

INSTRUCTION MANUAL

SPLICE-TRAK 90 SPLICE FINDER/ERASER

January, 1993

IM No. 597-9120

BROADCAST ELECTRONICS, INC.



IMPORTANT INFORMATION

EQUIPMENT LOST OR DAMAGED IN TRANSIT

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Replacement and Warranty Parts may be ordered from the address below. Be sure to include equipment model and serial number and part description and part number.

Broadcast Electronics, Inc.
4100 N. 24th St., P.O. Box 3606
Quincy, Illinois 62305
Tel: (217) 224-9600
Telex: 25-0142
Fax: (217) 224-9607

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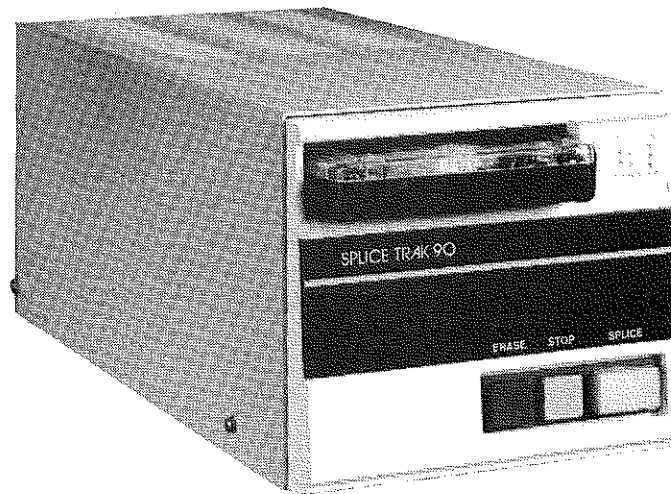
TECHNICAL MANUAL

BROADCAST ELECTRONICS
SPICE-TRAK 90 SERIES
SPICE FINDER/ERASER
597-9120

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TECHNICAL MANUAL
BROADCAST ELECTRONICS, INC.
SPLICE-TRAK 90
SPLICE FINDER/ERASER



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MODEL	PART NUMBER	DESCRIPTION
ST-90	900-9120-000	High-Speed Splice Finder and Tape Eraser for A or AA Size Cartridges, 117V ac 50/60 Hz Power Supply.
ST-90	900-9120-300	High-Speed Splice Finder and Tape Eraser for A or AA Size Cartridges, 220V ac 50/60 Hz Power Supply.

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SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. Section I provides a general description of the Broadcast Electronics ST-90 splice finder/eraser and lists the equipment specifications.

1-3. EQUIPMENT DESCRIPTION.

1-4. ELECTRICAL DESCRIPTION.

1-5. The Broadcast Electronics model ST-90 is a completely solid-state splice finder and cartridge tape eraser designed for continuous operation. With the exception of a power transformer and solid state relay, all power supply circuits and control circuits are contained on a single circuit board. For ease of maintenance, the circuit board utilizes interconnecting cables to interface with the front-panel switches and chassis mounted components.

1-6. MECHANICAL DESCRIPTION.

1-7. The ST-90 is equipped with a cartridge guidance system, an air damped solenoid, and the Broadcast Electronics PHASE LOK V head assembly. The cartridge guidance system is designed with spring-loaded components to channel a cartridge into the proper operating position. An air-damped solenoid provides a rapid response to front-panel switches. The head assembly contains two full-track erase heads.

1-8. OPTIONS AND ACCESSORIES.

1-9. Refer to Table 1-1 for options and accessories available for the ST-90 splice finder/eraser.

1-10. EQUIPMENT SPECIFICATIONS.

1-11. Refer to Table 1-2 for the electrical, physical, and environmental specifications of the Broadcast Electronics ST-90 splice finder.

TABLE 1-1. ST-90 OPTIONS AND ACCESSORIES

OPTIONS AND ACCESSORIES	PART NUMBER
RACK MOUNTING ACCESSORIES	
RACK MOUNT SHELF FOR EIA 19 INCH RACK, 7 INCH HEIGHT	900-9013
1/3 RACK FILLER PANEL FOR 7 INCH RACK SHELF	900-9014
1/2 RACK FILLER PANEL FOR 7 INCH RACK SHELF	900-9015
1/6 RACK FILLER PANEL FOR 7 INCH RACK SHELF	900-9017
TEST EQUIPMENT	
CUT-AWAY TAPE ALIGNMENT TEST CARTRIDGE	710-0132
TAPE HEAD AND TAPE GUIDE ALIGNMENT GAUGE KIT	970-0102
MOTOR ALIGNMENT GAUGE	836-0005
SPARE PARTS KIT	970-0121

TABLE 1-2. ELECTRICAL, PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS

PARAMETER	SPECIFICATION
<p>ELECTRICAL</p> <p>POWER REQUIREMENTS</p> <p>TAPE SPEED</p> <p>SPLICE DENSITY</p> <p>ERASE DEPTH</p> <p>TAPE CAPACITY</p> <p>PHYSICAL</p> <p>MOUNTING</p> <p>Standard</p> <p>Optional</p> <p>WEIGHT (Packed)</p> <p>DIMENSIONS</p> <p>HEIGHT</p> <p>Width</p> <p>Depth</p> <p>ENVIRONMENTAL</p> <p>AMBIENT OPERATING TEMPERATURE</p> <p>HUMIDITY</p>	<p>97V to 133V ac or 194V to 266V ac 50/60 Hz (as ordered).</p> <p>28 IPS at 60 Hz.</p> <p>0.5 mm.</p> <p>85 dB below 3% THD at 1 kHz.</p> <p>A or AA Size Cartridges.</p> <p>Desk-top.</p> <p>Rack Mount. 19 Inch (48.3 cm) EIA Rack.</p> <p>21 Pounds (9.53 kg).</p> <p>5.25 Inches (13.33 cm).</p> <p>5.75 Inches (14.60 cm).</p> <p>15.5 Inches (39.37 cm).</p> <p>32° F to 122° F (0° C to 50° C).</p> <p>95% Maximum. Non-Condensing.</p>

SECTION II

INSTALLATION

2-1. INTRODUCTION.

- 2-2. Section II contains information required for installation of the Broadcast Electronics ST-90 splice finder/eraser.

2-3. UNPACKING.

- 2-4. The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the ST-90 and perform a visual inspection to determine that no apparent damage has been incurred during shipment. All shipping materials should be retained until it is determined that the unit has not been damaged. Claims for damaged equipment must be promptly filed with the carrier or the carrier may not accept the claim.

- 2-5. The contents of the shipment should be as indicated on the packing list. If the contents are incomplete, or the unit is damaged electrically or mechanically, notify both the carrier and Broadcast Electronics, Inc.

2-6. INSTALLATION.

2-7. PLACEMENT.

- 2-8. The standard ST-90 machines are designed for desk-top placement. Units designed for rack mounting are available by optional assembly. To provide adequate structural support, it is recommended the rack mounted unit be installed in a rack shelf (refer to Figure 7-4 SECTION VII, DRAWINGS). Observe the following requirements and place the unit in any convenient location.

- A. Place the ST-90 within reach of the power cable.
- B. Do not place the ST-90 near heat generating equipment.
- C. For rack mounted units, allow one inch of rack space above and below the ST-90 for adequate ventilation.

2-9. AC POWER CONNECTION.



WARNING

***ENSURE ALL PRIMARY POWER IS DISCONNECTED
BEFORE PROCEEDING.***

WARNING

- 2-10. The ST-90 splice finder/eraser is wired for the proper power supply voltage when shipped from the factory. The operating voltage requirement for the unit is indicated on the identification plate which is located on the side-panel. If an alternate operating voltage is required, refer to schematic SD950-9020 in SECTION VII, DRAWINGS, and connect TB1 as required.

SECTION III

OPERATION

3-1. INTRODUCTION.

- 3-2. Section III identifies all controls and indicators associated with the ST-90 splice finder/eraser and provides standard operating procedures.

3-3. CONTROLS AND INDICATORS.

- 3-4. Refer to Figure 3-1 for the location of controls and indicators associated with the ST-90. The function of each control or indicator is described in Table 3-1.

3-5. OPERATION.



NOTE *THE FOLLOWING PROCEDURE ASSUMES THAT THE ST-90 IS COMPLETELY INSTALLED AND IS FREE OF ANY DISCREPANCIES.*

NOTE

- 3-6. Operate the rear-panel switch to the ON position.

- 3-7. Insert a cartridge into the deck. The STOP switch/indicator will illuminate.

3-8. SELECTING A FUNCTION.

- 3-9. The ST-90 is equipped with a splice finder function and a combined splice finder/eraser function. The following text will describe the operation of these functions.

- 3-10. **SPLICE FINDER.** To select and begin the splice finder function, depress the SPLICE switch/indicator. When the SPLICE switch/indicator is depressed, the following events will occur:

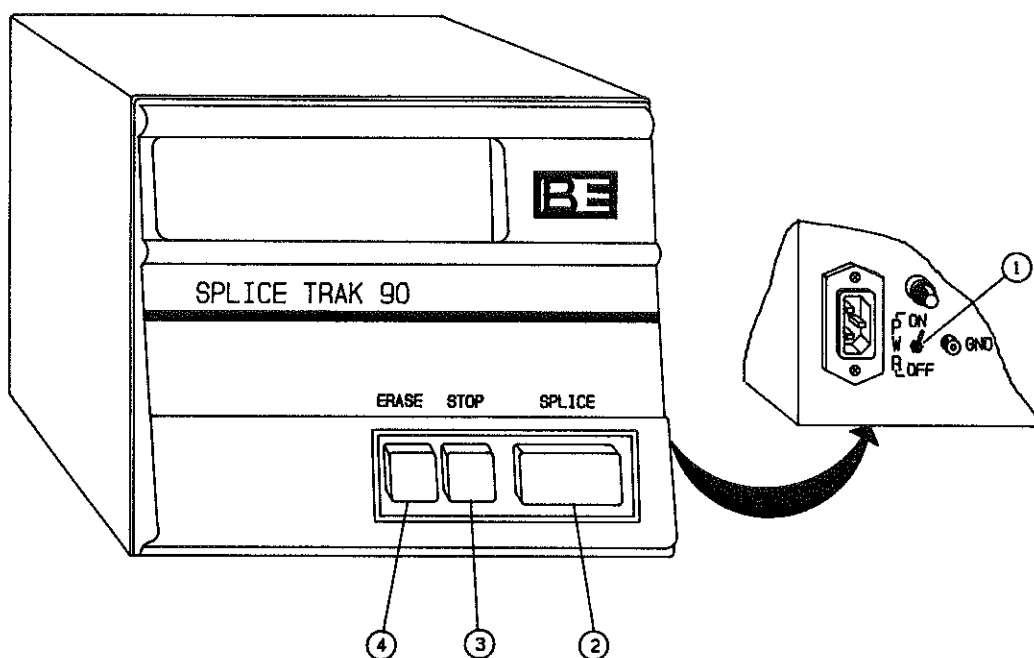
- A. The SPLICE switch/indicator will illuminate.
- B. The STOP switch/indicator will extinguish.
- C. Deck operation will continue until a splice is detected or the STOP switch/indicator is depressed.

