

**FA-2**  
**AUTOMATIC TRANSMITTER**  
**OUTPUT SWITCH CONTROLLER**

**April, 1999**

**IM No. 597-0107-004**

# IMPORTANT INFORMATION

## EQUIPMENT LOST OR DAMAGED IN TRANSIT.

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have: 1) inspected the containers for visible signs of damage and 2) counted the containers and compared with the amount shown on the shipping papers. If a shortage or evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

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Quincy, Illinois 62305  
Telephone: (217) 224-9600  
Fax: (217) 224-9607  
E-Mail: General – [bdcast@bdcast.com](mailto:bdcast@bdcast.com)  
Web Site: [www.bdcast.com](http://www.bdcast.com)

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Broadcast Electronics, Inc. reserves the right to modify the design and specifications of the equipment in this manual without notice. Any modifications shall not adversely affect performance of the equipment so modified.

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# SECTION I

## GENERAL INFORMATION

### 1-1. INTRODUCTION.

1-2. Information presented in this section provides a general description of the FA-2 automatic transmitter output switch controller and lists equipment specifications.

### 1-3. EQUIPMENT DESCRIPTION.

1-4. The Broadcast Electronics FA-2 transmitter output switch controller is specifically designed to automatically transfer the antenna to an alternate transmitter in a main/alternate transmitter system (refer to Figure 1-1). The FA-2 features adjustable switching threshold and delay circuitry, external alarm, remote control and status indication circuitry, and front-panel switch/indicators to indicate the on-air transmitter. In addition, the FA-2 is designed to operate with the alternate transmitter filaments in the energized or deenergized condition (refer to Figure 1-2).



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**FIGURE 1-1. FA-2 AUTOMATIC TRANSMITTER OUTPUT SWITCH CONTROLLER**

1-5. Figure 1-2 presents a typical main/alternate transmitter system installation. The normal RF output power of on-air transmitter A is connected to the antenna through the coaxial output switch. Alternate transmitter B is connected to the dummy load. The FA-2 RF sample circuits will monitor the on-air transmitter output for a failure condition.

1-6. If a fault occurs in the on-air transmitter which exceeds a preset threshold level and delay period, the FA-2 will automatically initiate the following transfer sequence.

- A. Transmitter A high voltage will be deenergized.
- B. If connected, an external alarm will be activated.
- C. The coaxial switch will operate to connect transmitter B to the antenna and transmitter A to the dummy load.
- D. The automatic switching circuitry will be disabled.
- E. When the coaxial switch is correctly positioned, transmitter B high voltage will be energized for on-air operation.

1-7. The FA-2 output switch controller is available in one configuration as follows:

<b>MODEL</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
FA-2	909-0200-004	Transmitter output switch controller with power supply for a main/alternate transmitter system, rack mount, 120 or 240V ac, 50/60 Hz.

1-8. **OPTIONS AND ACCESSORIES.**

1-9. The following is a list of the available options for the FA-2 output switch controller.

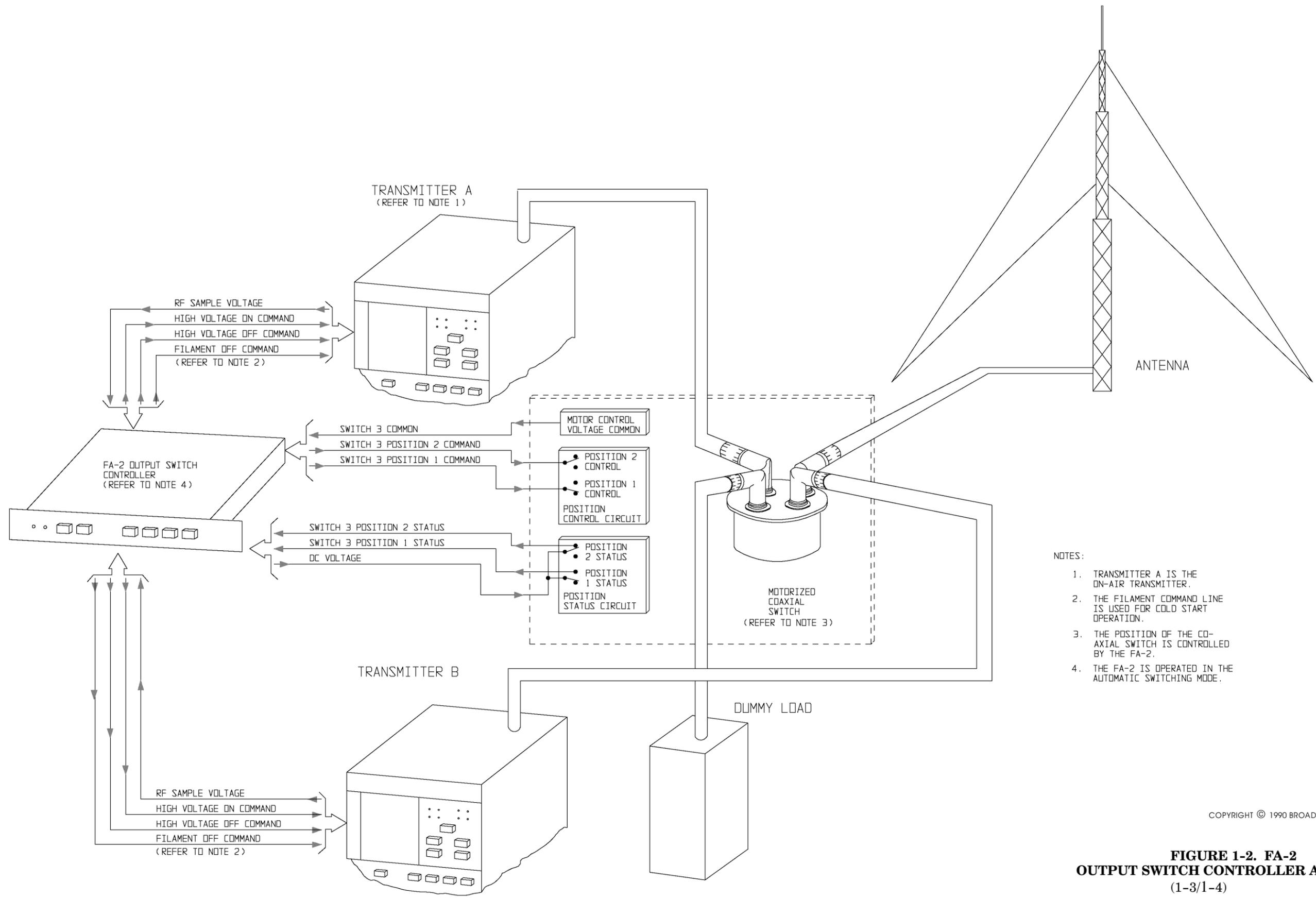
<b>PART NUMBER</b>	<b>DESCRIPTION</b>
961-0003	Optional slide rail kit with mounting hardware.

1-10. **EQUIPMENT SPECIFICATIONS.**

1-11. Refer to Table 1-1 for electrical, physical, and environmental specifications of the FA-2 output switch controller.

**TABLE 1-1. FA-2 ELECTRICAL, PHYSICAL, AND ENVIRONMENTAL SPECIFICATIONS**

<b>PARAMETER</b>	<b>SPECIFICATION</b>
<b>ELECTRICAL</b>	
POWER REQUIRMENTS	120 or 240V ac, 50/60 Hz.
REMOTE INPUTS	Switch or Relay Contact Closure.
REMOTE OUTPUTS	Negative or Positive Logic.
POWER FAILURE THRESHOLD LEVEL	25% to 75% of Total Output Power, Adjustable.
<b>PHYSICAL</b>	
SIZE:	
WIDTH	19 Inches (48.26 cm).
DEPTH	15.625 Inches (39.68 cm).
HEIGHT	3.5 Inches (8.89 cm).
WEIGHT (PACKED)	16 Pounds (7.3 Kg).
<b>ENVIRONMENTAL</b>	
AMBIENT TEMPERATURE RANGE	+14°F to 122°F (-10°C to +50°C).
MAXIMUM HUMIDITY	95%, Non-condensing.
MAXIMUM ALTITUDE	10,000 Feet Above Sea Level (3048 Meters).



- NOTES:
1. TRANSMITTER A IS THE ON-AIR TRANSMITTER.
  2. THE FILAMENT COMMAND LINE IS USED FOR COLD START OPERATION.
  3. THE POSITION OF THE CO-AXIAL SWITCH IS CONTROLLED BY THE FA-2.
  4. THE FA-2 IS OPERATED IN THE AUTOMATIC SWITCHING MODE.

**FIGURE 1-2. FA-2  
OUTPUT SWITCH CONTROLLER APPLICATION**  
(1-3/1-4)

# SECTION II INSTALLATION

## 2-1. INTRODUCTION.

2-2. This section contains information required for the installation and preliminary checkout of the Broadcast Electronics FA-2 automatic transmitter output switch controller.

## 2-3. UNPACKING.

2-4. The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the transmitter output switch controller. 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 if the unit is damaged electrically or mechanically, notify both the carrier and Broadcast Electronics, Inc.

## 2-6. INSTALLATION.

2-7. Each FA-2 output switch controller is operated, tested, and inspected at the factory prior to shipment and is ready for installation when received. Prior to installation, this publication should be studied to obtain a thorough understanding of the operation, circuitry, nomenclature, and installation requirements. Installation is accomplished as follows: 1) preliminary installation, 2) placement, 3) wiring, 4) power supply connections, 5) initial checkout and 6) installation adjustments.

## 2-8. PRELIMINARY INSTALLATION.



**WARNING**      ***ENSURE ALL FA-2 PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.***

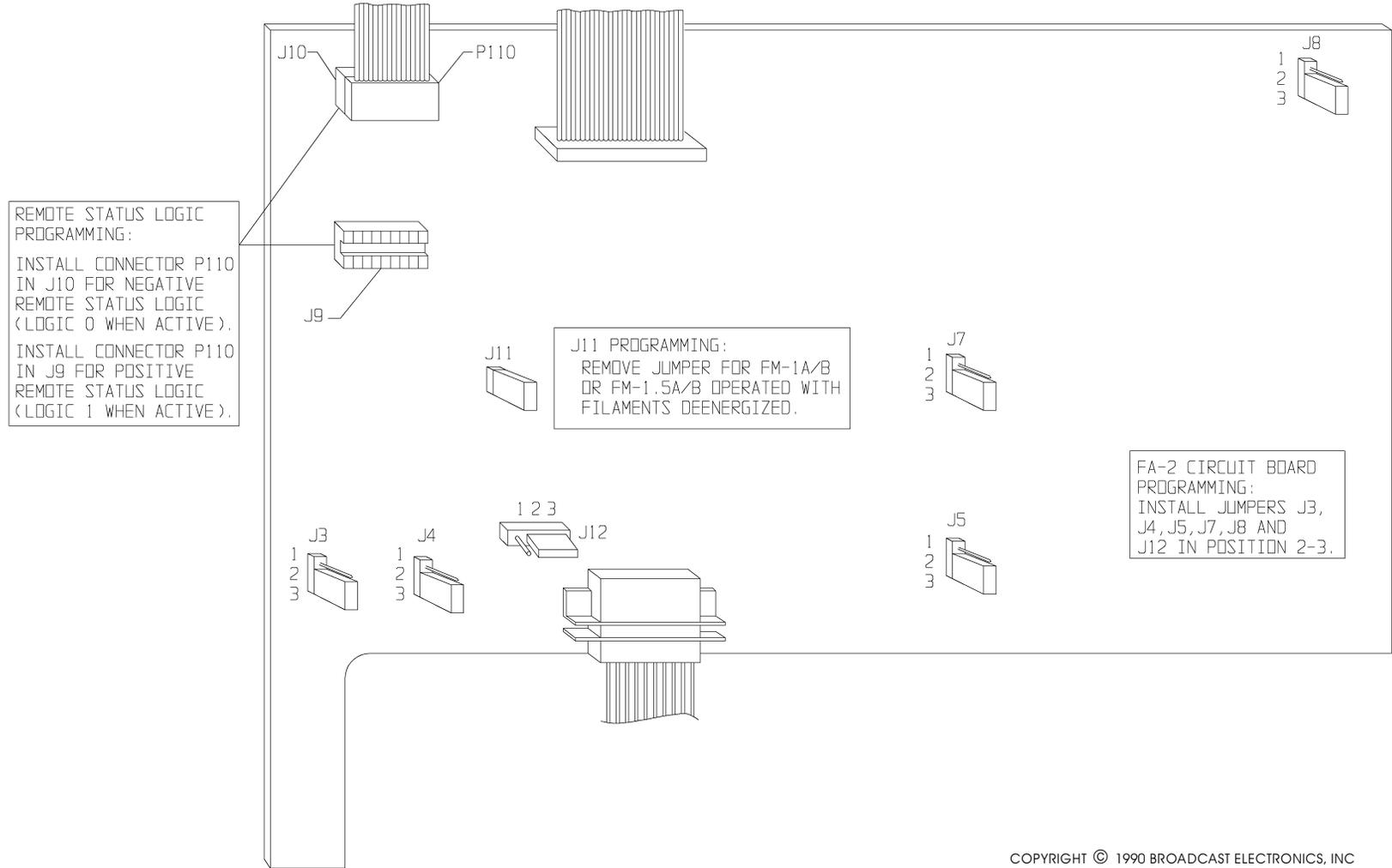
**WARNING**

2-9. Refer to the following information and perform the preliminary installation procedures. The procedures will require the unit be placed on a work surface with the top-panel removed. After completion of the procedures, replace the unit top-panel.

2-10. **CIRCUIT BOARD PROGRAMMING CHECK.** The FA-2 automatic output switch controller circuit boards are factory programmed during final test. To assure the circuit board jumpers have not become dislodged or changed during shipment, refer to Figure 2-1 and check the position of each jumper. Programmable jumpers J3, J4, J5, J7, J8, and J12 must be installed in position 2-3.

2-11. Programmable jumper J11 must be removed when an FM-1A/B or FM-1.5A/B transmitter is operated with the filaments in the deenergized condition during a transfer operation. Refer to Figure 2-1 and program J11 as required.

2-12. **REMOTE CONTROL LOGIC PROGRAMMING.** The FA-2 is equipped with programmable remote status logic. The circuitry provides either positive or negative logic for remote status indications. Positive Logic provides +15 Volts when active. Negative Logic provides a ground when active. The status lines are open when off. Refer to Figure 2-1 and program the circuitry for positive or negative logic as required.



