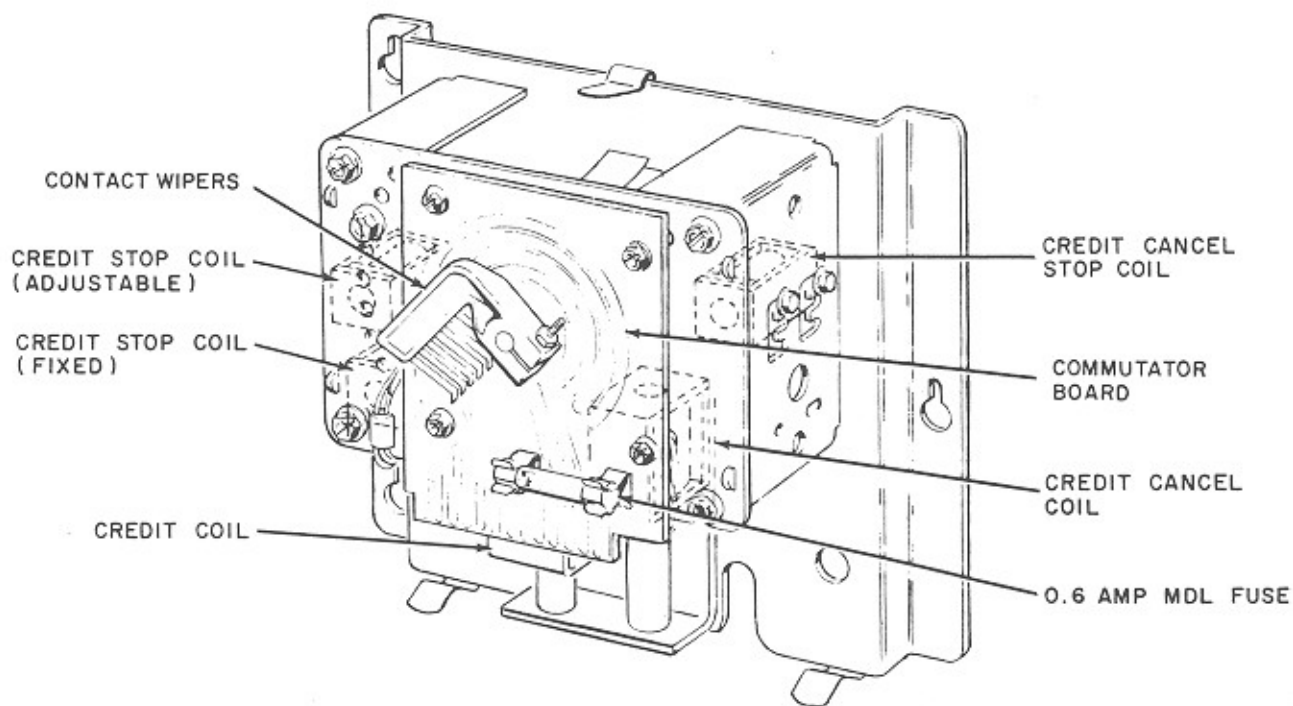


FIGURE 3-20. CREDIT UNIT COMPONENTS

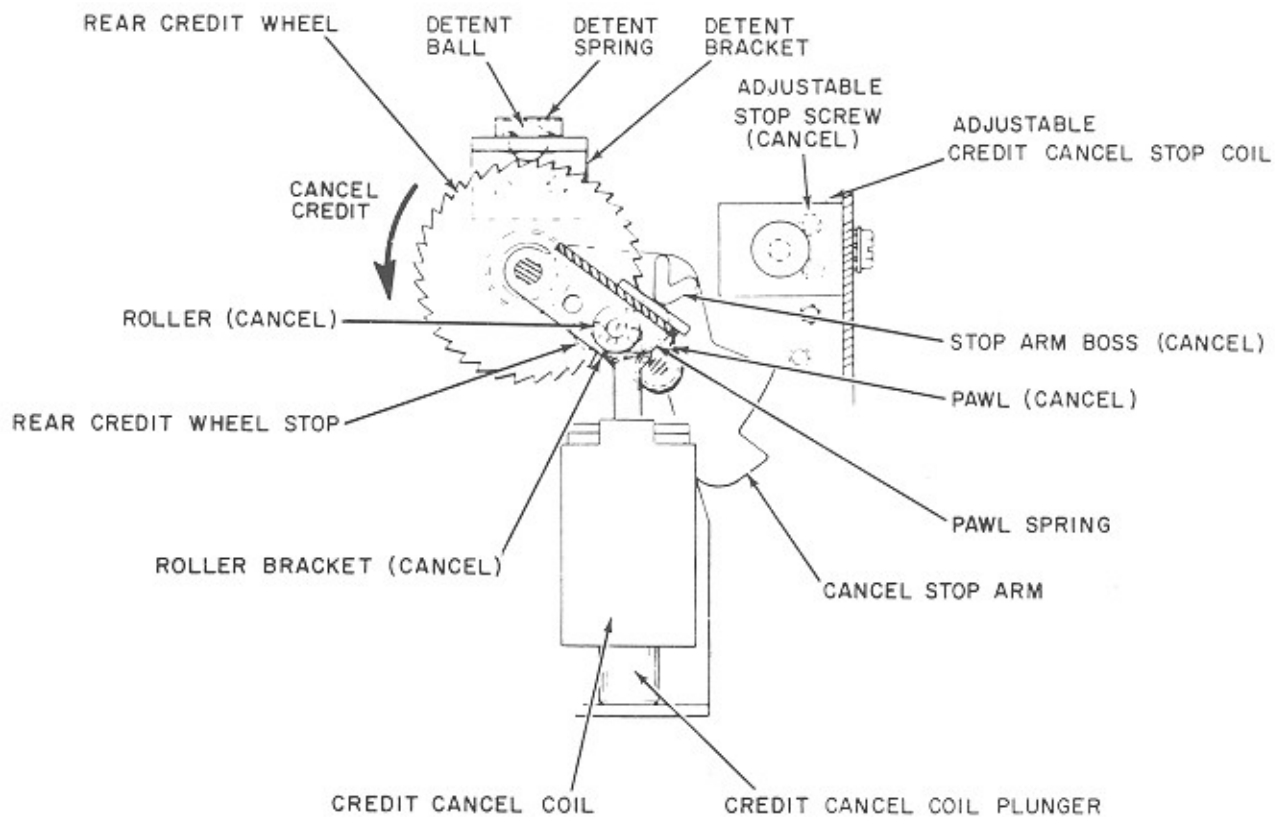


FIGURE 3-21. FRONT CREDIT WHEEL AND RELATED PARTS

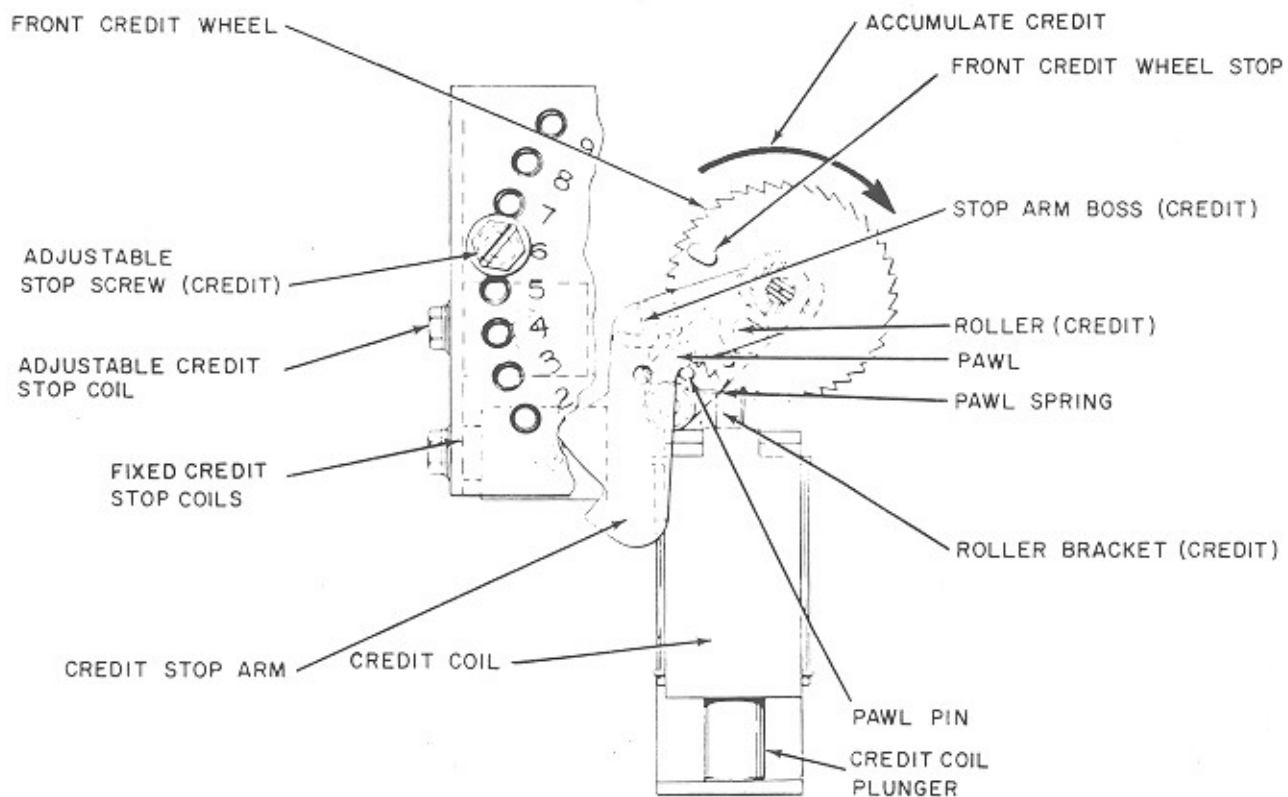


FIGURE 3-22. REAR CREDIT WHEEL AND RELATED PARTS

## SOUND SYSTEM

The phonograph sound system translates stylus vibration into electrical voltage, amplifies the voltage and the speaker converts it into sound. The sound system consists of a stylus and cartridge, a stereo preamplifier and amplifier unit, a speaker system, and a volume control. Identification and location of each major component is shown in figure 3-23. The purpose and description of each major component is explained in the following paragraphs.

Stylus and Cartridge. The stylus and cartridge convert mechanical movement into equivalent electrical voltage. The unit is mounted on the record changer

tone arm. This output voltage is transmitted through shielded cable to the preamplifier.

Preamplifier and Amplifier. (See figure 3-24) The preamplifier and amplifier units amplify phonograph cartridge output and drive the speaker system. The latest concepts in silicon transistor circuitry are designed into the 50-watt stereo system. It delivers a full 25 watts rms power per channel. Its wide frequency response and low distortion assure good record reproduction. The unit incorporates automatic volume control (AVC) and automatic quality control (AQC).