- 3-11. When a splice is detected, the following events will occur:

- A. Deck operation will terminate.
- B. The SPLICE switch/indicator will flash.
- C. The STOP switch/indicator will illuminate.
- D. The splice will be located approximately 5 inches beyond the capstan.

- 3-12. **Stop Switch Operation.** If the STOP switch/indicator is depressed during a splice find function, the following events will occur:

- A. Deck operation will terminate.
- B. The SPLICE switch/indicator will extinguish.
- C. The STOP switch/indicator will flash.



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FIGURE 3-1. CONTROLS AND INDICATORS

- 3-13. **SPLICE FINDER/ERASER.** To select the splice finder/eraser function, depress the ERASE switch/indicator. The ERASE switch/indicator will illuminate.
- 3-14. To initiate the splice finder/eraser function, depress the SPLICE switch/indicator. The following events will occur:
 - A. The STOP switch/indicator will extinguish.
 - B. The SPLICE switch/indicator will illuminate.
 - C. Deck operation will continue until the splice is detected twice or the STOP switch/indicator is depressed.
- 3-15. When the second splice is detected, the following events will occur:
 - A. Deck operation will terminate.
 - B. The SPLICE switch/indicator will flash.
 - C. The ERASE switch/indicator will extinguish.
 - D. The STOP switch/indicator will illuminate.

- 3-16. **Stop Switch Operation.** If the STOP switch/indicator is depressed during a splice finder/eraser function, the following events will occur:
- A. Deck operation will terminate.
 - B. The ERASE switch/indicator and STOP switch/indicator will flash.
 - C. The SPLICE switch/indicator will extinguish.
- 3-17. To terminate the splice finder/eraser function prior to deck operation, depress the STOP switch/indicator. The ERASE switch/indicator will extinguish.

TABLE 3-1. CONTROLS AND INDICATORS
(Sheet 1 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
1	PWR ON/OFF Switch	Controls the application of ac power to the unit.
2	SPLICE Switch/ Indicator	<p>Switch:</p> <ul style="list-style-type: none"> A. Selects and initiates the splice finder operation when depressed if the ERASE switch/indicator is extinguished. B. Initiates the splice finder/eraser operation if the ERASE switch/indicator is illuminated. <p>Indicator:</p> <ul style="list-style-type: none"> A. Illuminates to indicate deck operation. B. Flashes twice per second to indicate a completed operation.
3	STOP Switch/ Indicator	<p>Switch:</p> <ul style="list-style-type: none"> A. Terminates deck operation when depressed. B. Terminates an eraser function when depressed prior to deck operation. <p>Indicator:</p> <ul style="list-style-type: none"> A. Illuminates to indicate the unit is in the ready mode. B. Flashes twice per second to indicate an incomplete operation.

TABLE 3-1. CONTROLS AND INDICATORS
(Sheet 2 of 2)

INDEX NO.	NOMENCLATURE	FUNCTION
4	ERASE Switch/ Indicator	<p>Switch: Selects the eraser operation when depressed.</p> <p>Indicator:</p> <ul style="list-style-type: none"> A. Illuminates to indicate the eraser operation is selected. B. Flashes twice per second to indicate an incomplete eraser operation.

SECTION IV

THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. Section IV presents the theory of operation for the Broadcast Electronics ST-90 splice finder/eraser.

4-3. FUNCTIONAL DESCRIPTION.

4-4. The following text presents a functional description of the ST-90 in the splice finder/eraser mode of operation. A simplified schematic of the ST-90 is presented in Figure 4-1. Refer to Figure 4-1 as required for a description of the following circuits.

- A. Switch Decoder Circuit
- B. Erase Bias Circuit
- C. Indicator Control Circuit
- D. Motor Control Circuit
- E. Solenoid/Splice Control Circuit
- F. Power Supply Circuit

4-5. SWITCH DECODER CIRCUIT.

4-6. The front-panel splice, erase, and cartridge deck switches are input to the function decoder logic consisting of U15A, and U9A through U9C. When the erase switch is depressed, the output lines of the function decoder logic will preset bias enable flip-flop U8B/U8C to the erase mode. When the splice switch is depressed, the function decoder logic will activate splice control flip-flop U8A/U8D.

4-7. With the splice control flip-flop activated, the enable line will route a HIGH to: 1) transistor switch Q1, 2) inverter U11A, 3) the indicator control logic circuit, and 4) bias control flip-flop U12B. The output lines of flip-flop U12B will apply a HIGH to transistor switch Q5 and a LOW to transistor switch Q6.

4-8. Various control signals from the switch decoder circuit are also routed to the solenoid/splice control circuit, and indicator control circuit.

4-9. ERASE BIAS CIRCUIT.

4-10. The control logic from U12B will disable Q5 and enable Q6. A bias signal of approximately 180 MHz from oscillator U13 will be applied to amplifier U14A through level control R72. After amplification, the output of U14A is applied to the full track erase heads through erase head driver U17A, Q7, and Q8.

4-11. INDICATOR CONTROL CIRCUIT.

4-12. With the control logic signals from the switch decoder circuit, control data decoder U7B through U7D and U15B through U15D will apply control information to flash control switch U16. U16 will select and route either steady state signals from the switch decoder circuit or pulsed signals from flash oscillator U10B to the front-panel indicators through indicator driver logic U11B through U11D.

4-13. MOTOR CONTROL CIRCUIT.

4-14. The HIGH from the splice control flip-flop is inverted LOW by U11A and applied to solid state relay SSR1. SSR1 will energize and complete the primary ac circuit to operate the capstan motor.

- 4-15. **SOLENOID/SPLICE CONTROL CIRCUIT.**
- 4-16. **SOLENOID OPERATION.** Prior to solenoid operation, transistor Q2 is biased ON which routes +28 volts through the solenoid winding to the collector of transistor Q1 and the base of transistor Q3. With the HIGH from the splice control flip-flop, Q1 will conduct to rapidly operate the solenoid.
- 4-17. With Q1 conducting, a LOW is applied to the base of Q3 which biases Q3 OFF. The collector of Q3 will go HIGH which disables Q2 and allows +10 volts from solenoid driver U3 to be applied to the solenoid and splice control circuit.
- 4-18. **SPLICE OPERATION.** The solenoid/splice control logic consisting of U6, U7A, U7B, U10A through U10C, and U12A processes the information from the switch decoder circuit and splice comparator U5 to generate control signals. After approximately 2 seconds of solenoid operation, the control logic will output a HIGH to enable splice mute switch Q4 and comparator U5.
- 4-19. As a tape splice passes between the pinch roller and capstan shaft, the solenoid will move and generate a voltage spike. This volt- μ s spike is applied to high gain amplifier U4B through splice mute switch Q4 and a low pass filter which removes any primary ac component. The output of U4B is applied to comparator U5 which will output a HIGH to the control logic.
- 4-20. Upon detection of the first splice, the control logic will output a HIGH to the base of Q3. Q3 will bias Q2 ON for a brief duration to apply +28 volts for repositioning the solenoid. The splice detection circuitry will also be muted during this period.
- 4-21. Upon detection of the second splice, the control logic will output a LOW to the splice control flip-flop through diode D25. The enable line from the splice control flip-flop will toggle LOW to de-energize the solenoid and capstan motor.
- 4-22. **POWER SUPPLY CIRCUIT.**
- 4-23. Primary power is applied to the ST-90 through switch S1 and fuse F1 to the capstan motor and the primary of power transformer T1. The secondary of T1 is applied to a full-wave rectifier and filter to provide a +28V potential and a -28V potential.
- 4-24. The +28 voltage is applied to integrated circuit U1 to provide a regulated +16.5V dc operating potential to the logic circuit board. Indicator DS1 at the output of U1 will illuminate to indicate the presence of +16.5 volts.
- 4-25. +28 volts is also applied to transistor Q9 and zener diode D20 which operate as a voltage regulator to provide +26 volts for the front-panel indicators.
- 4-26. The -28 voltage is applied to integrated circuit U2 to provide a regulated -16.5V dc operating potential to the logic circuit board. Indicator DS2 at the output of U2 will illuminate to indicate the presence of -16.5 volts.

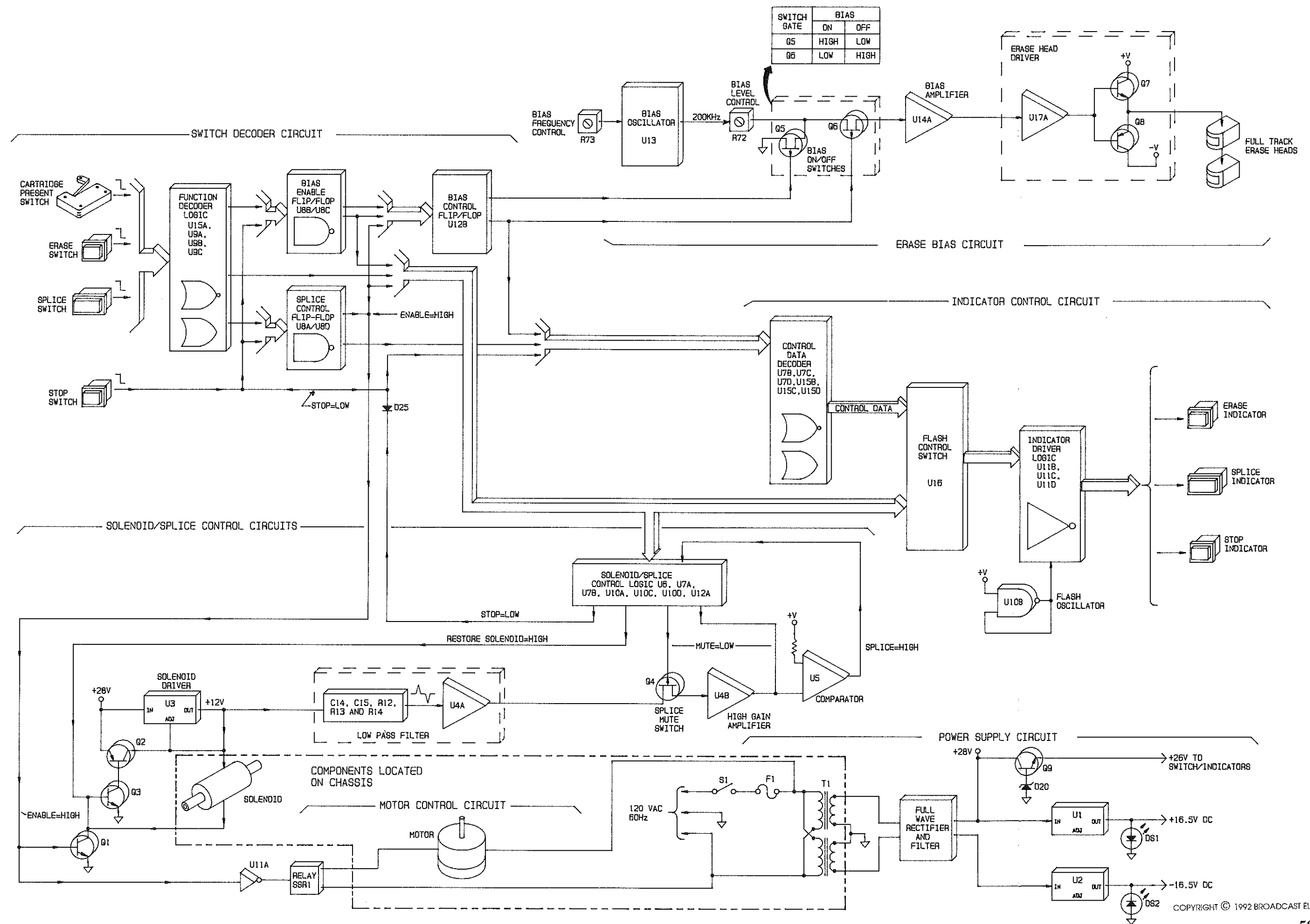


FIGURE 4-1.
ST-90 SIMPLIFIED SCHEMATIC
4-3/4-4

SECTION V

MAINTENANCE

5-1. INTRODUCTION.