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**FIGURE 2-1. FA-2 CIRCUIT BOARD PROGRAMMING**

- 2-13. **PLACEMENT.**
- 2-14. The FA-2 requires 3.5 inches (8.9 cm) of a 19 inch cabinet and may be mounted in any convenient location within reach of signal and power cables. An additional one inch of rack space above and below the unit should be provided for adequate cooling. The unit should not be mounted directly above or below heat-generating equipment, otherwise no special requirements need be observed.
- 2-15. The FA-2 external power supply requires a 20 inch square area for installation. The supply may be mounted in any convenient location within reach of an appropriate power source and the FA-2 rear-panel.
- 2-16. **WIRING.**
- 2-17. **TRANSMITTER INTERFACING.** Connect the FA-2 transmitter output switch controller to the transmitters as follows.



**WARNING**      ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

**WARNING**

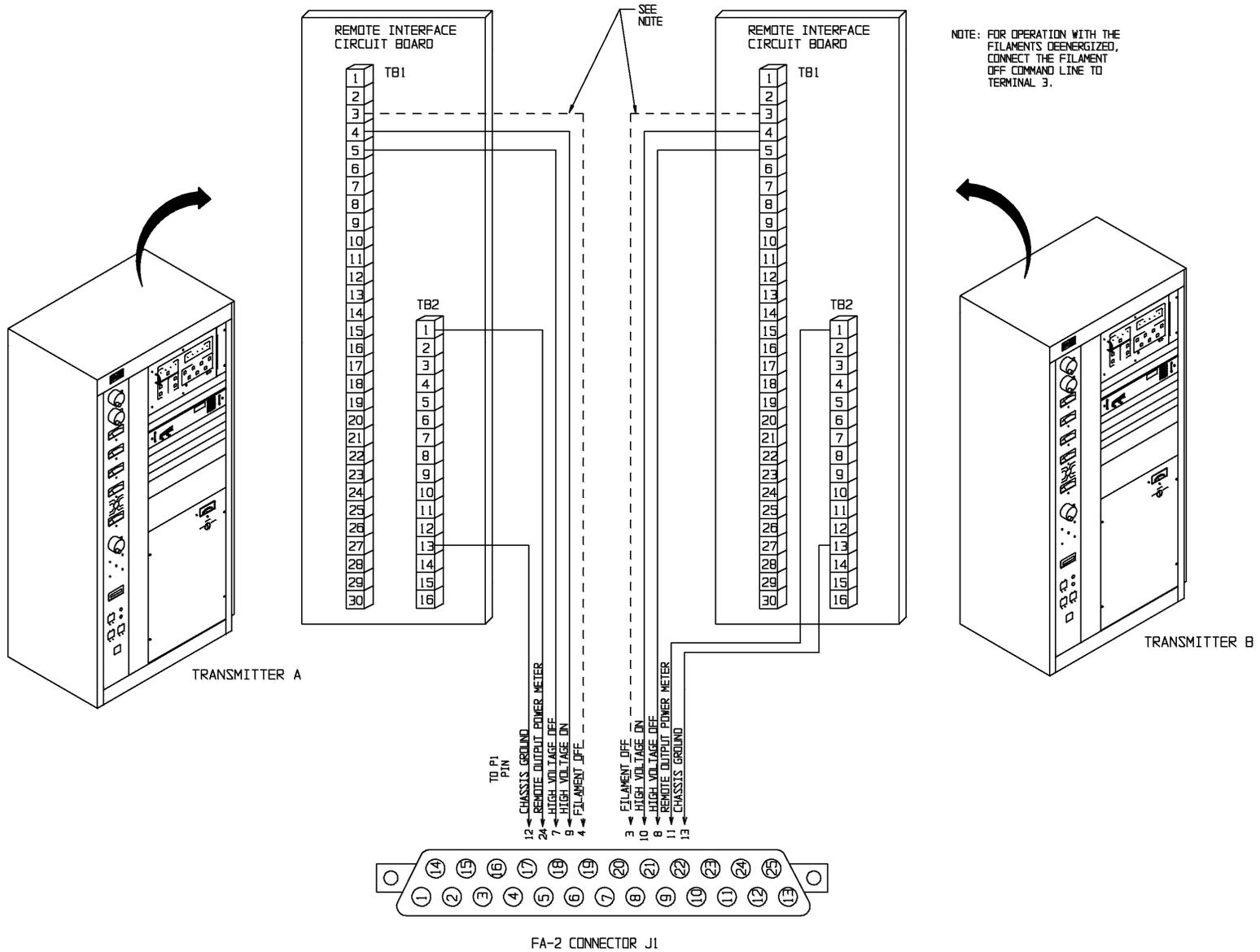
- 2-18. Disconnect all transmitter primary power.
- 2-19. Refer to Figure 2-2 and connect the FA-2 to the transmitter A and transmitter B remote interface circuit boards as shown for Broadcast Electronics B-Series and T-Series FM transmitters. Connections for Broadcast Electronics C-Series solid-state FM transmitters are presented in the FM-1C/FM-500C and FM-3C/FM-2C main/alternate system wiring diagrams. The diagrams are located in SECTION VII, DRAWINGS.
- 2-20. **DUMMY LOAD PROTECTION.** To provide dummy load protection, connect the wiring to the coaxial switch as follows.



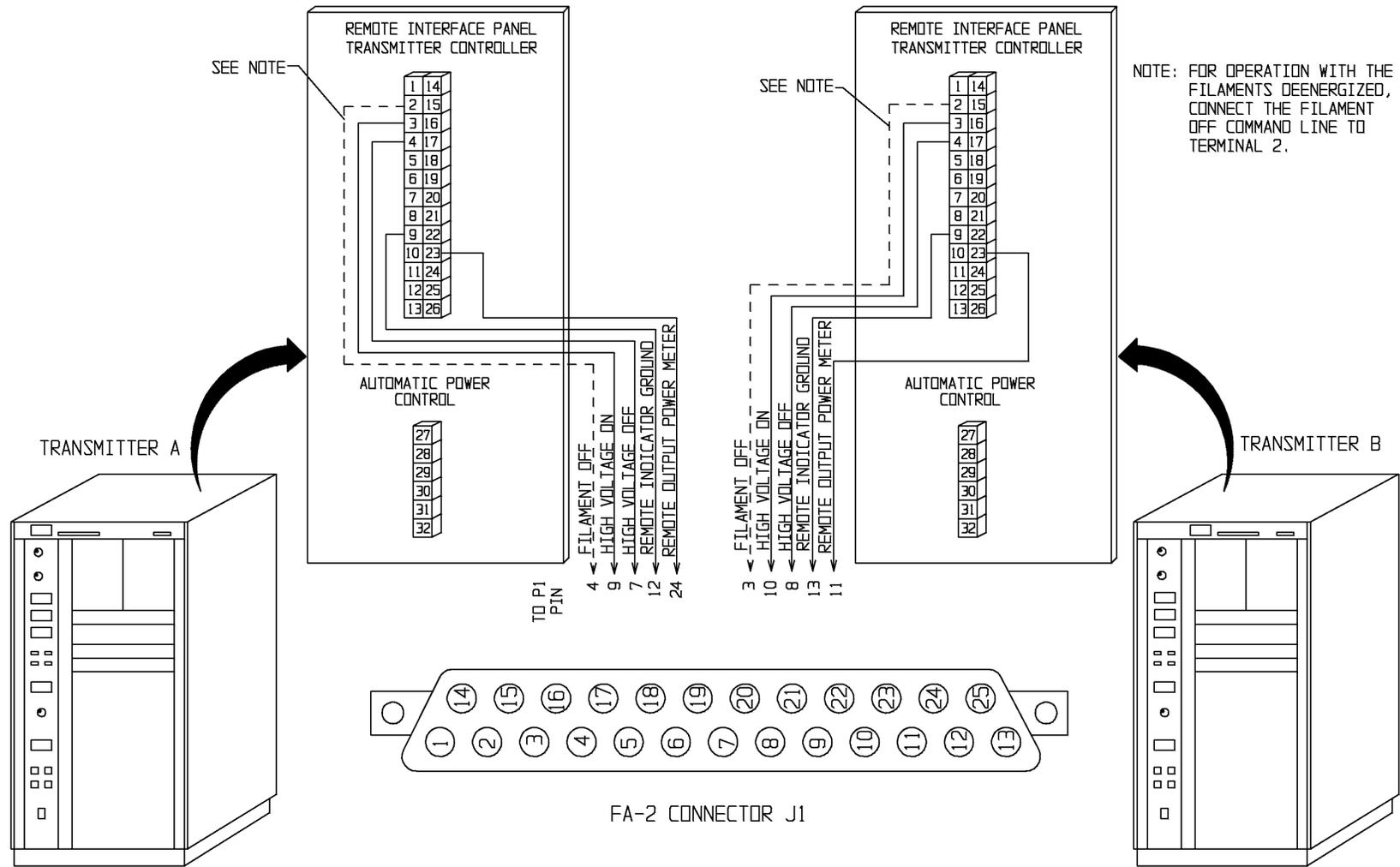
**WARNING**      ***DISCONNECT ALL TRANSMITTER PRIMARY POWER BEFORE PROCEEDING.***

**WARNING**

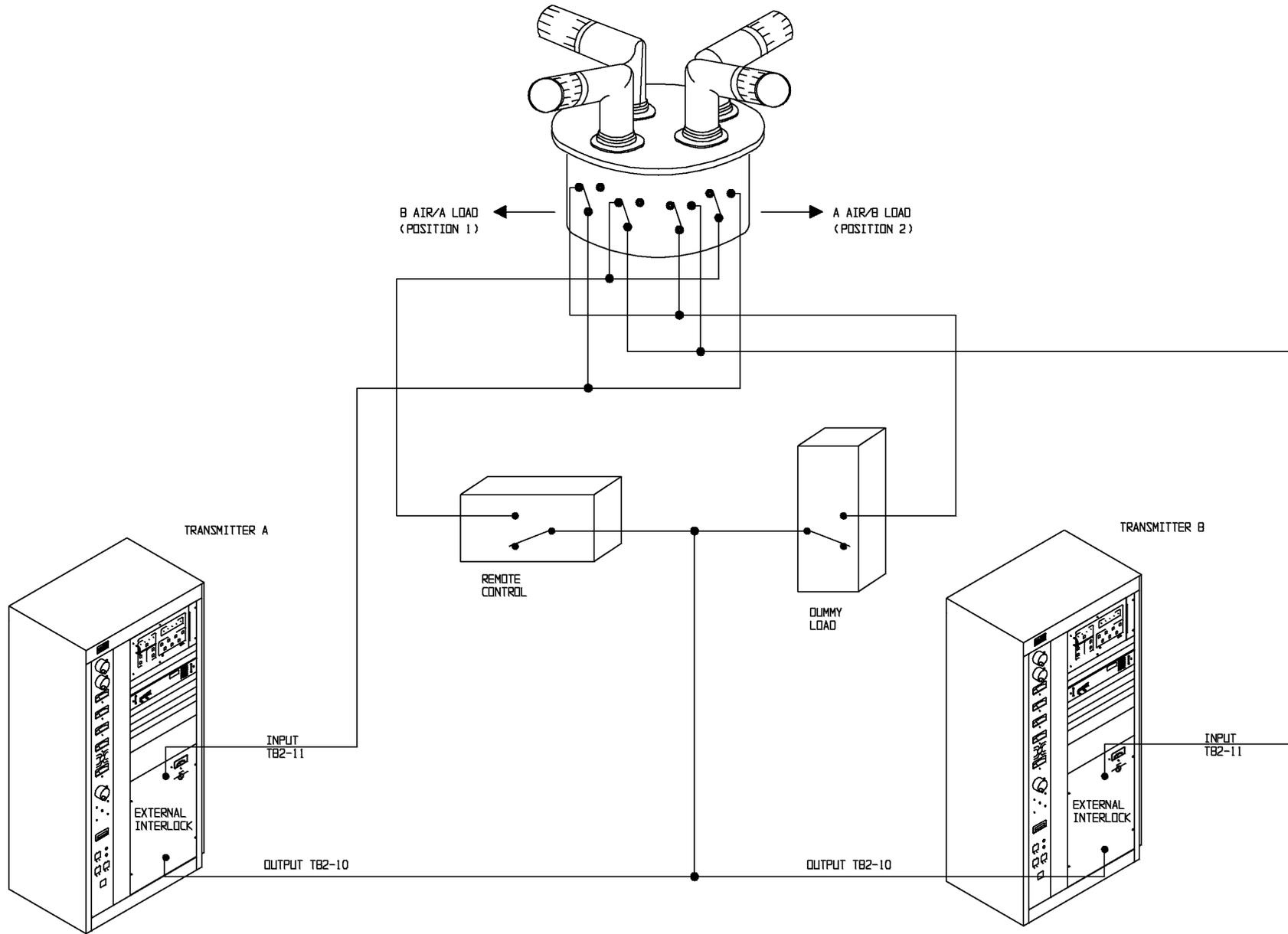
- 2-21. Disconnect all transmitter primary power.
- 2-22. Refer to Figure 2-3 and connect the transmitter A and transmitter B interlock system, the remote control device, and the dummy load to the coaxial switch as shown for Broadcast Electronics B-Series and T-Series FM transmitters. Connections for Broadcast Electronics C-Series solid-state FM transmitters are presented in the FM-1C/FM-500C and FM-3C/FM-2C main/alternate system wiring diagrams. The diagrams are located in SECTION VII, DRAWINGS. The connections will vary depending upon the type of main/alternate transmitter system installation.