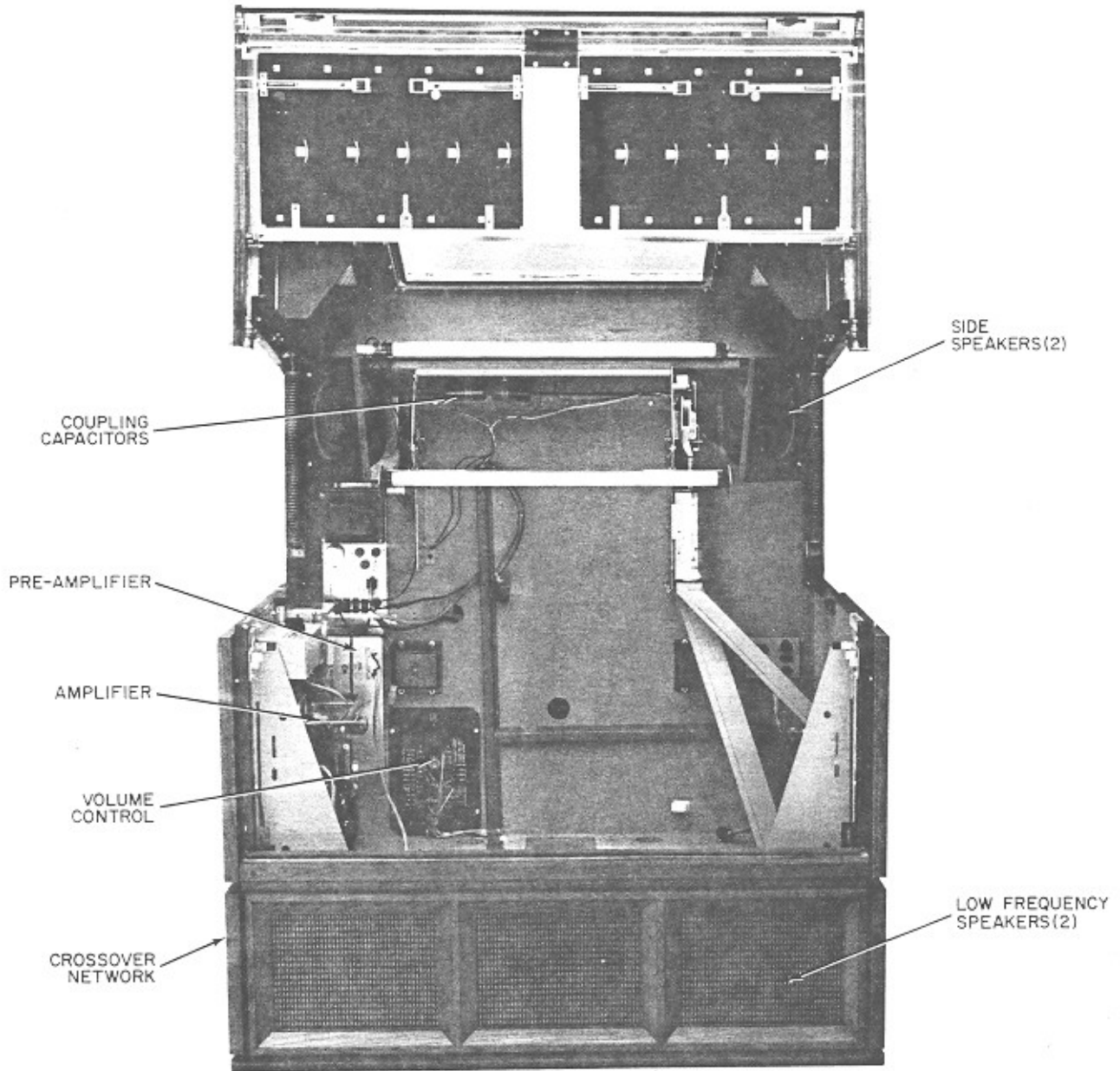


FIGURE 3-23. SOUND SYSTEM COMPONENTS

The output stage is coupled to the speakers. Treble range and bass boost controls are provided on the preamplifier chassis to compensate for differences in room acoustics. A mute relay silences the amplifier while a record is being transferred to or from the turntable.

Preamplifier circuitry is completely solid state for durability and long service life. Protection is included for voltage transients, excessive heat, and accidental shorting of speaker leads.

#### Preamplifier

The preamplifier board is the same for both the 50 and 100 watt amplifiers. The preamplifier board, however, is a part of the 50 watt preamplifier assembly mounted in the rear of cabinet, while it is a component part mounted on the 100 watt power amplifier.

The preamplifier amplifies the phonograph cartridge ac output voltage to drive the power amplifier. The preamplifier consists of two identical, independent audio channels. Right channel component designations end in the letter R, while left channel components end in the letter L. Treble range and bass boost controls are provided to enable adjustment of frequency contour. All components are mounted on a single printed circuit board.

#### MM-5 50W Hybrid Amplifier

The 50W hybrid power amplifier uses one 5U4GB full wave rectifier, two 12AX7A twin triodes and four 7868 beam power tubes. The 5U4GB in the power supply provides dc plate voltages. The 12AX7A serves as both a driver and phase inverter for the 7868 output tubes which operate as a class AB push-pull amplifier.

To supply the 24-volts for the transistorized preamplifier, a separate regulated circuit is included in the power supply. Diodes D902 and D903 rectify voltage from the power transformer secondary winding while zener diode Z901 maintains constant voltage to the printed circuit board regardless of load.

#### 100W Power Amplifier. (Optional)

The 100 watt amplifier power supply uses a full wave bridge type rectifier system. The bridge rectifier is normally connected to the 59 volt winding of the power transformer. In installations where the line voltage exceeds 125 volts, one end of the primary transformer lead should be connected to the "high line tap" which gives a 10% reduction in voltage. A surge suppressor is connected across the rectifier input to limit line transient voltages.