- 5-2. This section provides general maintenance information, mechanical and electrical adjustment procedures, and troubleshooting information for the Broadcast Electronics ST-90 splice finder/eraser.

5-3. SAFETY CONSIDERATIONS.

- 5-4. Low voltages are used throughout the ST-90 logic/control circuit board assembly. Maintenance with power energized is always considered hazardous and caution should be observed. Good judgment, care, and common sense must be practiced to prevent accidents. The procedures contained in this section should be performed only by experienced and trained maintenance personnel.

5-5. FIRST LEVEL MAINTENANCE.

- 5-6. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a maintenance log.



WARNING

DISCONNECT PRIMARY POWER TO THE ST-90 BEFORE ATTEMPTING ANY EQUIPMENT MAINTENANCE.

WARNING

5-7. GENERAL.

- 5-8. Periodically remove abrasions from the ST-90 chassis with a cloth moistened with a mild household cleaner. Remove dust from the chassis exterior with a brush and vacuum cleaner as required.

5-9. ELECTRICAL.

- 5-10. The ST-90 logic/control circuit board should be periodically cleaned of accumulated dust using a soft brush and vacuum cleaner. Check the circuit boards for improperly seated semiconductors and components damaged by overheating.

5-11. MECHANICAL.



WARNING

MOST SOLVENTS WHICH REMOVE TAPE RESIDUE ARE VOLATILE AND TOXIC BY NATURE AND MUST BE APPLIED IN SMALL AMOUNTS IN A WELL VENTILATED AREA. OBSERVE THE SOLVENT CONTAINER SAFETY INFORMATION AND DO NOT USE THE SOLVENT NEAR FLAME, CIGARETTES, AND HOT SOLDERING IRONS.

WARNING



WARNING

WARNING

- 5-12. Each day clean the heads, tape guides, pressure roller, and capstan shaft with a cleaning solvent to remove accumulated oxide. Recommended cleaning solvents include:
1) Broadcast Electronics head cleaning kit 979-0064 and 2) isopropyl alcohol.

- 5-13. Approximately once a week, demagnetize the heads and other ferrous components in the tape path. Perform the demagnetizing with an appropriate degausser. Observe the degausser operating instructions to prevent damage to the heads.
- 5-14. **SECOND LEVEL MAINTENANCE.**
- 5-15. Second level maintenance consists of procedures required to restore an ST-90 to operation after a fault has occurred. The procedures are divided into mechanical adjustments, electrical adjustments, mechanical component replacement procedures, electrical component replacement procedures, and troubleshooting.
- 5-16. The ST-90 maintenance philosophy consists of isolating a problem to a specific assembly with subsequent troubleshooting to isolate defective components. The defective components may be repaired locally or the entire assembly may be returned to Broadcast Electronics, Inc. for repair or replacement.
- 5-17. **MECHANICAL ADJUSTMENTS.**
- 5-18. The following text provides adjustment procedures for mechanical components associated with the ST-90. The procedures are presented in the following order.

ADJUSTMENT PROCEDURES

- A. Motor Alignment Procedure.
 - B. Solenoid Response Adjustment.
 - C. Head Adjustments.
- 5-19. The following test equipment is required for the mechanical adjustment procedures. Refer to the following list as required for each procedure.

TEST EQUIPMENT

- A. Tape Head and Tape Guide Alignment Gauge (BE P/N 300-0002).
 - B. Motor Alignment Gauge (BE P/N 836-0005).
 - C. Allen Wrenches (supplied with the ST-90).
 - D. Tape Alignment Cut-Away Test Cartridge (BE P/N 710-0132).
 - E. No. 2 Phillips Screwdriver, 4 Inch (10.2 cm) Blade.
- 5-20. **MOTOR ALIGNMENT PROCEDURE.** The deck pressure roller operates in conjunction with the motor capstan shaft to provide tape movement. The pressure roller and the motor capstan shaft must be properly aligned to prevent improper tape movement across the heads.
- 5-21. **Procedure.** To align the capstan motor and deck solenoid, proceed as follows:
- 5-22. Disconnect the primary power to the ST-90.
- 5-23. Manually retract the deck solenoid plunger (refer to Figure 5-1) and remove the pressure roller E-ring, pressure roller, and the nylon washers.
- 5-24. Refer to Figure 5-2 and loosen the two motor mounting screws to allow movement of the motor assembly.
- 5-25. Refer to Figure 5-3A and place motor alignment gauge 836-0005 on the deck pressure roller shaft.