**FM T-SERIES TRANSMITTERS**  
**FIGURE 2-2. FA-2 TRANSMITTER CONTROLLER WIRING**  
**(SHEET 1 OF 2)**



**FM B-SERIES TRANSMITTERS**  
**FIGURE 2-2. FA-2 TRANSMITTER CONTROLLER WIRING**  
**(SHEET 2 OF 2)**

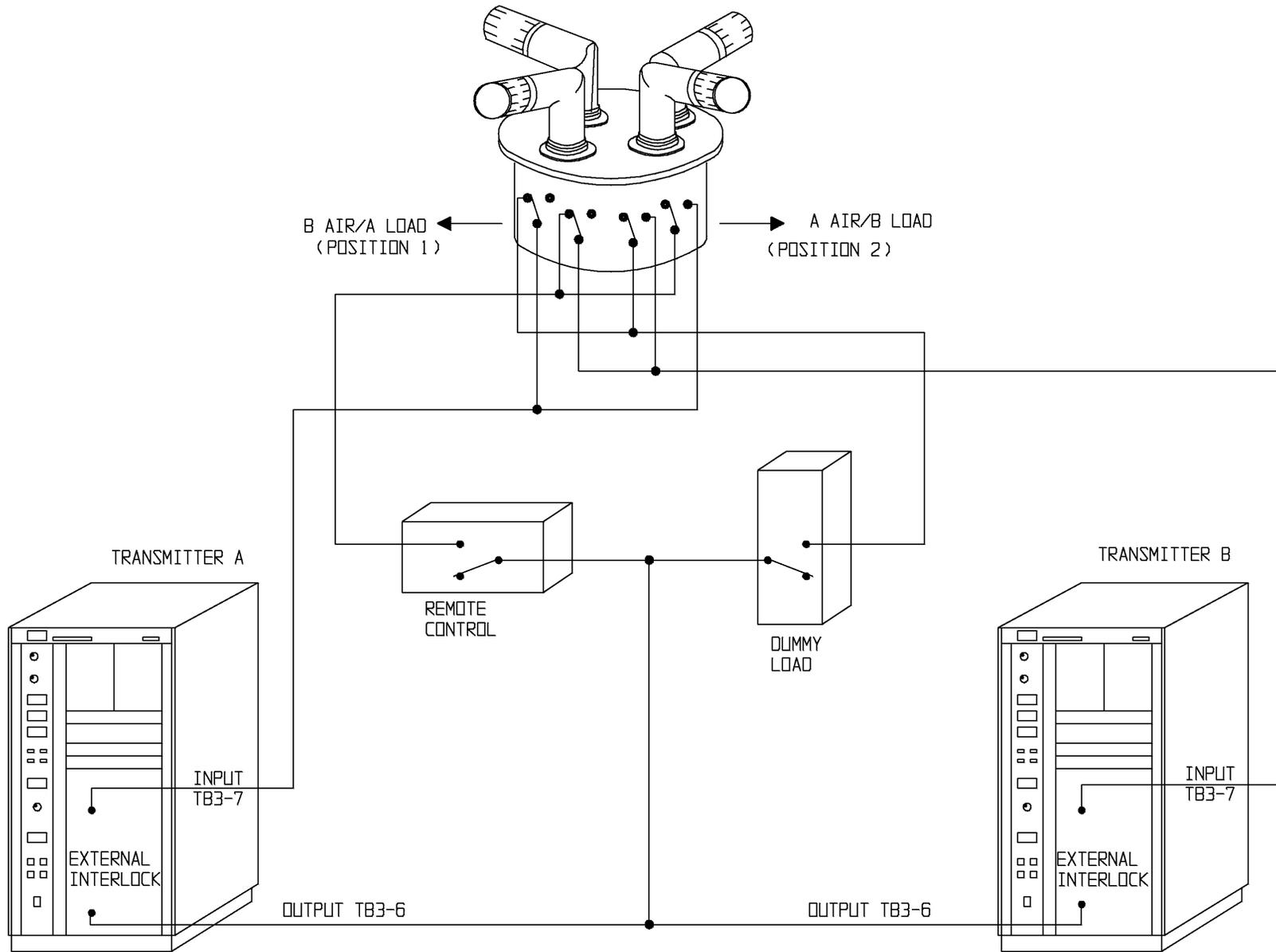


**FM T-SERIES TRANSMITTERS**

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**FIGURE 2-3. MAIN/ALTERNATE INTERLOCK PROTECTION SYSTEM  
(SHEET 1 OF 2)**

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**FM B-SERIES TRANSMITTERS**  
**FIGURE 2-3. MAIN/ALTERNATE INTERLOCK PROTECTION SYSTEM**  
**(SHEET 2 OF 2)**

**597-0107-5**



**WARNING**

***ENSURE ALL TRANSMITTER SYSTEM POWER IS DISCONNECTED BEFORE PROCEEDING.***

**WARNING**

- 2-23. **TRANSMITTER OUTPUT SWITCHING CONTROL.** The FA-2 transmitter output switching control connections are provided on rear-panel barrier strips TB1 and TB2. The unit is designed to provide multiple control and status connections to meet any system requirement. Table 2-1 and Figure 2-4 present a functional description of the connection terminals. Refer to Table 2-1 and Figure 2-4 and interface the FA-2 to the output switch and the B-Series or T-Series FM transmitter. Connections for Broadcast Electronics C-Series solid-state FM transmitters are presented in the FM-1C/FM-500C and FM-3C/FM-2C main/alternate system wiring diagrams. The diagrams are located in SECTION VII, DRAWINGS. The connections will vary depending upon the type of main/alternate transmitter system installation.
- 2-24. **Coaxial Switch Status.** The FA-2 coaxial switch status connections are provided on rear-panel barrier strip TB2 (refer to Figure 2-5). TB2-9 provides +12V dc logic potential for the position 1 and position 2 status contacts on the coaxial switch. Connect the status contacts to the FA-2 switch status terminals as indicated.
- 2-25. **Coaxial Switch Command.** The FA-2 coaxial switch command connections are provided on rear-panel barrier strip TB1 (refer to Figure 2-6). Coaxial switches require an ac or dc motor control power source. Refer to the coaxial switch instruction manual to determine the proper power source for the motor control. Connect the appropriate motor control power source and status contacts to the FA-2 switch command terminals as indicated.
- 2-26. **Coaxial Switch Applications.** Refer to Figure 7-6 in SECTION VII, DRAWINGS for typical applications of FA-2 and coaxial switch interfacing. Connections will vary depending on the requirements of the main/alternate transmitter system installation.
- 2-27. **REMOTE CONTROL CONNECTIONS.** Remote control connections are provided on the FA-2 rear-panel terminal strips. Refer to the FA-2 remote control wiring diagram, SECTION VII, DRAWINGS and Table 2-1 and connect the remote circuitry to the rear-panel terminals as required.
- 2-28. **POWER SUPPLY CONNECTIONS.**
- 2-29. The FA-2 power supply operates from a 120V or 240V ac 50/60 Hz power source. The supply is shipped from the factory to operate from a 120V ac power source. If the supply is to be operated from a 220V ac power source, proceed as follows:



**WARNING**

***ENSURE NO PRIMARY POWER IS CONNECTED TO THE UNIT BEFORE PROCEEDING.***

**WARNING**

- A. Refer to the information on the FA-2 power supply rear-panel and install jumpers on the transformer terminal strip as indicated.
- B. Remove the fuse from the power supply.
- C. Refer to the information on the FA-2 power supply rear-panel and install a fuse rated for the power supply input potential.

**TABLE 2-1. FA-2 REAR-PANEL TERMINAL CONNECTIONS  
(Sheet 1 of 2)**

INDEX NO.	NOMENCLATURE	FUNCTIONAL DESCRIPTION
1	Coaxial switch <b>SW1, SW2, and SW3</b> position <b>P1</b> and position <b>P2</b> control connections.	Internal relay circuitry provides a contact closure to activate switch operation. SW1-P1, SW1-P2, SW2-P1, and SW2-P2 are not used.
2	<b>ALARM</b> control connections.	Internal relay circuitry provides a contact closure to activate external visual or aural alarm.
3	Coaxial switch <b>COM</b> connections.	Common connections for coaxial switches SW1, SW2, and SW3 (SW1 and SW2 are not used).
4	<b>PRESET PWR A</b> and <b>PRESET PWR B</b> control connections.	Not used.
5	<b>+15V IN</b> and <b>GND</b> power supply connections.	Connections for the power supply.
6	Coaxial switch <b>SW1, SW2, and SW3</b> position 1 and position 2 status connections.	Continuous contact to positive voltage from coaxial switch required to indicate switch position status (SW1-1, SW1-2 and SW2-1, SW2-2 are not used).
7	<b>A+B LD OFF</b> remote control connection	Momentary contact to positive voltage disables both transmitters and the automatic switching circuitry.
8	<b>B AIR</b> remote control connection	Momentary contact to positive voltage configures transmitter B for on-air operation.
9	<b>A AIR</b> remote control connection	Momentary contact to positive voltage configures transmitter A for on-air operation.
10	<b>A+B AIR ON</b> remote control connection	Momentary contact to positive voltage enables the selected transmitter for on-air operation and the automatic switching circuitry (if enabled).
11	<b>+12V OUT</b> connection	Provides approximately +12 volts dc for remote control switch circuitry and coaxial switch position logic.
12	<b>AUT MOD</b> remote status connection	Indicates the status of the automatic switching circuitry. Programmable internal circuitry provides either positive or negative logic to indicate enabled status.

**TABLE 2-1. FA-2 REAR-PANEL TERMINAL CONNECTIONS  
(Sheet 2 of 2)**

INDEX NO.	NOMENCLATURE	FUNCTIONAL DESCRIPTION
13	<b>R-C OFF IND</b> remote status connection	Indicates the status of the remote control. Programmable internal circuitry provides positive or negative logic to indicate disabled status.
14	<b>A+B LD</b> remote status connection	NOT USED.
15	<b>A AIR</b> remote status connection	Indicates transmitter A is configured for on-air operation. Programmable internal circuitry provides either positive or negative logic to indicate status.
16	<b>B AIR</b> remote status connection	Indicates transmitter B is configured for on-air operation. Programmable internal circuitry provides either positive or negative logic to indicate status.
17	<b>A+B AIR</b> remote status connection	NOT USED.



**WARNING**

***ENSURE NO PRIMARY POWER IS CONNECTED TO THE UNIT BEFORE PROCEEDING.***

**WARNING**

2-30. The FA-2 modular power supply unit requires connections to: 1) the FA-2 unit rear-panel and 2) the power source. Refer to Figure 2-7 and connect the power supply wiring to the FA-2 rear-panel terminal strip as shown. Once the power supply is connected to the FA-2 unit, connect the power supply line cord to the appropriate power source.

2-31. **INITIAL CHECKOUT.**

2-32. Perform an initial checkout of the main/alternate system as follows:



**WARNING**

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

**WARNING**

- A. Ensure all system primary power is disconnected and operate all system circuit breakers to the OFF position.
- B. Ensure primary power to the center control cabinet is properly connected and secured.

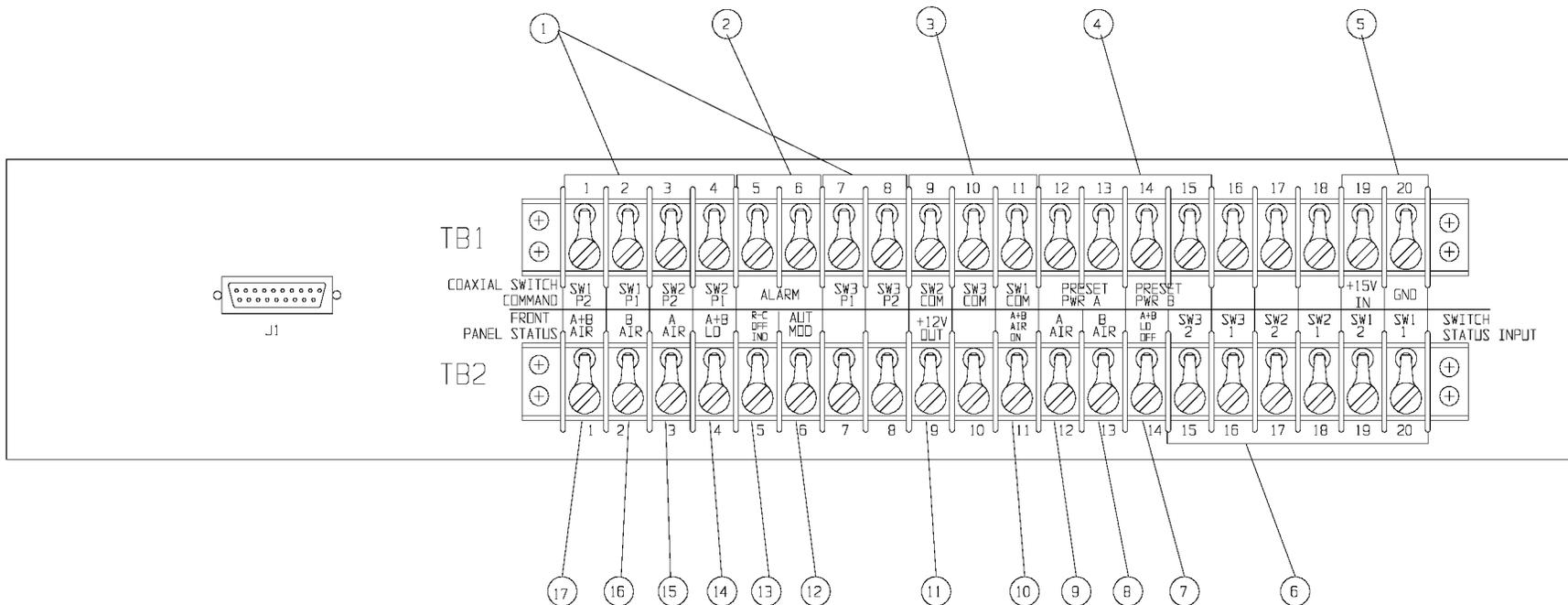
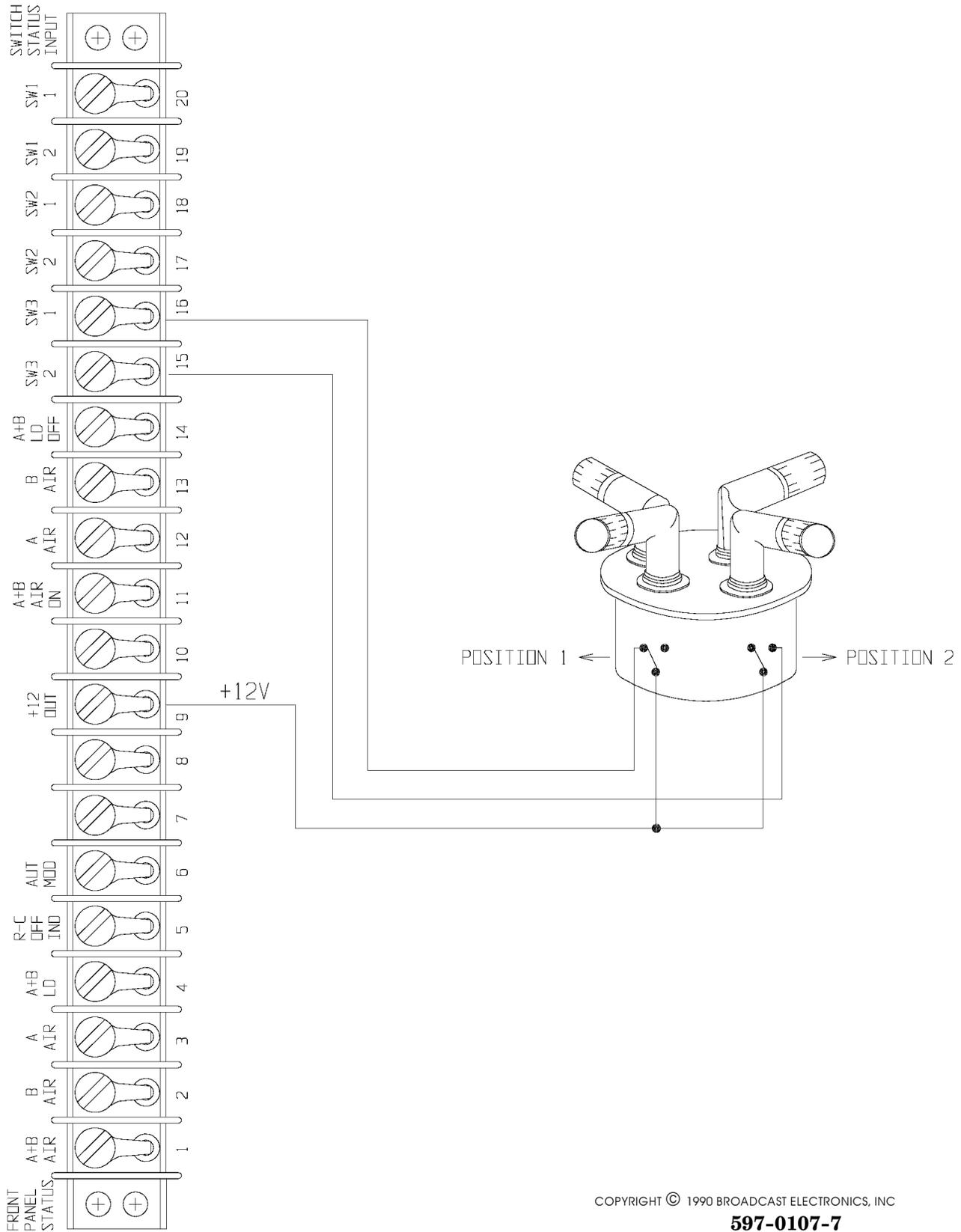
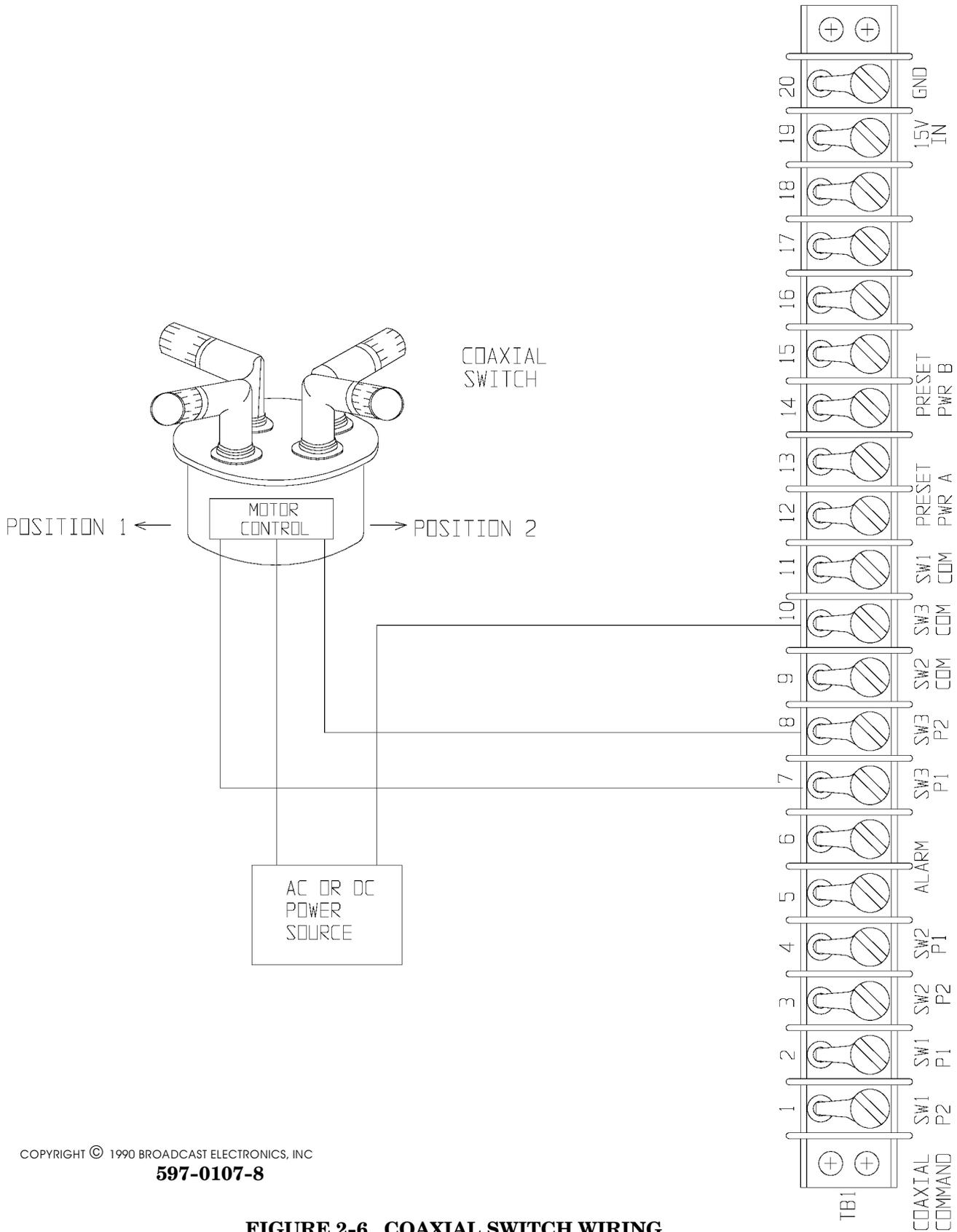