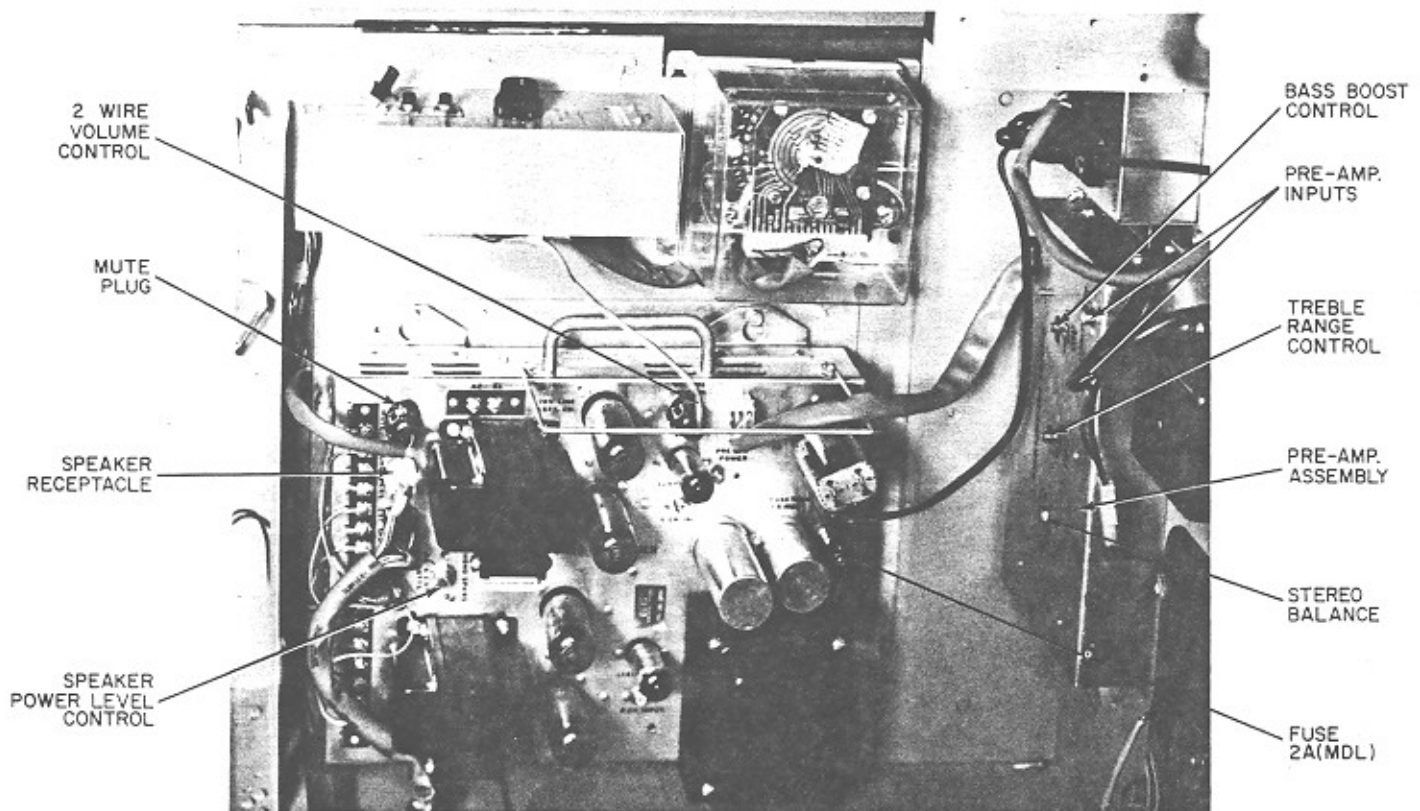


FIGURE 3-24. PREAMPLIFIER AND AMPLIFIER



**Output Transformer Package (100W) (Optional) (See figure 3-25).** The transformer package enables the amplifier to operate 70-volt speaker lines for extension speakers, and provides exclusive Rowe/AMI Stereo Round Sound. Stereo Round Sound improves channel separation. The package consists of two output transformers, a power level control, and associated parts, mounted on a single chassis. The chassis sits on the floor of the cabinet to the left of the record changer mechanism. The unit is electrically connected between the amplifier and speaker system. Output transformer secondary connections are brought out to terminal strips to allow operation with low-impedance extension speakers as well as the recommended 70-volt extension speakers. A 4-position switch, at the center of the chassis, controls phonograph speaker level relative to extension speaker level.