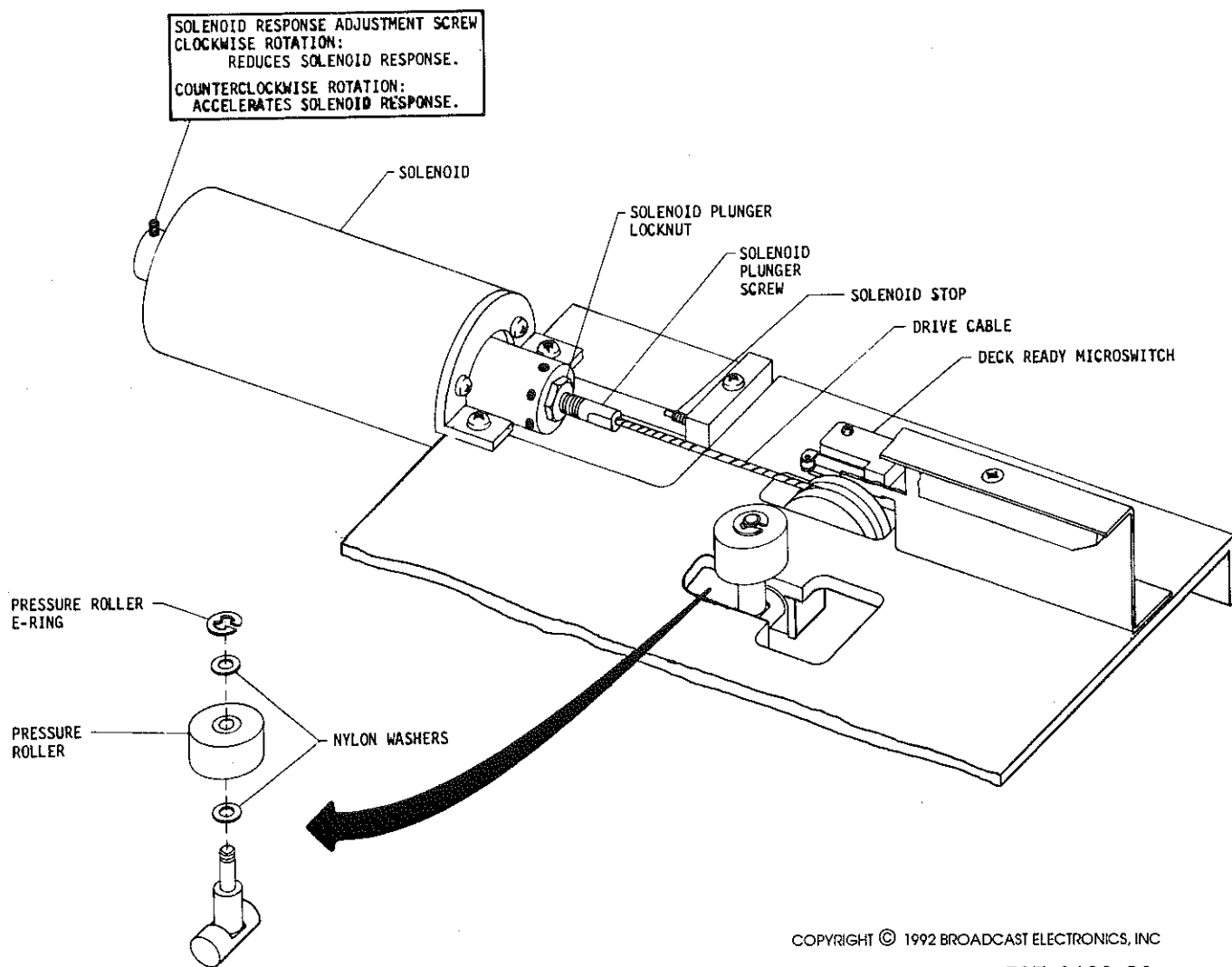


FIGURE 5-1. CARTRIDGE DECK ASSEMBLY

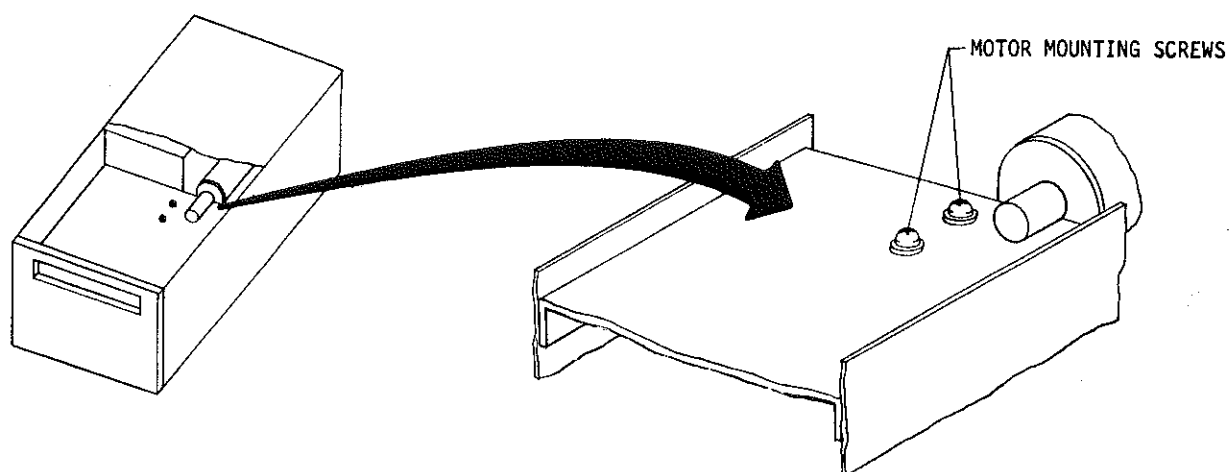
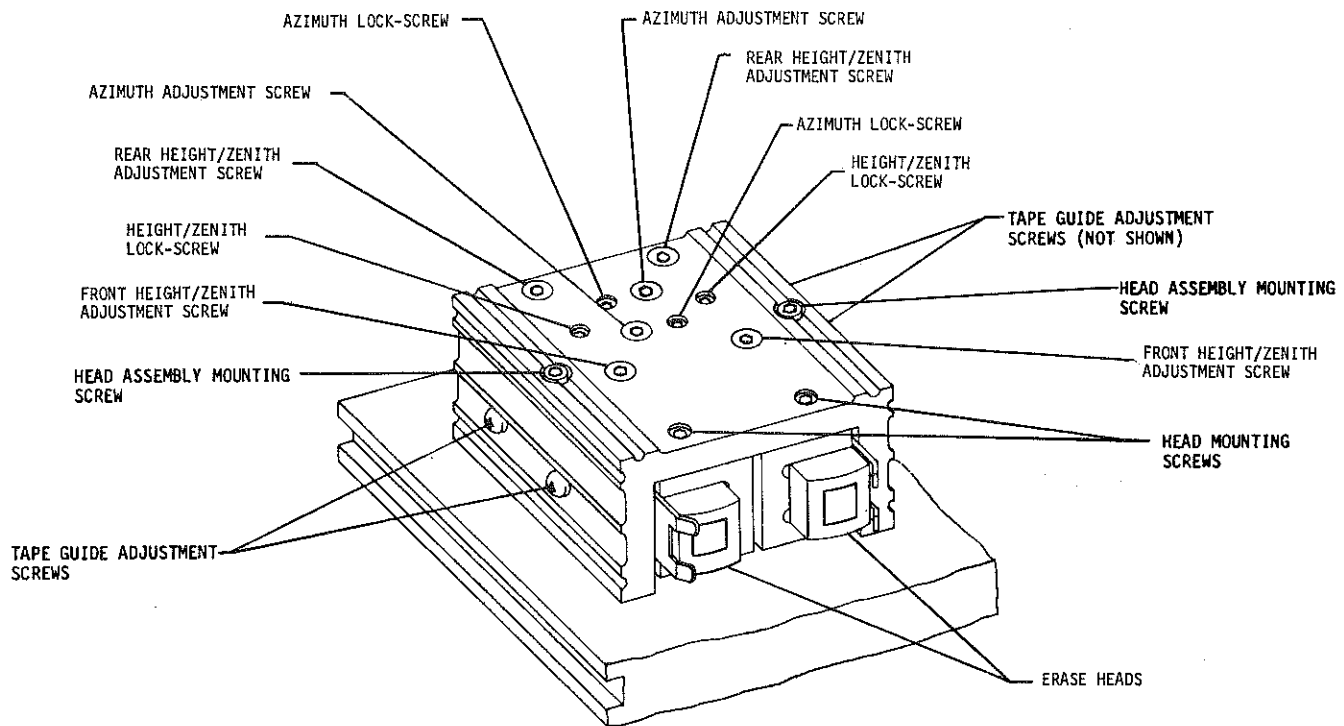


FIGURE 5-2. MOTOR MOUNTING SCREWS



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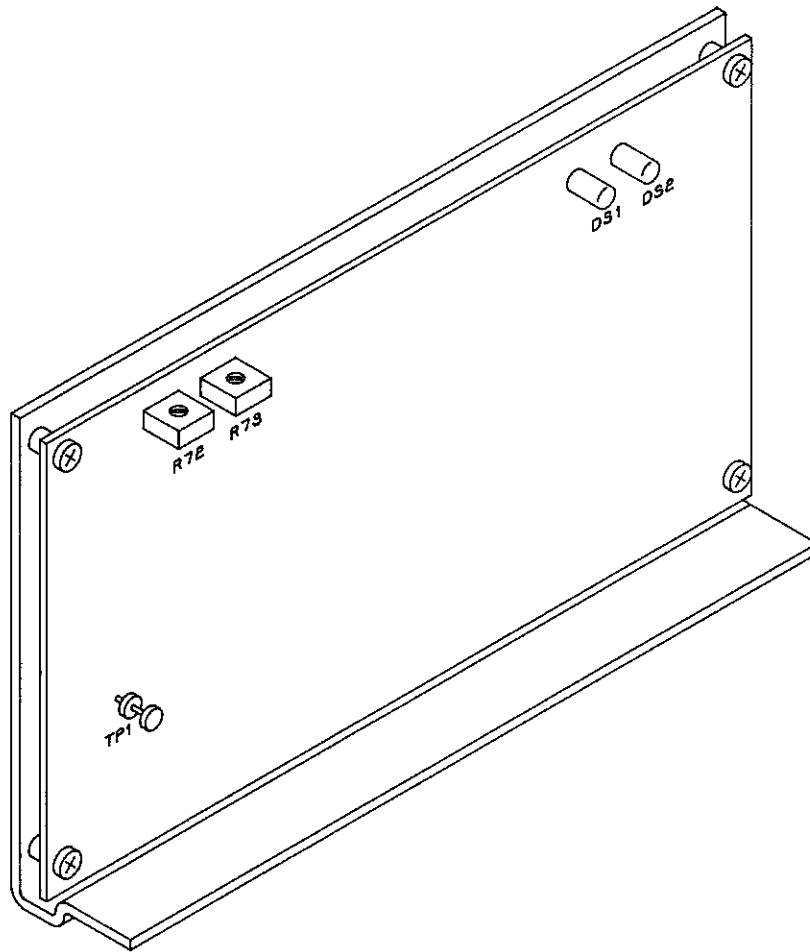
FIGURE 5-5. HEAD ADJUSTMENT CONTROLS

- 5-61. Refer to Figure 5-5 and loosen the head azimuth lock-screw.
- 5-62. Refer to Figure 5-5 and adjust the head azimuth screw until the bottom of the head is parallel with the deck.
- 5-63. Secure the head azimuth lock-screw.
- 5-64. **ELECTRICAL ADJUSTMENTS.**
- 5-65. The following tools and test equipment are required for the electrical adjustment procedures.
 - A. Insulated Non-Metallic adjustment Tool.
 - B. Frequency counter.
 - C. Calibrated Oscilloscope.
 - D. Blank Cartridge.
- 5-66. **BIAS FREQUENCY ADJUSTMENT.** Potentiometer R73 on the logic/control circuit board adjusts the erase bias frequency. The bias frequency is adjusted as follows.
- 5-67. **Procedure.** To adjust bias frequency control R73, proceed as follows:
- 5-68. Disconnect the ST-90 primary power and remove the top-panel.
- 5-69. Refer to Figure 5-6 and connect a frequency counter between TP1 and ground.

- 5-70. Insert a blank cartridge into the deck and operate the ST-90 in the erase mode.
- 5-71. Refer to Figure 5-6 and adjust R73 for 180 kHz \pm 50 Hz as indicated on the frequency counter.
- 5-72. Disconnect the ST-90 primary power, remove the test equipment, and replace the top-panel.
- 5-73. **BIAS LEVEL ADJUSTMENT.** Potentiometer R72 on the logic/control circuit board adjusts the bias level. The bias level is adjusted as follows.
- 5-74. **Procedure.** To adjust bias level control R72, proceed as follows:
- 5-75. Refer to the **BIAS FREQUENCY ADJUSTMENT** procedure in the preceding text and calibrate the bias frequency.
- 5-76. Disconnect the ST-90 primary power and remove the top-panel.
- 5-77. Refer to Figure 5-6 and connect an oscilloscope between TP1 and ground.
- 5-78. Insert a blank cartridge into the deck and operate the ST-90 in the erase mode.
- 5-79. Refer to Figure 5-6 and adjust R72 for 550 mV p-p as indicated on the oscilloscope.
- 5-80. Disconnect the ST-90 primary power, remove the test equipment, and replace the top-panel.
- 5-81. **MECHANICAL PARTS REPLACEMENT PROCEDURES.**
- 5-82. The following text provides mechanical parts replacement procedures. The procedures are presented in the following order.
- A. Pressure Roller Replacement.
 - B. Head Replacement.
 - C. Motor Replacement.
- 5-83. The following equipment is required for the replacement procedures. Refer to the list as required for each procedure.

EQUIPMENT

- A. No. 2 Phillips Screwdriver, 4 Inch (10.2 cm) Blade.
 - B. Needle-nose pliers.
 - C. Allen Wrenches (located in accessory parts kit).
- 5-84. **PRESSURE ROLLER REPLACEMENT PROCEDURE.** To replace a splice finder/eraser pressure roller, proceed as follows:
- 5-85. Disconnect the ST-90 primary power.
- 5-86. Refer to Figure 5-1 and manually retract the solenoid plunger.
- 5-87. Remove the pressure roller E-ring, the pressure roller, and the nylon washers (refer to Figure 5-1).
- 5-88. Refer to Figure 5-1 and replace the washers, the pressure roller, and the pressure roller E-ring.

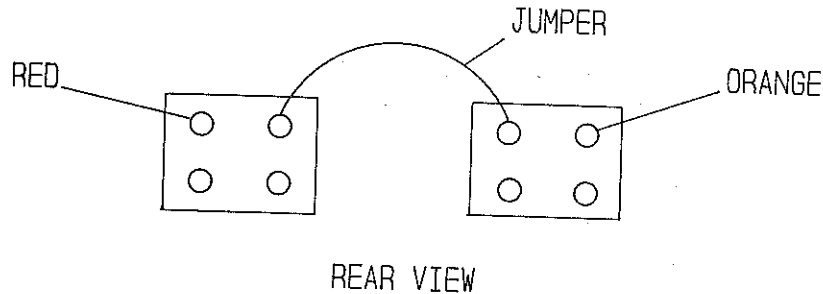


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FIGURE 5-6. CIRCUIT BOARD CONTROLS AND TEST POINTS

- 5-89. Check the pressure roller indentation by performing the **PRESSURE ROLLER INDENTATION ADJUSTMENT** procedure.
- 5-90. **HEAD REPLACEMENT.** To replace a tape head, proceed as follows:
- 5-91. Disconnect the ST-90 primary power.
- 5-92. Loosen the head assembly mounting screws (refer to Figure 5-5) and remove the entire head assembly from the cartridge deck.
- 5-93. Refer to Figure 5-5 and loosen the defective tape head mounting screw.
- 5-94. Remove the defective head from the head assembly and disconnect the head leads.
- 5-95. Refer to Figure 5-7 and connect the head leads to the replacement head as shown.
- 5-96. Firmly seat the replacement head into the head assembly and secure the mounting screw.
- 5-97. Replace the head assembly and secure the mounting screws.
- 5-98. Align the head by performing all the **HEAD ADJUSTMENT** procedures.