FIGURE 2-4. FA-2 REAR-PANEL TERMINAL CONNECTIONS

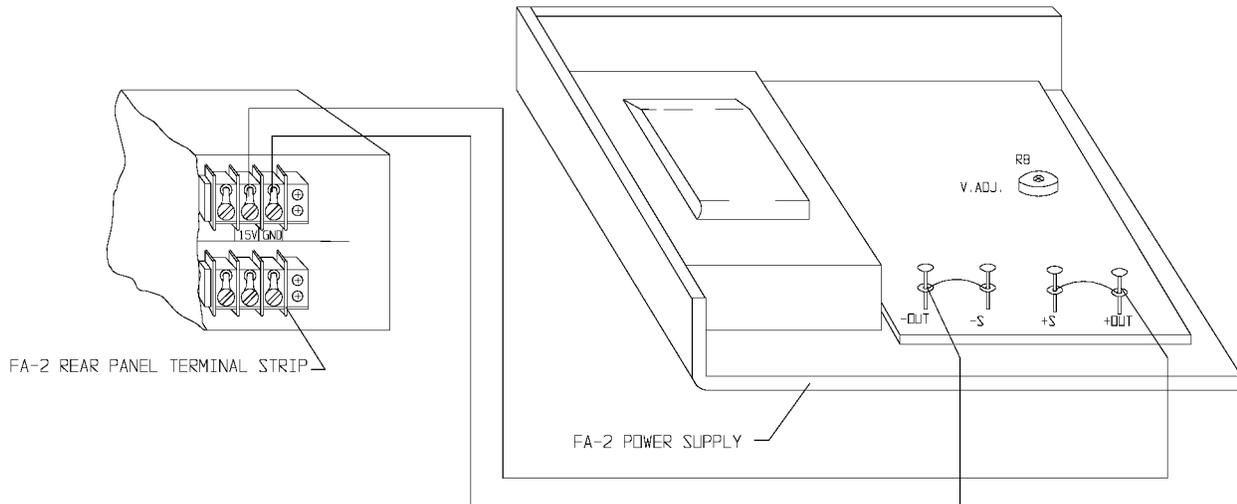


**FIGURE 2-5. COAXIAL SWITCH STATUS WIRING**



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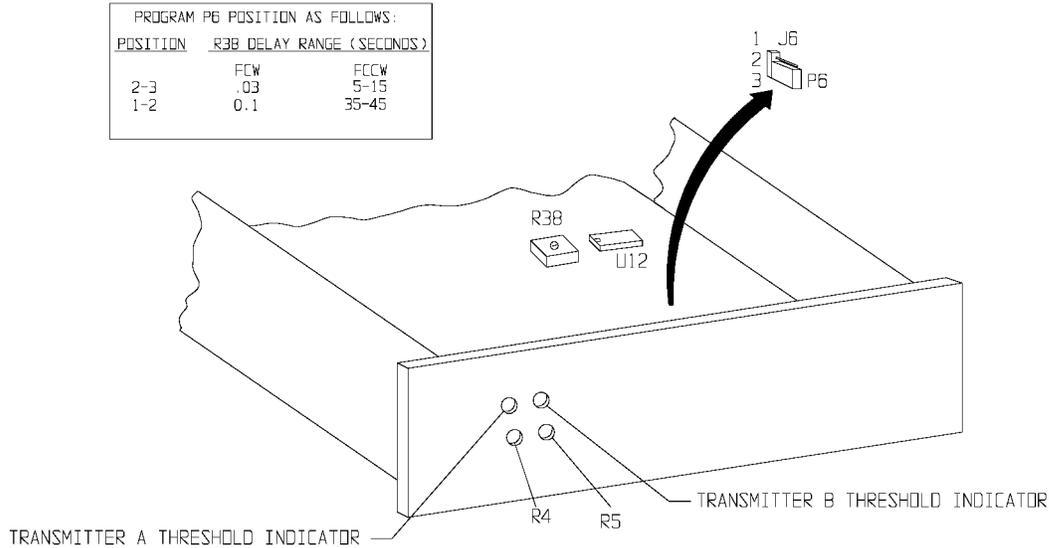
**FIGURE 2-6. COAXIAL SWITCH WIRING**



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**597-0107-9**

**FIGURE 2-7. FA-2 POWER SUPPLY CONNECTIONS**

- C. Ensure all ground connections are secure.
  - D. Ensure the center cabinet ground strap is properly connected to the transmitter ground strap.
  - E. Ensure all RF connections are secure.
  - F. Ensure all connections on transmitter A and transmitter B remote interface panel terminals are secure.
  - G. Remove any extra hardware and wire lying within the center control cabinet.
  - H. Replace all rear doors and panels on the system cabinets.
  - I. Operate the front-panel **AUTO** and **RMTE CNTL OFF** switch/indicators to the OUT position.
- 2-33. Apply primary power to the system.
- 2-34. Operate all system circuit breakers to the ON position.
- 2-35. An FA-2 front-panel mode selection switch/indicator will illuminate to indicate which transmitter is configured for on-air operation.
- 2-36. **INSTALLATION ADJUSTMENTS.**
- 2-37. **POWER FAILURE THRESHOLD ADJUSTMENTS.** Potentiometers R4 and R5 located on the front panel (refer to Figure 2-8) adjust the power failure limit for transmitters A and B. R4 and R5 are individually adjusted for the desired transmitter power failure level. The power failure threshold controls are adjusted as follows.



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597-0107-10

**FIGURE 2-8. LOCATION OF R4, R5, R38, AND J6**

- 2-38. **Procedure.** To adjust the transmitter A power failure threshold level control R4, proceed as follows:
- A. Apply power to the main/alternate transmitter system.
  - B. Operate the FA-2 **AUTO** switch/indicator to the out position (manual mode).
  - C. Refer to Figure 2-8 and operate transmitter A power failure threshold level control R4 fully clockwise.
  - D. Depress the transmitter A **HIGH VOLTAGE ON** switch/indicator to illuminate the switch/indicator. The transmitter will be operational after the filament warm-up delay.
  - E. Operate the transmitter to the desired power failure level.
  - F. Refer to Figure 2-8 and adjust transmitter A power failure threshold level control R4 until the transmitter A indicator just extinguishes.
  - G. Terminate transmitter A operation.
  - H. Repeat the procedure for transmitter B. Adjust the threshold level using transmitter B threshold level control R5 and the transmitter B threshold indicator (refer to Figure 2-8).
- 2-39. **POWER FAILURE DELAY ADJUSTMENT.** Potentiometer R38 on the logic circuit board adjusts the time delay between the detection of a power failure and the initiation of a transfer operation. The power failure delay control is adjusted as follows.

2-40. **Procedure.** To adjust power failure delay control R38, proceed as follows:



**WARNING**      ***DISCONNECT THE MAIN/ALTERNATE TRANSMITTER SYSTEM PRIMARY POWER BEFORE PROCEEDING.***

**WARNING**

- A. Disconnect power from the main/alternate transmitter system.
- B. Remove the FA-2 top-panel.
- C. Refer to Figure 2-8 and program P6 for the required delay range.
- D. Apply primary power to the system and operate the desired transmitter for normal power output.
- E. Operate the FA-2 in the automatic mode and deenergize the on-air transmitter high voltage.
- F. Refer to Figure 2-8 and adjust R38 until the required delay duration is attained. Repeat steps D through F if required.
- G. Replace the FA-2 top-panel and all access panels.

# SECTION III OPERATION

## 3-1. INTRODUCTION.

3-2. This section identifies all controls and indicators associated with the FA-2 automatic transmitter output switch controller and provides standard operating procedures.

## 3-3. CONTROLS AND INDICATORS.

3-4. Refer to Figure 3-1 for the location of all controls and indicators associated with normal operation of the FA-2 automatic transmitter output switch controller. The function of each control or indicator is described in Table 3-1.

## 3-5. OPERATION.



### NOTE

***THE FOLLOWING PROCEDURE ASSUMES THAT THE FA-2 IS COMPLETELY INSTALLED AND IS FREE OF ANY DISCREPANCIES.***

### NOTE

3-6. The FA-2 switch controller is the primary control center for a main/alternate transmitter system. Use the FA-2 to energize, de-energize, and switch the main/alternate system transmitters.

## 3-7. INITIAL TRANSMITTER TURN-ON.

3-8. The main/alternate transmitter system may be configured as an energized stand-by or de-energized stand-by system. An energized stand-by system is when the filament circuit of the alternate transmitter is energized prior to a switching sequence. A de-energized system is when the filament circuit of the alternate transmitter is not energized prior to a switching sequence. To initially turn-on the transmitter system, proceed as follows:

A. Apply primary power to the system.

The front-panel **A AIR B LOAD** switch/indicator or **B AIR A LOAD** switch/indicator will be illuminated to indicate which transmitter is configured for on-air operation.