**Speaker System.** The Rowe/AMI Stereo Round Phonograph does not require extension speakers to obtain full stereo reproduction. Sound is projected from

both the front and sides of the cabinet to form the stereo image. Speaker location within the cabinet determines this effect.

The speaker system consists of two 10-inch low frequency speakers, two 6-inch speakers for mid and high frequencies, coupling capacitors and a crossover network. The 10-inch, heavy-duty speakers are mounted in a duct-tuned, bass reflex enclosure at the bottom of the cabinet.

The two round, 6-inch curvilinear-cone speakers are used for mid and high frequencies. The speakers are mounted in sealed, fiberglass-damped enclosures.

**Two-Wire Volume Control.** A Rowe/AMI first, the two-wire volume control simplifies large, complex installations and saves cost. Redesigned preamplifier circuitry permits remote volume control operation using two unshielded wires. Any wires can be used - there are no special requirements for conductor size or shielding.

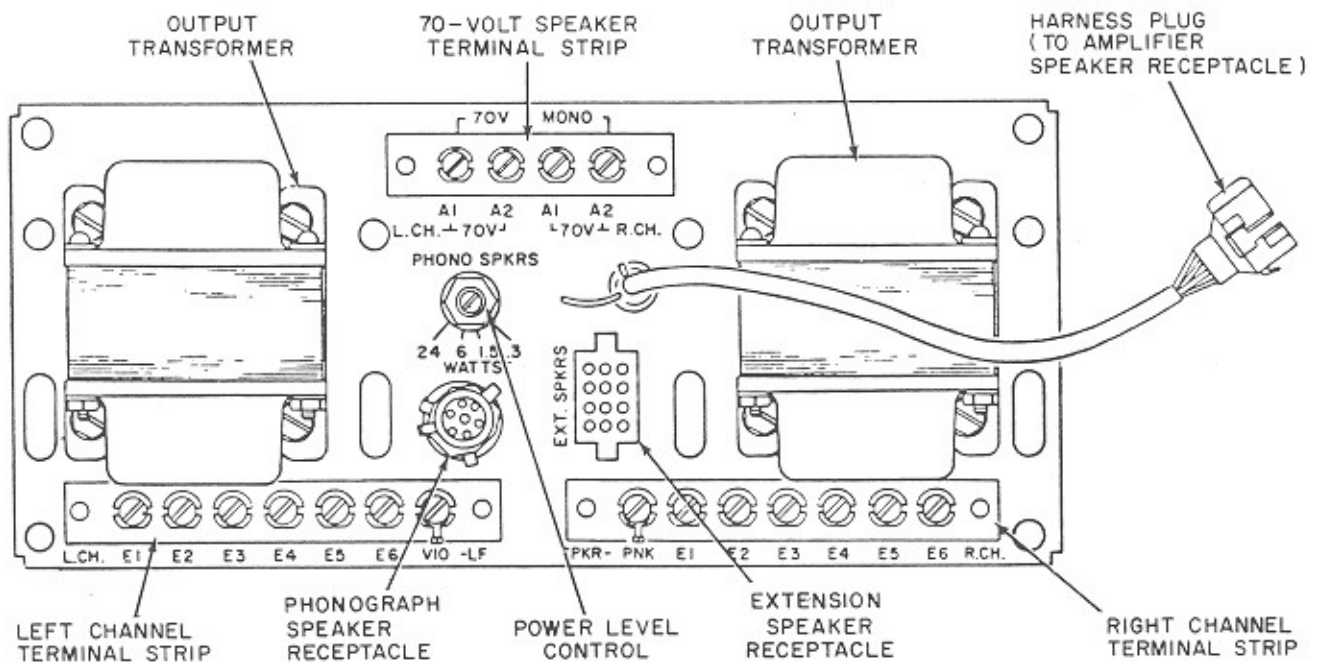


FIGURE 3-25. TRANSFORMER ACCESSORY PACKAGE