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FIGURE 5-7. HEAD WIRING DIAGRAM

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- 5-99. **MOTOR REPLACEMENT.** To replace the capstan motor, proceed as follows:
- 5-100. Disconnect the ST-90 primary power.
- 5-101. Remove the top-panel and bottom-panel.
- 5-102. Place the ST-90 on a side-panel.
- 5-103. Refer to drawing SD950-9020 in **SECTION VII, DRAWINGS** and disconnect the motor leads from terminal block TB-1 and motor starting capacitor C1.
- 5-104. Refer to Figure 5-2 and locate the motor mounting screws. While supporting the motor, remove the motor mounting screws and carefully remove the motor from the chassis.



CAUTION
CAUTION

***EXERCISE CARE WHEN HANDLING THE MOTOR
TO AVOID DAMAGING THE BEARINGS. NEVER
HANDLE THE MOTOR BY THE CAPSTAN SHAFT.***

- 5-105. Carefully insert the new motor into the ST-90 chassis and replace the motor mounting screws. Do not tighten the motor mounting screws at this time.
- 5-106. Refer to drawing SD950-9020 in **SECTION VII, DRAWINGS**, and reconnect the motor leads to terminal block TB-1 and motor starting capacitor C1.
- 5-107. Align the motor by performing the **MOTOR ALIGNMENT PROCEDURE** described in the preceding text.
- 5-108. Replace the ST-90 top-panel and bottom-panel.
- 5-109. **TROUBLESHOOTING.**
- 5-110. Low voltages are used throughout the ST-90 logic/control circuitry. The power supply assembly contains primary ac line voltage. Therefore, do not perform any maintenance or troubleshooting procedures on the power supply circuitry with power energized. Troubleshooting with power energized is always considered hazardous and caution should be observed. Good judgment, care, and common sense must be practiced to prevent accidents.
- 5-111. The troubleshooting philosophy for the ST-90 consists of isolating a problem to a specific circuit. The problem may be isolated by referencing the following information and Table 5-1 which presents the ST-90 splice finder/eraser troubleshooting.

TABLE 5-1. ST-90 TROUBLESHOOTING

SYMPTOM	DEFECT
NO SOLENOID, MOTOR, AND INDICATOR OPERATION	1. Check line fuse F1.
NO MOTOR OPERATION	1. Check the capstan motor. 2. Check motor relay SSR1. 3. Check inverter U11A.
NO SOLENOID OPERATION	1. Check transistor switch Q1. 2. Check transistor Q2. 3. Check the solenoid.
NO ERASER OPERATION	1. Check transistor switches Q5 and Q6. 2. Check integrated circuits U13, U14A, U17A, and transistors Q7 and Q8. 3. Check the erase heads.
NO SPLICE FINDER OPERATION	1. Check splice mute switch Q4. 2. Check integrated circuits U6, U7A, U7B, U10A, U10B, U10C, and U12A. 3. Check operational amplifiers U4 and U5.
NO INDICATOR FLASH OPERATION	1. Check integrated circuit U10B.



WARNING

WARNING

DISCONNECT PRIMARY POWER TO THE ST-90 BEFORE REMOVING OR INSERTING PRINTED CIRCUIT BOARDS OR REPLACING ANY COMPONENTS.



CAUTION

CAUTION

INADVERTENT CONTACT BETWEEN ADJACENT COMPONENTS OR CIRCUIT BOARDS WITH TEST EQUIPMENT MAY CAUSE SERIOUS DAMAGE TO THE ST-90.

- 5-112. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire device may be returned to Broadcast Electronics Inc. for re-pair or replacement.



WARNING

WARNING

DISCONNECT POWER BEFORE REMOVING OR REPLACING CIRCUIT BOARDS OR COMPONENTS.



CAUTION

CAUTION

WHEN REPLACING A COMPONENT MOUNTED ON A HEATSINK, ENSURE A THIN FILM OF A ZINC-BASED HEATSINK COMPOUND IS USED TO ASSURE GOOD HEAT DISSIPATION.

- 5-113. **COMPONENT REPLACEMENT.** The circuit board used in the ST-90 is double-sided with plated-through holes. Due to the plated-through hole design, solder fills the holes by capillary action. This condition requires that defective components be removed carefully to avoid damage to the circuit board.
- 5-114. On all circuit boards, the adhesion between the copper trace and the circuit board fails at almost the same temperature as solder melts. A circuit board trace can be destroyed by excessive heat or lateral movement during soldering. Use of a small soldering iron with steady pressure is required for circuit board repairs.
- 5-115. To remove a soldered component from a circuit board, cut the leads from the body of the defective component while the device is still soldered to the board. Grip a component lead with needle-nose pliers. Touch the soldering iron to the lead at the solder connection on the circuit side of the board. When the solder begins to melt, push the lead through the back side of the board and cut off the clinched end of the lead. Each lead may now be heated independently and pulled out of each hole. The holes may be cleared by careful re-heating with a low wattage iron and removing the residual solder with a soldering vacuum tool.
- 5-116. Install the new component and apply solder from the circuit side of the board. If no damage has been incurred to the plated-through holes, soldering of the component side of the board will not be required.



WARNING

WARNING

MOST SOLVENTS WHICH REMOVE ROSIN FLUX ARE VOLATILE AND TOXIC BY NATURE AND SHOULD BE USED ONLY IN SMALL AMOUNTS IN A WELL VENTILATED AREA AWAY FROM FLAME, CIGARETTES, AND HOT SOLDERING IRONS.



WARNING

WARNING

OBSERVE THE MANUFACTURERS CAUTIONARY INSTRUCTIONS.

- 5-117. After soldering, remove residual flux with a suitable solvent. Rubbing alcohol is highly diluted and is not effective.
- 5-118. The board should be checked to ensure the flux has been completely removed. Rosin flux is not normally corrosive, however in time, the flux will absorb enough moisture to become conductive and create problems.
- 5-119. **INTEGRATED CIRCUITS.** Special care should be exercised with integrated circuits. Each integrated circuit must be installed by matching the integrated circuit notch with the notch on the socket. Do not attempt to remove an integrated circuit from a socket with your fingers. Use an integrated circuit puller to lightly pry the component from the socket.

SECTION VI

PARTS LISTS

6-1. INTRODUCTION.

- 6-2. This section provides descriptions and part numbers of electrical components, assemblies, and selected mechanical parts required for maintenance of the Broadcast Electronics ST-90 splice finder/eraser. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram. Table 6-1 presents the ST-90 replaceable parts list index.

TABLE 6-1. REPLACEABLE PARTS LIST INDEX

TABLE	DESCRIPTION	PART NO.	PAGE
6-2	ST-90 SPLICE FINDER/ERASER ASSEMBLY	900-9120-000/ -300	2
6-3	ST-90 LOGIC CIRCUIT BOARD ASSEMBLY	950-9020	2
6-4	ACCESSORY KIT	979-0085	5
6-5	HEAD BOX ASSEMBLY	950-0302	5
6-6	CABLE ASSEMBLY	940-9120	5

TABLE 6-2. ST-90 SPLICE FINDER/ERASER ASSEMBLY - 900-9120-000/-300
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
E1 THRU E7, E9,E10	Turret Terminal, Double Shoulder	413-1597	9
L1,L2	Head, Full Track Erase, Model B771701 Inductance at 1 kHz: 0.12 mH Impedance at 100 kHz: 65 Ohms DC Resistance: 0.65 Ohms	250-0011	2
P2	Plug, Housing, 4-Pin	418-0240	1
S1	Switch, Pushbutton, Rectangular, Momentary Contact, Illuminated (SPLICE)	340-0103	1
S2,S3	Switch, Pushbutton, Square, Momentary Contact, Illuminated (STOP and ERASE)	340-0104	2
T1	Transformer, Power Dual Primary: 120V, 50/60 Hz Dual Secondary: 25V @ 1 Ampere	376-7675	1
—	Relay, Solid State	270-0061	1
—	Solenoid, Coil, 32V dc, 1000V RMS, 60 Hz, 1.75 Inches Diameter, Resistance: 37.5 Ohms ±10%	280-0003	1
—	Lamp, Wedge-base, No. 85, 28V @ 0.04 Ampere	321-0085	3
—	Switch Cap, Yellow, Square (STOP)	340-0014	1
—	Switch Cap, Green, Rectangular (SPLICE)	340-0089	1
—	Switch Cap, Red, Square (ERASE)	343-0043	1
—	Switch, Micro, Roller Actuator, SPDT, 5 Amperes @ 125V ac	346-0027	1
—	Switch, Miniature Toggle, SPDT, 5A @ 120V ac or 2A @ 250V ac	348-7101	1
—	Motor, Synchronous, 117V, 60 Hz, 1800 RPM @ 5.0 oz-in	384-0000-4	1
----	Fuse Holder	415-2012	1
----	Connector, Power, AC Input	418-0042	1
----	Pins, Connector	417-0053	3
----	Pins, Crimp Type	417-8766	2
----	Pressure Pad, Cartridge Guide	459-0123	2
----	Pressure Roller	404-0001-009	1
----	Pressure Roller Shaft	459-0081-1	1
—	Pressure Roller Cross Shaft	446-0059	1
—	Cartridge Guide, Left	445-0008	1
—	Cartridge Guide, Right	445-0006	1
—	Retainer, "E" Ring	454-3318	1
—	Blank Front Panel Circuit Board	510-9002	1
—	Cable Assembly	940-9120	1
—	Head Box Assembly	950-0302	1
—	Control Logic Circuit Board Assembly	950-9020	1

TABLE 6-2. ST-90 SPLICE FINDER/ERASER ASSEMBLY - 900-9120-000/-300
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Accessory Kit	979-0085	1
ADDITIONAL PARTS FOR - 900-9020-000			
F1	Fuse, AGC, 250V, 1/2 Ampere	330-0050	1
ADDITIONAL PARTS FOR - 900-9020-300			
F1	Fuse, AGC, 250V, 1/4 Ampere	330-0025	1