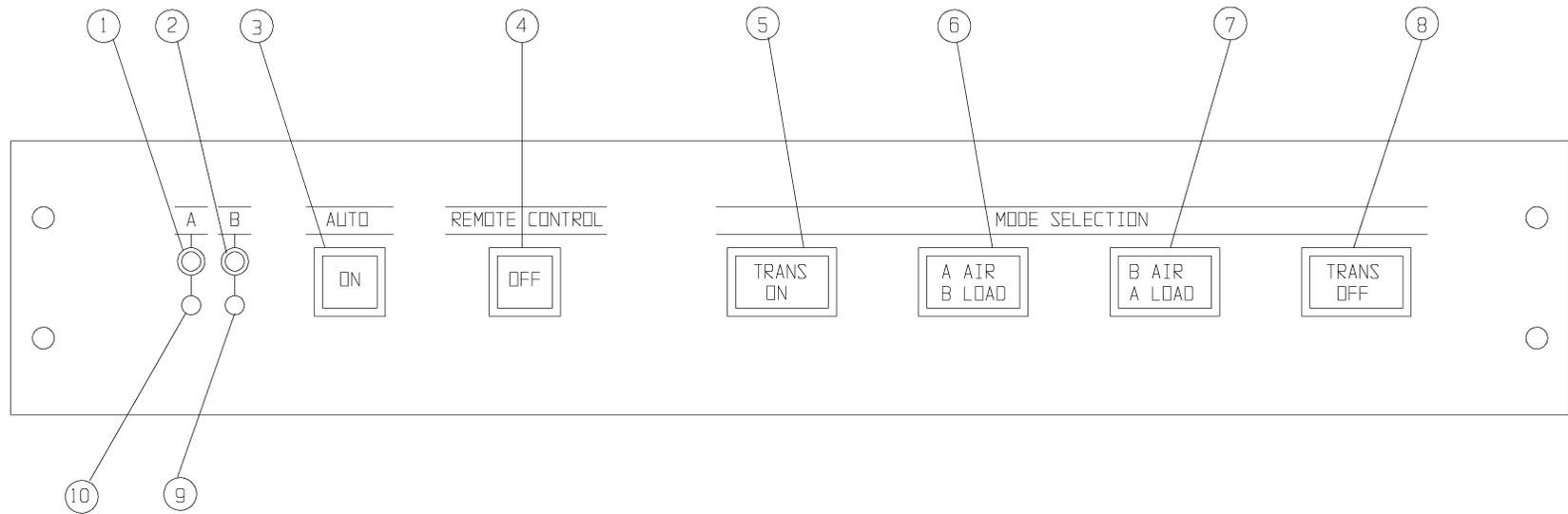
B. For energized stand-by systems only, locally or remotely energize the transmitter A and B filament circuitry. Allow the PA tubes to attain operating temperature.

## 3-9. SELECTING AND ENABLING THE ON-AIR TRANSMITTER.

3-10. To select the desired transmitter for on-air operation, proceed as follows:

A. If the illuminated mode selection switch/indicator (**A AIR B LOAD** or **B AIR A LOAD**) indicates the desired transmitter, depress the front-panel **TRANS ON** switch. The following events will occur:

1. The selected transmitter will energize.



**FIGURE 3-1. FA-2 CONTROLS AND INDICATORS**

**TABLE 3-1. FA-2 CONTROLS AND INDICATORS**

INDEX NO.	NOMENCLATURE	FUNCTION
1	Transmitter A Indicator	Indicates transmitter A output power level is normal when illuminated.
2	Transmitter B Indicator	Indicates transmitter B output power level is normal when illuminated.
3	<b>AUTO ON</b> Switch/Indicator	<p>SWITCH: Enables or disables the internal automatic switching circuitry.</p> <p>INDICATOR: Indicates the automatic switching mode is enabled when illuminated.</p>
4	<b>REMOTE CONTROL OFF</b> Switch/Indicator	<p>SWITCH: Enables or disables remote control operation.</p> <p>INDICATOR: Indicates remote operation is disabled when illuminated.</p>
5	<b>TRANS ON</b> Switch	Energizes the transmitter configured for on-air operation. The transmitter configured for dummy load operation will not be energized.
6	<b>A AIR B LOAD</b> Switch/Indicator	<p>SWITCH: Configures transmitter A for on-air operation and transmitter B for dummy load operation.</p> <p>INDICATOR: Indicates transmitter A is configured for on-air operation and transmitter B for dummy load operation when illuminated.</p>
7	<b>B AIR A LOAD</b> Switch/Indicator	<p>SWITCH: Configures transmitter B for on-air operation and transmitter A for dummy load operation.</p> <p>INDICATOR: Indicates transmitter B is configured for on-air operation and transmitter A for dummy load operation when illuminated.</p>
8	<b>TRANS OFF</b> Switch	Deenergizes both transmitter A and transmitter B.
9	Transmitter B Output Power Failure Threshold Control	Adjusts the output power threshold at which the control circuitry will recognize a transmitter B failure.
10	Transmitter A Output Power Failure Threshold Control	Adjusts the output power threshold at which the control circuitry will recognize a transmitter A failure.

2. After a short duration to allow the transmitter to attain normal output power, the appropriate front-panel threshold indicator will illuminate to indicate normal output power.
- B. If the extinguished mode selection switch/indicator (**A AIR B LOAD** or **B AIR A LOAD**) is the desired transmitter, select and enable the transmitter as follows:
1. Depress either the **A AIR B LOAD** or **B AIR A LOAD** switch/indicator to configure the desired transmitter for on-air operation.
  2. Depress the **TRANS ON** switch.
- The following events will occur:
1. The selected mode switch/indicator will illuminate.
  2. After a short duration to allow the coaxial outputswitch to transfer, the selected transmitter will energize. The appropriate front-panel threshold indicator will illuminate to indicate normal output power.

3-11. **ENABLING THE AUTOMATIC SWITCHING MODE.**

3-12. The automatic switching mode is enabled as follows:

1. Operate the **AUTO** switch/indicator to the IN position.
2. Depress the **TRANS ON** switch.

The **AUTO** switch/indicator will illuminate to indicate the automatic switching mode is enabled after a short delay to allow the on-air transmitter output power to increase above the power failure threshold.

3-13. In the event of an on-air transmitter failure and an automatic switching sequence, the automatic switching mode will be disabled. The **AUTO** switch/indicator will extinguish to indicate the automatic switching mode is disabled. To re-enable the automatic switching mode once the failed transmitter has been repaired, depress the front-panel **TRANS ON** switch. The **AUTO** switch/indicator will illuminate to indicate the automatic switching mode is enabled.

3-14. To disable the automatic switching mode, proceed as follows:

1. Operate the **AUTO** switch/indicator to the OUT position.

The **AUTO** switch/indicator will extinguish to indicate the automatic switching mode is disabled.

3-15. **MANUAL SWITCHING.**

3-16. To manually operate the FA-2 switch controller to connect the alternate transmitter to the antenna, depress either the **A AIR B LOAD** or **B AIR A LOAD** switch/indicators. The FA-2 will respond as follows:

- A. If the on-air transmitter is energized when the manual switching operation is initiated, the FA-2 will: 1) de-energize the on-air transmitter, 2) perform the switching sequence, and 3) energize the selected on-air transmitter.
- B. If the on-air transmitter is de-energized when the manual switching operation is initiated, the FA-2 will only perform the switching sequence.

3-17. **POWER FAILURE DETECTION CIRCUIT.**

3-18. The power failure detection circuitry is enabled when the **TRANS ON** switch is depressed. The circuit will monitor the on-air transmitter output power. If the output power decreases below the power failure threshold, the external alarm circuit will be energized to indicate a transmitter failure. The power failure detection circuit is disabled when the **TRANS OFF** switch is depressed.

3-19. **TRANSMITTER TURN-OFF.**

3-20. To turn-off the on-air transmitter, depress the front-panel **TRANS OFF** switch. The following events will occur:

- A. The on-air transmitter high voltage will de-energize.
- B. The appropriate front-panel threshold indicator will extinguish.
- C. The FA-2 will retain the final system mode configuration.

3-21. **EXTERNAL ALARM RESET.**

3-22. The FA-2 external alarm circuit can be reset locally or remotely. To reset the alarm circuit, depress one of the following front-panel or remote switch/indicators.

- A. **TRANS ON**
- B. **A AIR B LOAD**
- C. **B AIR A LOAD**
- D. **TRANS OFF**

3-23. **REMOTE OPERATION.**

3-24. Remote main/alternate transmitter system operation is accomplished through the FA-2 rear-panel transmitter on, transmitter A air, transmitter B air, and transmitter off remote connections. To operate the system remotely, follow the procedures as described for local operation.

# SECTION IV

## THEORY OF OPERATION

### 4-1. INTRODUCTION.

4-2. This section presents the theory of operation for the Broadcast Electronics FA-2 automatic transmitter output switch controller.

### 4-3. GENERAL DESCRIPTION.

4-4. The FA-2 is designed to automatically transfer the antenna to an alternate transmitter in the event a fault occurs in the on-air transmitter. Figure 4-1 presents a block diagram of the FA-2 automatic control circuitry. Refer to Figure 4-1 and the following description of the automatic control circuitry.

4-5. The FA-2 detector circuit provides an RF presence signal which is derived from the RF sample voltage of on-air transmitter A. This signal is routed to the command control logic, and automatic monitoring and delay logic circuits. The automatic monitoring and delay logic will detect the loss of the RF presence signal when transmitter A fails.

4-6. With the loss of the RF presence signal, the following two events will occur. 1) The command control logic will generate instructions to deenergize the transmitter A high voltage, and 2) the automatic monitoring and delay logic will generate and route a transfer request to the mode control logic.

4-7. The mode control logic provides mode information to the switch comparator logic. The comparator logic will generate and route a transfer command to the command control logic.

4-8. The command control logic will generate and route instructions to the coaxial switch. The coaxial switch will transfer the antenna to the output of transmitter B and provide switch position status information to the switch comparator logic. When the switch position status and mode information are compared, the comparator will terminate the transfer command to the command control logic.

4-9. With the absence of the transfer command, the command control logic will generate instructions to energize transmitter B high voltage for on-air operation. To facilitate maintenance, the output of transmitter A is connected to the dummy load.

### 4-10. FUNCTIONAL DESCRIPTION.

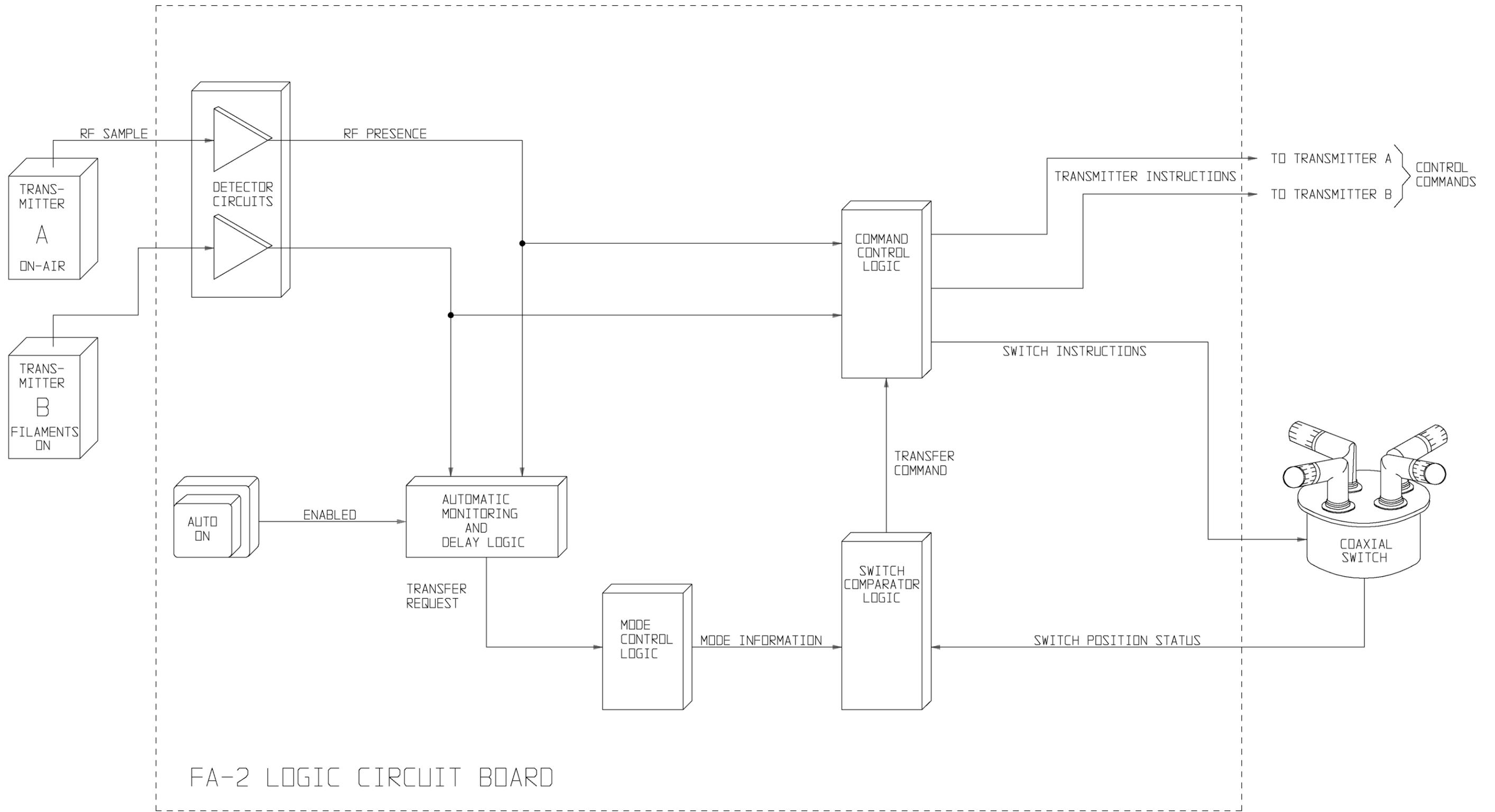
4-11. A simplified schematic of the FA-2 is presented in Figure 4-2. Refer to the simplified schematic as required for the following functional equipment description.

4-12. When applicable, the text will describe the operation of the transmitter A and transmitter B threshold detector and automatic monitor circuits. The detection and automatic monitor circuits for transmitters A and B are identical; therefore, only the transmitter A circuit will be discussed.