TABLE 6-3. ST-90 LOGIC CIRCUIT BOARD ASSEMBLY - 950-9020
(Sheet 1 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1, C2	Capacitor, Electrolytic, 2200 uF, 35V	014-2293	2
C3 THRU C10	Capacitor, Electrolytic, 10 uF, 35V	023-1076	8
C11	Capacitor, Electrolytic, 1 uF, 10V	024-1064	1
C12	Capacitor, Electrolytic, 2.2 uF, 25V	013-2064	1
C13	Capacitor, Polyester, 0.47 uF, ±10%, 100V	038-4753	1
C14	Capacitor, Mylar, 0.22 uF ±10%, 100V	030-2253	1
C15	Capacitor, Mylar, 0.01 uF ±10%, 100V	031-1043	1
C16	Capacitor, Mylar, 0.22 uF ±10%, 100V	030-2253	1
C17, C18	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C19	Capacitor, Electrolytic, 10uF, 35V	023-1076	1
C20	Capacitor, Silvered Mica, 100 pF ±5%, 500V	040-1022	1
C21	Capacitor, Mylar, 0.22 uF ±10%, 100V	030-2253	1
C22	Capacitor, Electrolytic, 1 uF, 10V	024-1064	1
C23 THRU C25	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C26	Capacitor, Electrolytic, 1 uF, 10V	024-1064	1
C27 THRU C29	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	3
C30	Capacitor, Mylar, 0.01 uF ±10%, 100V	031-1043	1
C31	Capacitor, Electrolytic, 2.2 uF, 25V	013-2064	1
C32	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C33	Capacitor, Mica, 390 pF ±5%, 100V	042-3922	1
C34	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C35, C36	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C37, C38	Capacitor, Electrolytic, 1 uF, 10V	024-1064	2
C39	Capacitor, Mica, 33 uF ±5%, 500V	042-3312	1
C40, C41	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	2
C42, C43	Capacitor, Electrolytic, 100 uF, 25V	023-1083	2
C44	Capacitor, Polyester, 0.0022 uF ±10%, 100V	031-2033	1
C45	Capacitor, Electrolytic, 1 uF, 10V	024-1064	1
C46	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C47	Capacitor, Electrolytic, 4.7 uF, 35V, Low Leakage	024-4753	1

TABLE 6-3. ST-90 LOGIC CIRCUIT BOARD ASSEMBLY - 950-9020
(Sheet 2 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C48 THRU C52	Capacitor, Monolythic Ceramic, 0.1 uF $\pm 20\%$, 50V	003-1054	5
C53	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C54, C55	Capacitor, Monolythic Ceramic, 0.1 uF $\pm 20\%$, 50V	003-1054	2
C56	Capacitor, Electrolytic, 100 uF, 35V	023-1084	1
C57 THRU C59	Capacitor, Mylar, 0.01 uF $\pm 10\%$, 100V	031-1043	1
C60	Capacitor, Monolythic Ceramic, 0.1 uF $\pm 20\%$, 50V	003-1054	1
C61	Capacitor, Electrolytic, 2.2 uF, 50V	020-2264	1
C62	Capacitor, Electrolytic, 4.7 uF, 35V, Low Leakage	024-4753	1
C63, C64	Capacitor, Ceramic, 0.001 uF $\pm 10\%$, 200V	030-1033	2
C65 THRU C68	Capacitor, Monolythic Ceramic, 0.1 uF $\pm 20\%$, 50V	003-1054	4
C69	Capacitor, Ceramic, 0.001 uF $\pm 10\%$, 200V	030-1033	1
D1 THRU D4	Diode, MR502, Silicon, 200V, 3 Amperes	202-0502	4
D5	Diode, Silicon, 600V, 1 Ampere	203-4005	1
D6 THRU D12	Diode, 1N4848, Silicon, 75V, 0.3 Ampere	203-4148	7
D13	Diode, Silicon, 600V, 1 Ampere	203-4005	1
D14 THRU D19	Diode, 1N4848, Silicon, 75V, 0.3 Ampere	203-4148	6
D20	Diode, 1N4750A, Zener, 27V $\pm 10\%$, 1 Watt	200-0027	1
D21 THRU D28	Diode, 1N4848, Silicon, 75V, 0.3 Ampere	203-4148	8
DS1, DS2	Indicator, LED, Green, 521-9175, 3V, 40 mA Maximum	323-9224	2
J1	Receptacle, Male, 20-Pin In-line	417-0200	1
J2	Socket, 4-Pin	418-0255	1
J3 THRU J5	Receptacle, Single Pin	417-0071-001	3
Q1	Transistor, TIP120, Silicon, NPN, Darlington, TO-220 Case	210-0120	1
Q2	Transistor, TIP125, Silicon, PNP, Darlington, TO-220 Case	210-0125	1
Q3	Transistor, 2N3904, NPN, Silicon, TO-92 Case	211-3904	1
Q4	Field Effect Transistor, J270, P-Channel JFET, TO-92 Case	211-0270	1
Q5, Q6	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	211-0271	2
Q7	Transistor, TIP31A, Silicon, NPN, TO-220 AB Case	219-0031	1
Q8	Transistor, TIP32A, Silicon, NPN, TO-220 AB Case	219-0032	1
Q9	Transistor, TIP31A, Silicon, NPN, TO-220 AB Case	219-0031	1
R1, R2	Resistor, 1.5 k Ohm $\pm 1\%$, 1/4W	103-1504	2
R3, R4	Resistor, 124 Ohm $\pm 1\%$, 1/4W	103-1243	2
R5	Resistor, 2.26 k Ohm $\pm 1\%$, 1/4W	103-2264	1
R6	Resistor, 5 Ohm $\pm 1\%$, 1/W, WW	120-5011	1
R7	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R8, R9	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	2

TABLE 6-3. ST-90 LOGIC CIRCUIT BOARD ASSEMBLY - 950-9020
(Sheet 3 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R10	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R11	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R12	Resistor, 49.9 k Ohm $\pm 1\%$, 1/4W	103-4951	1
R13	Resistor, 499 k Ohm $\pm 1\%$, 1/4W	103-4996	1
R14	Resistor, 90.9 k Ohm $\pm 1\%$, 1/4W	103-9095	1
R15	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R16	Resistor, 22 Meg Ohm $\pm 5\%$, 1/4W	100-2283	1
R17	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	1
R18	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R19	Resistor, 10 Meg Ohm $\pm 5\%$, 1/4W	100-1083	1
R20	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R21	Resistor, 220 k Ohm $\pm 5\%$, 1/4W	100-2263	1
R22	Resistor, 33 k Ohm $\pm 5\%$, 1/4W	100-3353	1
R23	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R24	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R25	Resistor, 470 k Ohm $\pm 5\%$, 1/4W	100-4763	1
R26 THRU R30	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	5
R31 THRU R33	Resistor, 1.5 k Ohm $\pm 5\%$, 1/4W	100-1543	3
R34	Resistor, 51 k Ohm $\pm 5\%$, 1/4W	100-5153	1
R35 THRU R37	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	3
R38	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	1
R39	Resistor, 100 Ohm $\pm 5\%$, 1/4W	100-7533	1
R40 THRU R42	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	3
R43	Resistor, 5.1 k Ohm $\pm 5\%$, 1/4W	100-5143	1
R44	Resistor, 220 Ohm $\pm 5\%$, 1/4W	100-2233	1
R45	Resistor, 5.1 k Ohm $\pm 5\%$, 1/4W	100-5143	1
R46	Resistor, 330 k Ohm $\pm 5\%$, 1/4W	100-3363	1
R47	Resistor, 470 k Ohm $\pm 5\%$, 1/4W	100-4763	1
R48	Resistor, 25 Ohm $\pm 5\%$, 5W, WW	132-2523	1
R49	Resistor, 330 k Ohm $\pm 5\%$, 1/4W	100-3363	1
R50	Resistor, 470 k Ohm $\pm 5\%$, 1/4W	100-4763	1
R51	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R52	Resistor, 15 k Ohm $\pm 5\%$, 1/4W	100-1553	1
R53, R54	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	2
R55	Resistor, 5.1 k Ohm $\pm 5\%$, 1/4W	100-5143	1
R56, R57	Resistor, 100 Ohm $\pm 5\%$, 1/4W	100-1033	2
R58	Resistor, 5.1 k Ohm $\pm 5\%$, 1/4W	100-5143	1
R59	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R60	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R61	Resistor, 1 Ohm $\pm 5\%$, 1W	120-1013	1
R62	Resistor, 470 k Ohm $\pm 5\%$, 1/4W	100-4763	1
R63	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	1
R64 THRU R69	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	6

TABLE 6-3. ST-90 LOGIC CIRCUIT BOARD ASSEMBLY - 950-9020
(Sheet 4 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R70	Resistor, 470 Ohm $\pm 5\%$, 1/4W	100-4733	1
R71	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	1
R72	Potentiometer, 50 k Ohm $\pm 10\%$, 1/2W	178-5054	1
R73	Potentiometer, 10 k Ohm $\pm 10\%$, 1/2W	178-1054	1
R77, R78	Resistor, 1.8 k Ohm $\pm 5\%$, 1/4W	100-1843	2
R79	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R80	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R81	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R82	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R83	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R84	Resistor, 510 k Ohm $\pm 5\%$, 1/4W	100-5163	1
R85, R86	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	2
R87	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
U1	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, T0-220 Case	227-0317	1
U2	Integrated Circuit, LM337T, Adjustable Negative Voltage Regulator, 1.2V to 37V, 1.5 Ampere, T0-220 Case	227-0337	1
U3	Integrated Circuit, LM317T, Adjustable Positive Voltage Regulator, 1.2V to 37V, 1.5 Ampere, T0-220 Case	227-0317	1
U4	Integrated Circuit, RC4559NB, Dual JFET-Input Operational Amplifier, 8-Pin Dip	221-4559	1
U5	Integrated Circuit, TL311P, JFET-Differential Comparator, 8-Pin Dip	220-0311	1
U6	Integrated Circuit, MC14528BCP, Dual Monostable Multivibrator, CMOS, 16-Pin Dip	224-4528	1
U7	Integrated Circuit, MC14044BP, Quad NAND R-S Latch, CMOS, 16-Pin Dip	228-4044	1
U8	Integrated Circuit, MC14093BCP, CMOS, NAND Gate, 14-Pin Dip	220-4093	1
U9	Integrated Circuit, CD4071B, OR Gate, CMOS, 14-Pin Dip	225-0005	1
U10	Integrated Circuit, MC14093BCP, CMOS, Quad 2-Input NAND Gate, 14-Pin Dip	220-4093	1
U11	Integrated Circuit, ULN2003A, 7 Section, NPN Darlington Driver, CMOS, 16-Pin Dip	229-2003	1
U12	Integrated Circuit, MC14013BCP, Dual Type Flip-Flop, CMOS, 14-Pin Dip	228-4013	1
U13	Integrated Circuit, XR2206CP, Function Generator, 0.01 Hz to 1 MHz, 16-Pin Dip	229-2206	1

TABLE 6-3. ST-90 LOGIC CIRCUIT BOARD ASSEMBLY - 950-9020
(Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U14	Integrated Circuit, LM318P, Operational Amplifier, 8-Pin Dip	221-0318	1
U15	Integrated Circuit, MC14001, CMOS, Quad 2-Input Nor Gate, 14-Pin Dip	228-4001	1
U16	Integrated Circuit, MC14053B, CMOS, Analog Multiplexer/Demultiplexer, 16-Pin Dip	220-4053	1
U17	Integrated Circuit, LM318P, Operational Amplifier, 8-Pin Dip	221-0318	1
XU4, XU5	Socket, 8-Pin Dip	417-0804	2
XU6, XU7	Socket, 16-Pin Dip	417-1604	2
XU8 THRU XU10	Socket, 14-Pin Dip	417-1404	3
XU11	Socket, 16-Pin Dip	417-1604	1
XU12	Socket, 14-Pin Dip	417-1404	1
XU13	Socket, 16-Pin Dip	417-1604	1
XU14	Socket, 8-Pin Dip	417-0804	1
XU15	Socket, 14-Pin Dip	417-1404	1
XU16	Socket, 16-Pin Dip	417-1604	1
XU17	Socket, 8-Pin Dip	417-0804	1
XU16	Socket, 16-Pin Dip	417-1604	1
XU17	Socket, 8-Pin Dip	417-0804	1

TABLE 6-4. ACCESSORY KIT - 979-0085

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Gauge, Motor Alignment	836-0005	1
—117V 50/60 HZ—			
F1	Fuse, AGC, 250V, 1/2 Ampere	330-0050	1
—	AC Line Cord, N.E.M.A. 3-Wire North American Plug	682-0001	1
—220V 50/60 Hz—			
F1	Fuse, AGC, 250V, 1/4 Ampere	330-0025	1
—	AC Line Cord, CEE 7/7 3-Wire European Plug	682-0003	1

TABLE 6-5. HEAD BOX ASSEMBLY - 950-0302

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Tape Guide	445-0004	2
—	Spring, Head Box	430-0012	6

TABLE 6-3. ST-90 LOGIC CIRCUIT BOARD ASSEMBLY - 950-9020
(Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U14	Integrated Circuit, LM318P, Operational Amplifier, 8-Pin Dip	221-0318	1
U15	Integrated Circuit, MC14001, CMOS, Quad 2-Input Nor Gate, 14-Pin Dip	228-4001	1
U16	Integrated Circuit, MC14053B, CMOS, Analog Multiplexer/Demultiplexer, 16-Pin Dip	220-4053	1
U17	Integrated Circuit, LM318P, Operational Amplifier, 8-Pin Dip	221-0318	1
XU4, XU5	Socket, 8-Pin Dip	417-0804	2
XU6, XU7	Socket, 16-Pin Dip	417-1604	2
XU8 THRU XU10	Socket, 14-Pin Dip	417-1404	3
XU11	Socket, 16-Pin Dip	417-1604	1
XU12	Socket, 14-Pin Dip	417-1404	1
XU13	Socket, 16-Pin Dip	417-1604	1
XU14	Socket, 8-Pin Dip	417-0804	1
XU15	Socket, 14-Pin Dip	417-1404	1
XU16	Socket, 16-Pin Dip	417-1604	1
XU17	Socket, 8-Pin Dip	417-0804	1
XU16	Socket, 16-Pin Dip	417-1604	1
XU17	Socket, 8-Pin Dip	417-0804	1

TABLE 6-4. ACCESSORY KIT - 979-0085

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Gauge, Motor Alignment	836-0005	1
—117V 50/60 HZ—			
F1	Fuse, AGC, 250V, 1/2 Ampere	330-0050	1
—	AC Line Cord, N.E.M.A. 3-Wire North American Plug	682-0001	1
—220V 50/60 Hz—			
F1	Fuse, AGC, 250V, 1/4 Ampere	330-0025	1
—	AC Line Cord, CEE 7/7 3-Wire European Plug	682-0003	1

TABLE 6-5. HEAD BOX ASSEMBLY - 950-0302

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Tape Guide	445-0004	2
—	Spring, Head Box	430-0012	6

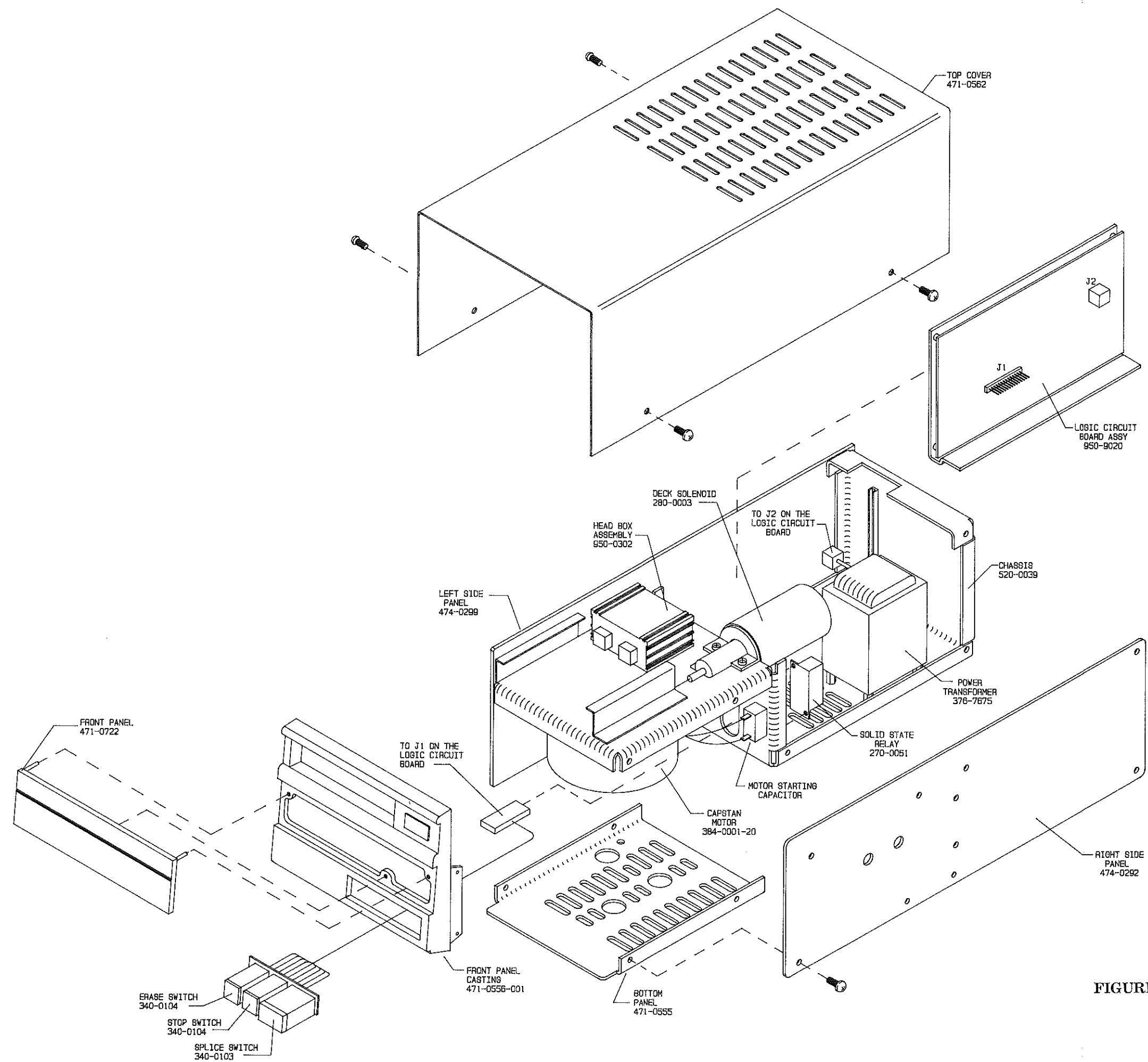
SECTION VII

DRAWINGS

7-1. **INTRODUCTION.**

7-2. This section provides assembly drawings, wiring diagrams, and schematic diagrams as listed below for the Broadcast Electronics ST-90.

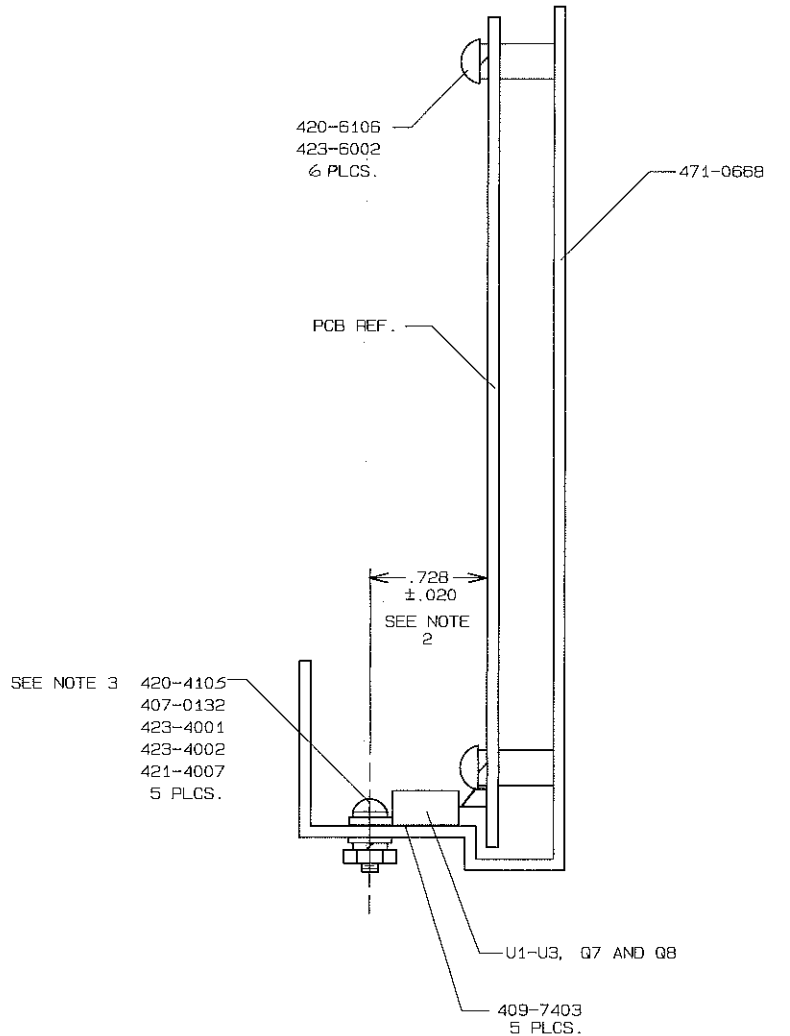
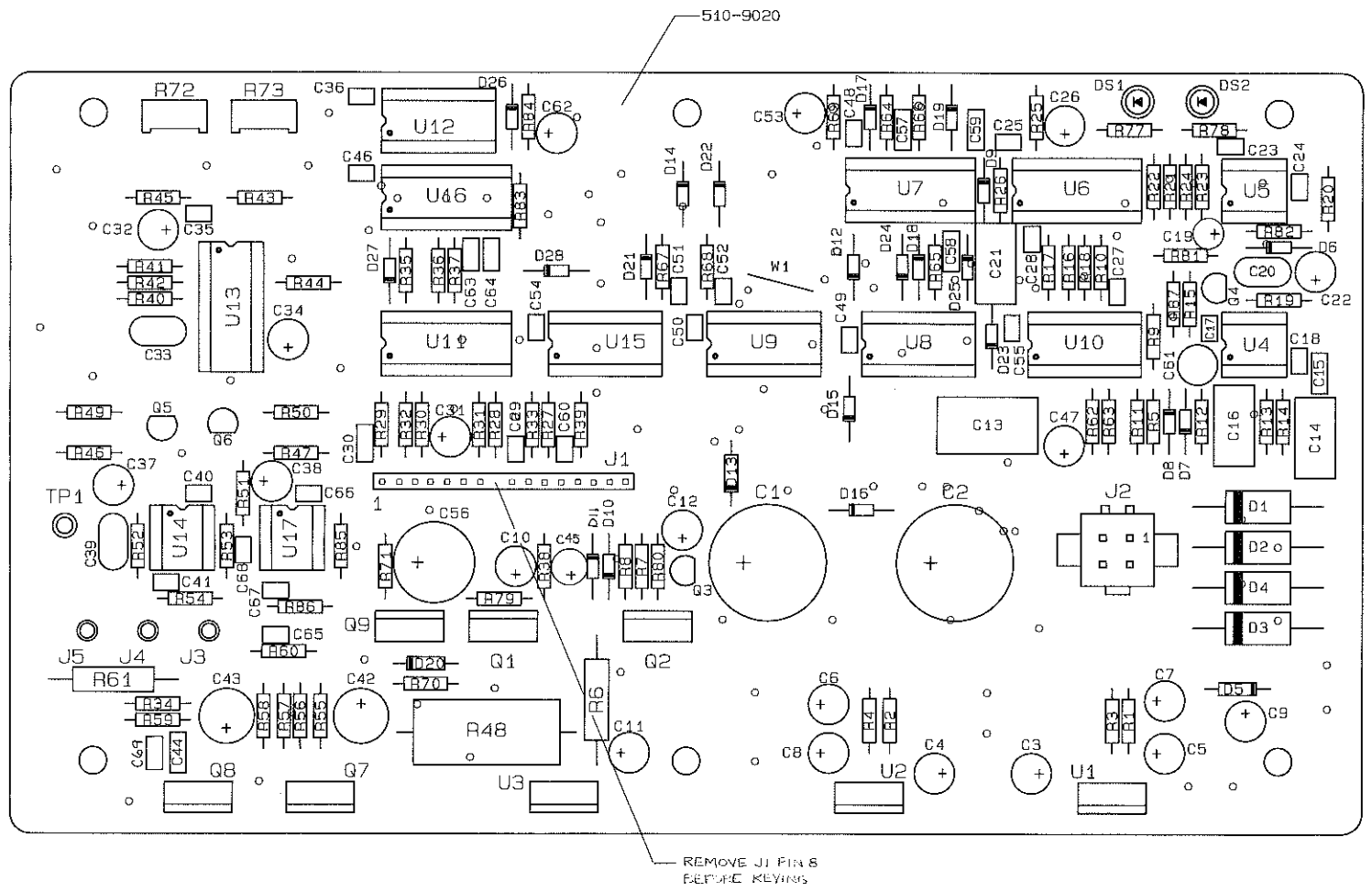
FIGURE	TITLE	NUMBER
7-1	ST-90 SERIES ASSEMBLY DIAGRAM	597-9120-71
7-2	ST-90 LOGIC CIRCUIT BOARD AND OVERALL SCHEMATIC DIAGRAM	SD950-9020
7-3	ST-90 LOGIC CIRCUIT BOARD ASSEMBLY DIAGRAM	AD950-9020
7-4	ST-90 RACK MOUNT INSTALLATION DIAGRAM	597-9100-160