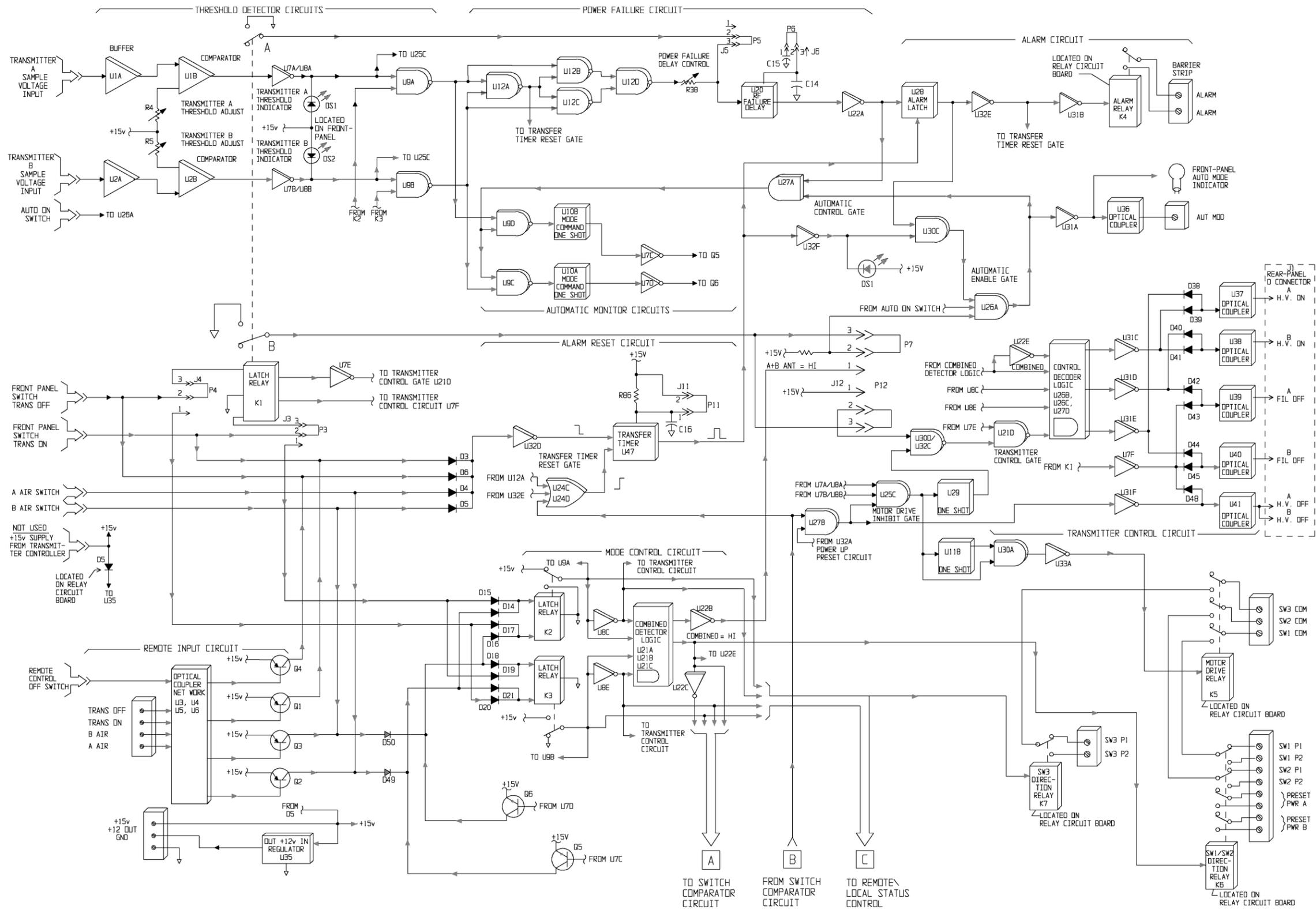
4-13. The following information is presented with transmitter A operating at a normal output power level into the antenna (A AIR/B LOAD). The text describes the automatic process of switching transmitter B into the antenna and transmitter A into the load (B AIR/A LOAD) when a fault occurs in transmitter A.

4-14. **AUTOMATIC ENABLE.** Automatic enable gate U26A provides automatic mode switching when an RF output power failure is detected. When the front-panel **AUTO ON** switch/indicator is depressed, a HIGH is applied to U26A and ANDed with HIGHs from AND gate U30C and J7 pin 2. U26A will output a HIGH to automatic control gate U27A. A HIGH is also applied to inverter U31A which outputs a LOW to the front-panel **AUTO MODE** indicator and optical isolator U36. U36 outputs a HIGH to illuminate an external indicator.

- 4-15. **THRESHOLD DETECTOR CIRCUIT.** The threshold detector circuit monitors a sample voltage from transmitter A. The sample voltage is routed to comparator U1B through buffer U1A. When the sample voltage decreases below a preset threshold level established by potentiometer R4, U1B will generate a LOW to inverters U7A/U8A. U7A/U8A will apply a HIGH to threshold indicator DS1, motor drive inhibit gate U25C, and NAND gate U9A.
- 4-16. With a HIGH from mode control relay K2, U9A will output a LOW to U9D and U12A. A HIGH from U9B is also applied to the input of U12A and U9C. The output of U12A will apply a HIGH to transfer timer reset gate U24C/U24D.
- 4-17. **OUTPUT POWER FAILURE CIRCUIT.** The RF output power failure circuit provides a delay before a mode change is initiated after a fault is detected. Integrated circuits U12A, U12B, U12C, and U12D operate as an exclusive OR gate. Latch relay K1A is operated to enable the power failure circuit. With the LOW from U9A, exclusive OR gate U12 will output a HIGH to RF failure delay timer U20 through potentiometer R38.
- 4-18. If the duration of the fault exceeds the delay determined by R38 and C14/C15, U20 will apply a HIGH through inverter U22A to automatic control gate U27A and alarm latch U28. With the HIGH from U20 and a HIGH from U26A, U27A will output a HIGH to U9C and U9D.
- 4-19. **ALARM CIRCUIT.** The alarm circuit provides an external indication of an RF output power failure. With a HIGH from U22A, alarm latch U28 will output a LOW to inverter U32E. U32E will output a HIGH to U31B which will output a LOW to energize alarm relay K4. The HIGH from U32E is also applied to transfer timer reset gate U24C/U24D.
- 4-20. Alarm latch U28 also applies a LOW to AND gate U30C. U30C will output a LOW to U26A which disables the automatic enable gate.
- 4-21. **AUTOMATIC MONITOR CIRCUIT.** The automatic monitor circuit generates a switching command automatically. With both inputs HIGH, U9C will output a LOW to mode command one shot U10A. U10A will output a HIGH which is inverted LOW by U7D and applied to transistor switch Q6.
- 4-22. With a LOW from U7D, transistor switch Q6 outputs a HIGH through diodes D16 and D18 to relays K2 and K3 which operate to the B AIR/A LOAD position. The control logic for the appropriate mode change is established and routed to switch direction relay K7 which de-energizes. The control logic is also routed to the control decoder logic, the status decoder logic, and the switch comparator circuit.
- 4-23. **MODE CONTROL CIRCUIT.** The mode control circuit generates the various logic control signals for mode switching. The control logic signals are determined by the position of mode control latch relays K2 and K3 which operate as flip-flops. The HIGH and LOW logic signals (and inverted signals through U8C and U8E) from the relays are input to the combined detector logic. The combined detector logic processes the information to provide the logic control signals.
- 4-24. **SWITCH COMPARATOR CIRCUIT.** The switch comparator circuit generates the control logic which terminates the high voltage of both transmitters until the coaxial switch is correctly positioned. Only the logic from coaxial switch SW3 is input to the switch position comparator logic through inverter U19 and the optical isolator network. With the signals from the mode control circuit, the switch comparator logic will output a LOW to inverter U22D which applies a HIGH to U27B and transfer timer reset gate U24C/U24D.



**FIGURE 4-1. FA-2 AUTOMATIC CONTROL CIRCUITRY BLOCK DIAGRAM**  
(4-3/4-4)



**FIGURE 4-2.**  
**FA-2 SIMPLIFIED SCHEMATIC DIAGRAM**  
 (Sheet 1 of 2) (4-5/4-6)

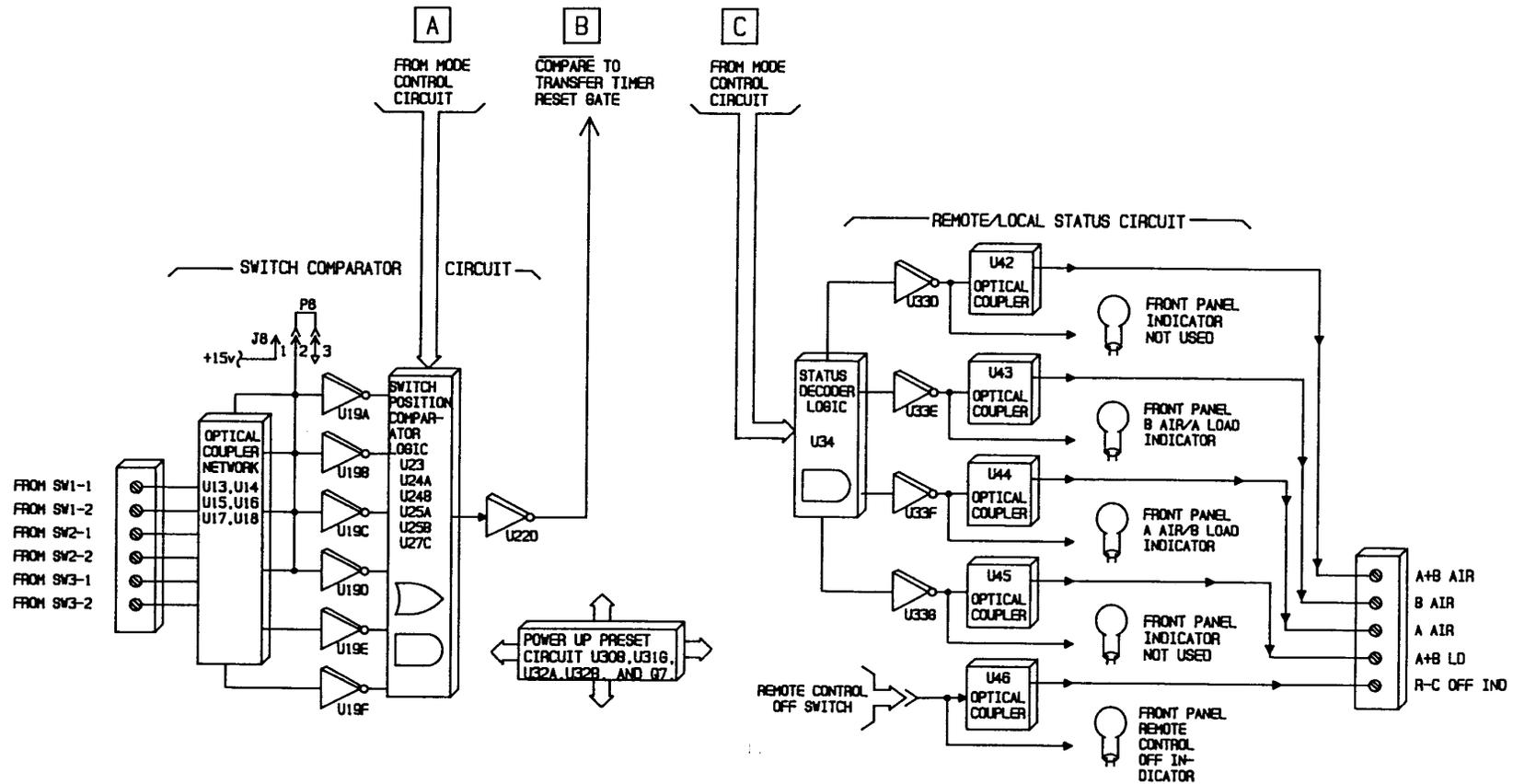


FIGURE 4-2. FA-2 SIMPLIFIED SCHEMATIC DIAGRAM  
(Sheet 2 of 2)

- 4-25. **High Voltage Off.** U27B will output a HIGH to inverter U31F which applies a LOW to optical isolator U41. U41 outputs a HIGH to both transmitters which terminates the high voltage. The HIGH from U27B is also applied to motor drive inhibit gate U25C.
- 4-26. With HIGHs from U7A/U8A and U7B/U8B indicating the absence of RF output power from the transmitters and a HIGH from U27B, U25C will output a HIGH to AND gate U30A and timers U29 and U11B (U29 will not respond at this time). U11B will output a HIGH to U30A which applies a HIGH to inverter U33A. U33A applies a LOW to K5 to enable the motor drive relay.
- 4-27. When coaxial switch SW3 is correctly positioned, the switch comparator logic will output a HIGH to inverter U22D which applies a LOW to U27B. U27B outputs a LOW to U25C which applies a LOW to timer U29. U29 will generate a HIGH to NAND gate U30D/U32C. A HIGH from relay K1B/R47 is also routed to the input of U30D/U32C through jumper P12. With this HIGH and the HIGH from U29, NAND gate U30D/U32C will output a LOW to transmitter control gate U21D.
- 4-28. **TRANSMITTER CONTROL CIRCUIT.** The transmitter control circuit provides commands to the transmitters. A LOW from latch relay K1 is applied to inverter U7E which outputs a HIGH to U21D. The HIGH from U7E and LOW from U30D/U32C are NANGED by U21D which outputs a HIGH to enable the control decoder logic.
- 4-29. With the mode control logic and the HIGH from U21D, the control decoder logic will output a HIGH to inverter U31D. U31D applies a LOW through steering diodes D40 and D42 to optical isolators U38 and U39. Finally, U38 and U39 output HIGHs which energizes the transmitter B high voltage and terminates the transmitter A filaments.
- 4-30. **REMOTE/LOCAL STATUS CIRCUIT.** The remote/local status circuit provides mode information to the front-panel and external indicators. When the mode control logic is applied to status decoder logic U34, a HIGH is output to inverter U33E. U33E outputs a LOW to illuminate front-panel switch/indicator **B AIR/A LOAD**. A LOW is also applied to optical isolator U43 which outputs a HIGH to an external indicator.
- 4-31. **REMOTE INPUT CIRCUIT.** The remote input circuit provides external control of the FA-2 output switch controller. When a remote mode switch is depressed, a HIGH is input to the optical isolator network. The optical isolator network outputs a LOW to transistor switch Q1, Q2, Q3, or Q4 which applies a HIGH to the appropriate mode control input circuit and alarm reset circuit.
- 4-32. **REMOTE OFF.** When the front-panel **REMOTE CONTROL OFF** switch/indicator is illuminated, the ground potential at the input of the optical isolator network is removed which disables the remote input circuit.
- 4-33. **ALARM RESET CIRCUIT.** The alarm reset circuit reactivates the alarm and automatic switching circuitry. This circuit consists of inverter U32D, transfer timer U47, and transfer timer reset gate U24C/U24D.
- 4-34. With the HIGH from U32E, OR gate U24C/U24D will output a HIGH to enable transfer timer U47. When a front-panel or remote control switch is depressed, a HIGH is input to inverter U32D through diode D3, D4, D5, or D6. U32D applies a LOW to U47 which generates a momentary HIGH to U32F and U28.
- 4-35. With the momentary HIGH from U47, alarm latch U28 will output a HIGH through inverters U32E and U31B to deenergize alarm relay K4. The HIGH from U28 is also applied to U30C. The momentary HIGH from U47 is also applied to inverter U32F which applies a LOW to DS1. DS1 will illuminate to indicate the transfer timer is energized. The LOW from U32F is also applied to U30C which will output a LOW to disable automatic enable gate U26A.

- 4-36. The duration of the HIGH from U47 is determined by the position of programmable jumper P11. When the output of U47 returns to a logic LOW, a HIGH is applied to U30C through inverter U32F. U30C will output a HIGH to automatic enable gate U26A which activates the automatic switching circuitry.
- 4-37. **POWER PRESET CIRCUIT.** Integrated circuits U30B, U31G, U32A, U32B, and transistor Q7 operate as a preset power circuit. Whenever power is applied to the FA-2, the preset circuit will initialize the logic circuitry to a preset format.
- 4-38. **POWER SUPPLY CIRCUIT.** An external +15V dc power source is routed to all integrated logic circuits. Integrated circuit U35 operates as a voltage regulator circuit to produce a regulated +12V dc supply for the remote source voltage.

# SECTION V MAINTENANCE

## 5-1. INTRODUCTION.

5-2. This section provides general maintenance information, electrical adjustment procedures, troubleshooting information, and component replacement procedures for the Broadcast Electronics FA-2 transmitter output switch controller.

## 5-3. SAFETY CONSIDERATIONS.

5-4. Low voltages are used throughout the FA-2 logic control and relay circuit boards. Maintenance with power on 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 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 performance log.



**WARNING**      ***DISCONNECT THE MAIN/ALTERNATE TRANSMITTER SYSTEM PRIMARY POWER BEFORE ATTEMPTING ANY EQUIPMENT MAINTENANCE.***  
**WARNING**

## 5-7. GENERAL.

5-8. Periodically remove abrasions from the FA-2 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.

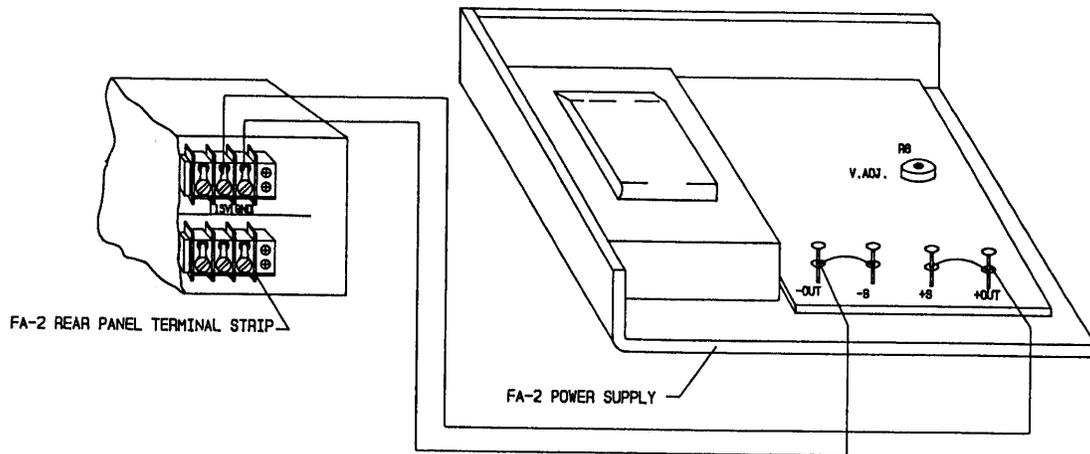
5-10. The FA-2 circuit boards should be periodically cleaned of accumulated dust using a soft brush and vacuum cleaner. Check the circuit boards for improperly seated semiconductors and components damaged by overheating.

## 5-11. SECOND LEVEL MAINTENANCE.

5-12. The second level maintenance consists of procedures required to restore an FA-2 to operation after a fault has occurred. The procedures are divided into electrical adjustment, troubleshooting, and component replacement procedures.

## 5-13. ELECTRICAL ADJUSTMENTS.

5-14. **POWER SUPPLY ADJUSTMENT.** Potentiometer R8 located on the power supply circuit board (refer to Figure 5-1) adjusts the power supply voltage. The power supply voltage is adjusted as follows.



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**FIGURE 5-1. POWER SUPPLY ADJUSTMENT**

5-15. **Procedure.** To adjust R8, proceed as follows:



**WARNING**      ***DISCONNECT PRIMARY POWER TO THE FA-2  
BEFORE PROCEEDING.***  
**WARNING**

- A. Disconnect the primary power to the FA-2.
- B. Connect a voltmeter between the +15V and ground terminals on the FA-2.
- C. Apply power to the unit.
- D. With an insulated tool, adjust V. ADJ R8 on the power supply until the meter indicates +15V.
- E. Disconnect the primary power to the FA-2 and remove all test equipment.

5-16. **TROUBLESHOOTING.**

5-17. The troubleshooting philosophy for the FA-2 output switch controller consists of isolating a problem to a specific circuit. The problem may be further isolated by referencing the following information and Figure 5-2 which presents the FA-2 troubleshooting information.





**WARNING**

***DISCONNECT THE POWER SOURCE FROM THE FA-2 BEFORE REMOVING OR REPLACING ANY COMPONENTS.***

**WARNING**



**CAUTION**

***INADVERTENT CONTACT BETWEEN ADJACENT COMPONENTS OR CIRCUIT BOARDS WITH TEST EQUIPMENT MAY CAUSE SERIOUS DAMAGE TO THE OUTPUT SWITCHER.***

**CAUTION**

- 5-18. After the problem 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 repair or replacement.
- 5-19. **COMPONENT REPLACEMENT.**
- 5-20. 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.
- 5-21. 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 reheating with a low wattage iron and removing solder with a soldering vacuum tool.
- 5-22. 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**

***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 MANUFACTURES CAUTIONARY INSTRUCTIONS.***

**WARNING**

- 5-23. After soldering, remove residual flux with a suitable solvent. Rubbing alcohol is highly diluted and is not effective.
- 5-24. 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.
- 5-25. **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 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 FA-2 output switch controller. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram.

**TABLE 6-1. REPLACEABLE PARTS LISTS**

<b>TABLE NO.</b>	<b>DESCRIPTION</b>	<b>PART NO.</b>	<b>PAGE</b>
6-2	FA-2 OUTPUT SWITCH CONTROLLER FINAL ASSEMBLY	909-0200-004	2
6-3	FA-2 REMOTE POWER SUPPLY ASSEMBLY	959-0188	2
6-4	FA-2 FINAL ASSEMBLY PARTS KIT	959-0279	2
6-5	FA-2 LOGIC CIRCUIT BOARD ASSEMBLY	919-0193-001	2
6-6	FA-2 RELAY CIRCUIT BOARD ASSEMBLY	919-0094	5
6-7	FA-2 CABLE ASSEMBLY	949-0132	6
6-8	LED CIRCUIT BOARD ASSEMBLY	919-0193-002	6

**TABLE 6-2. FA-2 OUTPUT SWITCH CONTROLLER FINAL ASSEMBLY - 909-0200-004**

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Instruction Manual	597-0107-004	1
----	Remote Power Supply Assembly	959-0188	1
----	Final Assembly Parts Kit	959-0279	1

**TABLE 6-3. FA-2 REMOTE POWER SUPPLY ASSEMBLY, 117V 50/60 Hz - 959-0188**

REF. DES.	DESCRIPTION	PART NO.	QTY.
F1	Fuse, AGC, 1/2A, 250V, Slow-Blow	334-0050	1
----	Fuse Holder	415-0004	1
----	Power Supply, 15V, 1.5 Ampere	540-0002	1
----	Power Cord, N.E.M.A. 3-Wire North American Plug	681-1723	1
----	Connector, 25-Pin	417-0251	1
----	Pin, Connector	418-0048	25

**TABLE 6-4. FA-2 FINAL ASSEMBLY PARTS KIT - 959-0279**

REF. DES.	DESCRIPTION	PART NO.	QTY.
DS3 THRU DS8	Lamp, No. 73, 14V, 0.08A, T-1 3/4 Bulb, Wedge Base	320-0007	6
L1,L2	Ferrite Shield, Impedance: 58 - 108 MHz	360-0058	2
S1,S2	Switch, Square Illuminated Pushbutton, SPDT, Panel Mount, 0.1A @ 125V dc	340-0067	2
S3 THRU S6	Switch, Push, Rectangular, Momentary Contact, Illuminated, SPDT, 0.1A @ 125V dc	340-0071	4
TB1,TB2	Barrier Strip, 20 Terminals	412-0020	2
----	Switchbutton, Micro, White, Rectangular, Incandescent Display	340-0048	2
----	Switchbutton, Micro, Red, Rectangular, Incandescent Display	340-0068	1
----	Switchbutton, Micro, Green, Rectangular, Incandescent Display	340-0069	1
----	Switchbutton, Micro, Yellow, Square, Incandescent Display	340-0070	2
----	FA-2 Logic Circuit Board Assembly	919-0193-001	1
----	FA-2 Relay Circuit Board Assembly	919-0094	1
----	FA-2 Cable Assembly	949-0132	1
----	Remote Power Supply Assembly	959-0188	1
----	LED Circuit Board Assembly	919-0193-002	1

**TABLE 6-5. FA-2 LOGIC CIRCUIT BOARD ASSEMBLY - 919-0193-001  
(Sheet 1 of 4)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,C2	Capacitor, Electrolytic, 10 uF, 35V	023-1076	2
C3	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C4	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C5	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	1
C6	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C7 THRU C13	Capacitor, Monolythic Ceramic, 0.1 uF ±20%, 50V	003-1054	7
C14	Capacitor, Electrolytic, 3.3 uF, 50V	020-3363	1

**TABLE 6-5. FA-2 LOGIC CIRCUIT BOARD ASSEMBLY - 919-0193-001  
(Sheet 2 of 4)**

<b>REF. DES.</b>	<b>DESCRIPTION</b>	<b>PART NO.</b>	<b>QTY.</b>
C15	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C16	Capacitor, Electrolytic, 470 uF, 50V	024-4783	1
C18	Capacitor, Monolythic Ceramic, 0.1 uF $\pm$ 20%, 50V	003-1054	1
C19 THRU C21	Capacitor, Electrolytic, 10 uF, 35V	023-1076	3
C22	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C23	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C24,C25	Capacitor, Electrolytic, 100 uF, 35V	023-1084	2
C26 THRU C44	Capacitor, Monolythic Ceramic, 0.1 uF $\pm$ 20%, 50V	003-1054	19
C45,C46	Capacitor, Electrolytic, 33 uF, 35V	024-3335	2
D1 THRU D51	Diode, 1N4005, Silicon, 400V @ 30 uA	203-4005	51
D52	Diode, Zener, 1N4740A, 10V, 1W	200-4740	1
D53 THRU D58	Diode, 1N4005, Silicon, 400V @ 30 uA	203-4005	6
DS1	Indicator, LED, Red, 521-9212, 1.7V @ 50 mA Maximum	323-9217	1
J1	Connector, Header, 26-Pin Dual In-line	417-2600	1
J2	Connector, 25-Pin D Type	418-2500	1
J3 THRU J8	Connector, Header, 3-Pin In-Line	417-0003	6
J9,J10	Socket, 16-Pin DIP	417-1604	2
J11	Connector, Header, 2-Pin In-line	417-4004	1
J12	Connector, Header, 3-Pin In-line	417-0003	1
K1 THRU K3	Relay, Coil: 12V dc Contact: DPDT, 120V ac @ 1 Ampere	270-0058	3
P3 THRU P8, P11,P12	Jumper, Programmable, 2-Pin	340-0004	8
Q1 THRU Q7	Transistor, 2N3906, PNP, Silicon, 40V, TO-92 Case	210-3906	7
R1	Resistor, 10 k Ohm $\pm$ 1%, 1/4W	100-1051	1
R2	Resistor, 34.8 k Ohm $\pm$ 1%, 1/4W	103-3485	1
R3	Resistor, 10 k Ohm $\pm$ 1%, 1/4W	100-1051	1
R4,R5	Potentiometer, 20 k Ohm $\pm$ 10%, 1/2W	178-2054	2
R6	Resistor, 4.75 k Ohm $\pm$ 1%, 1/4W	103-4741	1
R7	Resistor, 10 k Ohm $\pm$ 1%, 1/4W	100-1051	1
R8,R9	Resistor, 30 Ohm $\pm$ 5%, 1W	120-3023	2
R12	Resistor, 499 k Ohm $\pm$ 1%, 1/4W	103-4996	1
R13	Resistor, 10 k Ohm $\pm$ 1%, 1/4W	100-1051	1
R14	Resistor, 499 k Ohm $\pm$ 1%, 1/4W	103-4996	1
R15,R16	Resistor, 1 k Ohm $\pm$ 5%, 1/2W	110-1043	2
R17 THRU R20	Resistor, 100 k Ohm $\pm$ 1%, 1/4W	103-1062	4
R21 THRU R24	Resistor, 10 k Ohm $\pm$ 1%, 1/4W	100-1051	4
R25	Resistor, 20 Ohm $\pm$ 5%, 1/4W	100-2023	1
R26	Resistor, 560 Ohm $\pm$ 5%, 1/2W	110-5633	1
R27	Resistor, 10 k Ohm $\pm$ 1%, 1/4W	100-1051	1
R32	Resistor, 47.5 k Ohm $\pm$ 1%, 1/4W	103-4755	1
R33	Resistor, 2.43 k Ohm $\pm$ 1%, 1/4W	103-2434	1
R34	Resistor, 47.5 k Ohm $\pm$ 1%, 1/4W	103-4755	1
R35,R36	Resistor, 100 k Ohm $\pm$ 1%, 1/4W	103-1062	2

**TABLE 6-5. FA-2 LOGIC CIRCUIT BOARD ASSEMBLY - 919-0193-001**  
(Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R37	Resistor, 10 k Ohm $\pm 1\%$ , 1/4W	100-1051	1
R38	Potentiometer, 2 Meg Ohm $\pm 10\%$ , 1/2W	178-2074	1
R39 THRU R44	Resistor, 10 k Ohm $\pm 1\%$ , 1/4W	100-1051	6
R46	Resistor, 1 k Ohm $\pm 1\%$ , 1/4W	100-1041	1
R47	Resistor, 100 k Ohm $\pm 1\%$ , 1/4W	103-1062	1
R48,R49	Resistor, 47.5 k Ohm $\pm 1\%$ , 1/4W	103-4755	2
R50	Resistor, 10 k Ohm $\pm 1\%$ , 1/4W	100-1051	1
R51	Resistor, 47.5 k Ohm $\pm 1\%$ , 1/4W	103-4755	1
R52	Resistor, 560 Ohm $\pm 5\%$ , 1/2W	110-5633	1
R53	Resistor, 20 Ohm $\pm 5\%$ , 1/4W	100-2023	1
R54	Resistor, 30 Ohm $\pm 5\%$ , 1W	120-3023	1
R55	Resistor, 10 k Ohm $\pm 1\%$ , 1/4W	100-1051	1
R56	Resistor, 100 k Ohm $\pm 1\%$ , 1/4W	103-1062	1
R57 THRU R59	Resistor, 30 Ohm $\pm 5\%$ , 1W	120-3023	3
R60 THRU R63	Resistor, 20 Ohm $\pm 5\%$ , 1/4W	100-2023	4
R64 THRU R67	Resistor, 560 Ohm $\pm 5\%$ , 1/2W	110-5633	4
R68 THRU R77	Resistor, 1 k Ohm $\pm 1\%$ , 1/4W	100-1041	10
R78	Resistor, 332 Ohm $\pm 1\%$ , 1/4W	103-3323	1
R79 THRU R81	Resistor, 100 k Ohm $\pm 1\%$ , 1/4W	103-1062	3
R82 THRU R84	Resistor, 10 k Ohm $\pm 1\%$ , 1/4W	100-1051	3
R85	Resistor, 76.8 k Ohm $\pm 1\%$ , 1/4W	103-7685	1
R86	Resistor, 383 k Ohm $\pm 1\%$ , 1/4W	103-3836	1
R87 THRU R91	Resistor, 100 Ohm $\pm 1\%$ , 1/4W	100-1031	5
U1,U2	Integrated Circuit, LM358N, Dual Operational Amplifier, 8-Pin DIP	221-0358	2
U3 THRU U6	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	4
U7	Integrated Circuit, MC1416P, 7 NPN Darlington Driver Pack, 16-Pin DIP	226-2004	1
U8	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U9	Integrated Circuit, MC14011BCP, Quad 2-Input NAND Gate, CMOS, 14-Pin DIP	228-4011	1
U10,U11	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	2
U12	Integrated Circuit, MC14011BCP, Quad 2-Input NAND Gate, CMOS, 14-Pin DIP	228-4011	1
U13 THRU U18	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	6
U19	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1