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597-9120-71

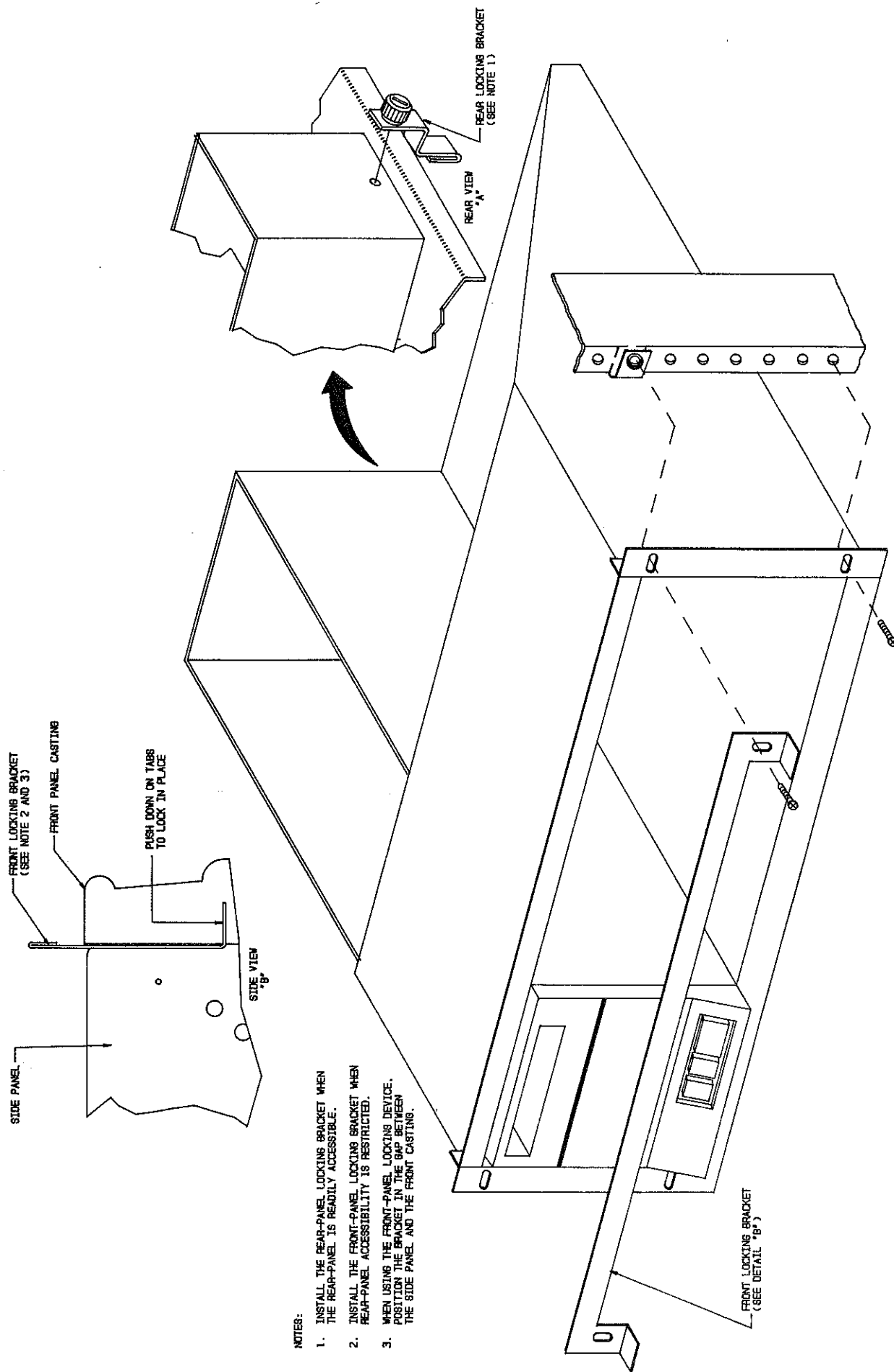
FIGURE 7-1. ST-90 SERIES ASSEMBLY DIAGRAM



- NOTE:
1. SEE SCHEMATIC SD950-9020
 2. U1-U3, Q7 AND Q8 MUST BE LOCATED TO DIMENSION SHOWN BEFORE SOLDERING TO P.C. BOARD.
 3. 420-4105, "5" PLCS. TO BE TORQUED 5-6 IN. LBS.

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OWN BY MERC 8-9-88 CHKD	MATERIAL SEE B/M 950-9020	 BROADCAST ELECTRONICS, INC. 4100 N. 24TH ST., P.O. BOX 3606 GAITHERSBURG, MD 20878-3606 TELE 220142 CABLE BROADCAST FAX 217/224-9600
ME PROJ. ENGR.	FINISH	
DATE 10/1/88	NEXT ASSY	TITLE ASSEMBLY- ERASER/SPLICE FINDER
TOLERANCE DECIMAL U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 9°	MODEL ST90	TYPE A D
SCALE 2/1		REV F
SHEET 1 OF 1		



- NOTES:
1. INSTALL THE REAR-PANEL LOCKING BRACKET WHEN THE REAR-PANEL IS READILY ACCESSIBLE.
 2. INSTALL THE FRONT-PANEL LOCKING BRACKET WHEN REAR-PANEL ACCESSIBILITY IS RESTRICTED.
 3. WHEN USING THE FRONT-PANEL LOCKING DEVICE, POSITION THE BRACKET IN THE GAP BETWEEN THE SIDE PANEL AND THE FRONT CASTING.

FIGURE 7-4. ST-90 SERIES CARTRIDGE MACHINE RACK ASSEMBLY

PRODUCT WARRANTY

LIMITED TWO YEAR

While this warranty gives Purchaser specific legal rights, which terminate two (2) years (one year on turntable, cartridge and blower motors) from the date of shipment, Purchaser may also have other rights which vary state to state.

Broadcast Electronics, Inc. ("Seller") hereby warrants cartridge machines, consoles, and other new Equipment manufactured by Seller against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of two (2) years (one year for turntable, cartridge and blower motors) from the date of shipment, as such term is defined herein. Other manufacturer's and suppliers' Equipment and services, if any, including electronic tubes, solid state devices, transmission line, antennas, towers, related equipment and installation and erection services, shall carry only such manufacturer's or suppliers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. Seller's sole responsibility with respect to any equipment or parts not conforming to this warranty is to replace such equipment or parts upon the return thereof F.O.B. Seller's factory or authorized repair depot within the period aforesaid.

In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that Purchaser is without the services of the Equipment due to its being serviced pursuant to this warranty. The terms of the foregoing warranty shall be null and void if the Equipment has been altered or repaired without specific written authorization of Seller, or if Equipment is operated under environmental conditions or circumstances other than those specifically described in Seller's product literature or instruction manual which accompany the Equipment. Seller shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of Seller.

Seller shall not be liable to Purchaser for any and all incidental or consequential damages for breach of either expressed or implied warranties. However, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to Purchaser. All express and implied warranties shall terminate at the conclusion of the period set forth herein. Any card which is enclosed with the equipment will be used by Seller for survey purposes only.

If the Equipment is described as used, it is sold as is and where is. If the contract covers equipment not owned by Seller at this date, it is sold subject to Seller's acquisition of possession and title.

EXCEPT AS SET FORTH HEREIN, AND EXCEPT AS TO TITLE, THERE ARE NO WARRANTIES, OR ANY AFFIRMATIONS OF FACT OR PROMISES BY SELLER, WITH REFERENCE TO THE EQUIPMENT, OR TO MERCHANTABILITY, FITNESS FOR A PARTICULAR APPLICATION, SIGNAL COVERAGE, INFRINGEMENT, OR OTHERWISE, WHICH EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT ON THE FACE HEREOF.

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