**TABLE 6-5. FA-2 LOGIC CIRCUIT BOARD ASSEMBLY - 919-0193-001**  
(Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U20	Integrated Circuit, NE555V, Timer, 8-Pin DIP	229-0555	1
U21	Integrated Circuit, MC14011BCP, Quad 2-Input NAND Gate, CMOS, 14-Pin DIP	228-4011	1
U22	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U23,U24	Integrated Circuit, CD4071B, OR Gate, CMOS, 14-Pin DIP	225-0005	2
U25,U26	Integrated Circuit, MC14073B, Tripple 3-Input AND Gate, CMOS, 14-Pin DIP	228-4073	2
U27	Integrated Circuit, CD4081B, AND Gate, CMOS, 14-Pin DIP	225-0008	1
U28	Integrated Circuit, MC14013BCP, Dual Type D Flip-Flop, CMOS, 14-Pin DIP	228-4013	1
U29	Integrated Circuit, MC14538B, Dual Retriggerable, Resettable Monostable Multivibrator, CMOS, 16-Pin DIP	228-4538	1
U30	Integrated Circuit, CD4081B, AND Gate, CMOS, 14-Pin DIP	225-0008	1
U31	Integrated Circuit, MC1416P, 7 NPN Darlington Driver Pack, 16-Pin DIP	226-2004	1
U32	Integrated Circuit, MC14584, Hex Schmitt Trigger, CMOS, 14-Pin DIP	228-4584	1
U33	Integrated Circuit, MC1416P, 7 NPN Darlington Driver Pack, 16-Pin DIP	226-2004	1
U34	Integrated Circuit, CD4081B, AND Gate, CMOS, 14-Pin DIP	225-0008	1
U35	Integrated Circuit, LM78L12CZ, Three-Terminal Positive 12V Regulator, TO-92 Case	220-7812	1
U36 THRU U46	Integrated Circuit, 4N33, Optical Isolator, NPN Photo Transistor/Infared Emitting Diode Type, 1500V Isolation, Response: 30 kHz Maximum, Current: 50 mA Maximum, 6-Pin DIP	229-0033	11
U47	Integrated Circuit, NE555V, Timer, 8-Pin DIP	229-0555	1
----	Socket, 6-Pin DIP	417-0600	21
----	Socket, 8-Pin DIP	417-0804	4
----	Socket, 14-Pin DIP	417-1404	15
----	Socket, 16-Pin DIP	417-1604	9
----	Blank Circuit Board	519-0193-001	1

**TABLE 6-6. FA-2 RELAY CIRCUIT BOARD ASSEMBLY - 919-0094**  
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C50	Capacitor, Ceramic, 0.001 uF, 1 kV	002-1034	50
D1 THRU D4	Diode, 1N4005, Silicon, 600V @ 1 Ampere	203-4005	4
D5,D6	Diode, MR502, Silicon, 200V @ 3 Amperes	202-0502	2
J100,J101	Connector, Header, 13-Pin Dual In-line	417-2600	2
J102 THRU J104	Receptacle, 12-Pin	417-1276	3
J110	Socket, 16-Pin DIP	417-1604	1
K4 THRU K7	Relay, Coil: 12V dc, 160 Ohms Contact: 4PDT, 5A @ 240V ac	270-0053	4
L1 THRU L15	RF Choke, 4.7 uH ±10%, 430 mA, DC Resistance: 0.55 Ohms, 0.43 Amperes Maximum, Resonant at 115 MHz	360-0022	15

**TABLE 6-6. FA-2 RELAY CIRCUIT BOARD ASSEMBLY - 919-0094  
(Sheet 2 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
R1 THRU R4	Resistor, 1 k Ohm $\pm 1\%$ , 1/4W	100-1041	4
R6 THRU R11	Resistor, 1 k Ohm $\pm 1\%$ , 1/4W	100-1041	6
XK4 THRU XK7	Socket, Relay	270-0055	4
----	Blank Circuit Board	519-0094	1

**TABLE 6-7. FA-2 CABLE ASSEMBLY - 949-0132**

REF. DES.	DESCRIPTION	PART NO.	QTY.
J1	Connector, Female, 25-Pin D-Type	417-0129	1
P1	Plug, Ribbon Cable, Dual 13 Contact	418-2600	1
P2	Plug, 25-Pin, D-Type	418-3219	1
P9	Plug, 16-Pin DIP	417-1605	1
P100,P101	Plug, Ribbon Cable, Dual 13 Contact	418-2600	2
P102 THRU P104	Connector, Housing, 12-Pin	418-1271	3
P110	Plug, 16-Pin DIP	417-1605	1
P201	Connector, Housing, 5-Pin In-Line	417-0165	1
----	Socket, MR Amp Type	417-0053	34
----	Pins, Crimp Type	417-8766	4

**TABLE 6-8. FA-2 LED CIRCUIT BOARD ASSEMBLY - 919-0193-002**

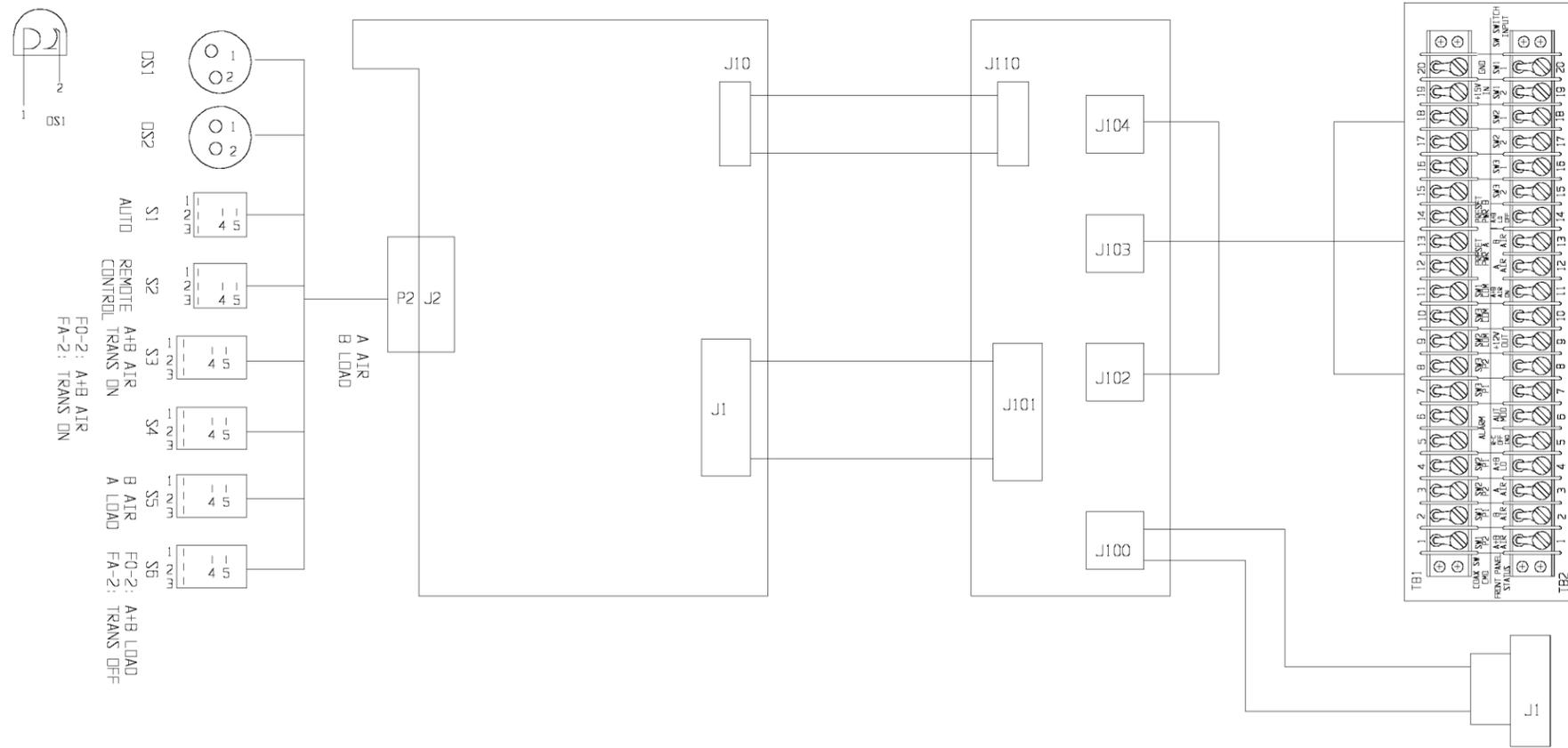
REF. DES.	DESCRIPTION	PART NO.	QTY.
DS201, DS202	Indicator, LED, Red, 521-9212, 1.7V @ 50 mA Maximum	323-9217	2
----	Receptacle, Male, 20-Pin In-Line	417-0200	1
----	Blank Circuit Board	519-0193-002	1

# 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 FA-2 transmitter output switch controller.

<b>FIGURE</b>	<b>TITLE</b>	<b>NUMBER</b>
7-1	FA-2/FO-2 OVERALL SCHEMATIC DIAGRAM	SD909-0117, 909-0200
7-2	FA-2 ASSEMBLY DIAGRAM	AD909-0200-004
7-3	RELAY CIRCUIT BOARD SCHEMATIC DIAGRAM	SC919-0094
7-4	RELAY CIRCUIT BOARD ASSEMBLY DIAGRAM	AD919-0094
7-5	LOGIC OUTPUT SWITCHER SCHEMATIC DIAGRAM	SD919-0193-001 /-002
7-6	LOGIC OUTPUT SWITCHER ASSEMBLY DIAGRAM	AC919-0193-001 /-002
7-7	FA-2 AND COAXIAL SWITCH INTERFACING	597-0107-16
7-8	FA-2 REMOTE CONTROL WIRING DIAGRAM	597-0107-17
7-9	OVERALL WIRING DIAGRAM, FM-1C1/FM-500C1 MAIN/ALTERNATE TRANSMITTER SYSTEM	SB909-2111-205/ 909-2501-205



J1 ↔ J101

PIN #	DESCRIPTION
1	ALARM RELAY (K4)
2	TRANS A H.V. ON
3	TRANS B H.V. ON
4	TRANS A FIL OFF
5	TRANS B FIL OFF
6	TRANS A H.V. OFF
7	TRANS B H.V. OFF
8	MOTOR SWITCH RELAY (K5)
9	SWITCH 1 & 2 MOTOR DIRECTION RELAY (K6)
10	SWITCH 3 MOTOR DIRECTION RELAY (K7)
11	+15V DC
12	GND
13	GND
14	TRANS A SAMPLE V
15	TRANS B SAMPLE V
16	A+B LD (TRANS OFF)
17	B-AIR
18	A-AIR
19	A+B APC (TRANS ON)
20	R-C COMM
21	SW1-1
22	SW1-2
23	SW2-1
24	SW2-2
25	SW3-1
26	SW3-2

J100 ↔ J1

PIN #	DESCRIPTION
1	N.C.
2	N.C.
3	TRANS B FIL OFF
4	TRANS A FIL OFF
5	N.C.
6	N.C.
7	TRANS A H.V. OFF
8	TRANS B H.V. OFF
9	TRANS A H.V. ON
10	TRANS B H.V. ON
11	TRANS B POWER SAMPLE
12	GND
13	GND
14	+15V-ENABLE FOR DIAL XMTR CONTROLLER
15	+15V-ENABLE FOR DIAL XMTR CONTROLLER
16	+15V-ENABLE FOR DIAL XMTR CONTROLLER
17	+15V-ENABLE FOR DIAL XMTR CONTROLLER
18	+15V-ENABLE FOR DIAL XMTR CONTROLLER
19	+15V-ENABLE FOR DIAL XMTR CONTROLLER
20	+15V-ENABLE FOR DIAL XMTR CONTROLLER
21	+15V-ENABLE FOR DIAL XMTR CONTROLLER
22	+15V-ENABLE FOR DIAL XMTR CONTROLLER
23	+15V-ENABLE FOR DIAL XMTR CONTROLLER
24	TRANS A POWER SAMPLE
25	+15V SUPPLY VOLTAGE

J104 ↔ REAR PANEL TERMINAL STRIP

PIN #	TERMINAL	DESCRIPTION
1	PRESET A	SWITCH CONTROLS
2	SW3-2	SWITCH STATUS
3	+15V IN	
4	PRESET B	SWITCH CONTROLS
5	SW3-1	SWITCH STATUS
6	SW2-2	SWITCH STATUS
7	GND	
8	SW1-2	SWITCH STATUS
9	SW2-1	SWITCH STATUS
10	N.C.	
11	SW1-1	SWITCH STATUS
12	N.C.	

J102 ↔ REAR PANEL TERMINAL STRIP

PIN #	TERMINAL	DESCRIPTION
1	SW1 P2	SWITCH CONTROLS
2	A+B AIR	RC STATUS
3	A AIR	RC STATUS
4	SW1 P1	SWITCH CONTROLS
5	B AIR	RC STATUS
6	A+B LOAD	RC STATUS
7	SW2 P2	SWITCH CONTROLS
8	ALARM	
9	R-C OFF IND	RC STATUS
10	SW2 P1	SWITCH CONTROLS
11	ALARM	
12	AUTO MODE	RC STATUS

J103 ↔ REAR PANEL TERMINAL STRIP

PIN #	TERMINAL	DESCRIPTION
1	SW3-P2	SWITCH CONTROLS
2	SW3-P1	SWITCH CONTROLS
3	+12V OUT	REMOTE CONTROL
4	SW3 COM	SWITCH CONTROLS
5	SW2 COM	SWITCH CONTROLS
6	A+B AIR DN	REMOTE CONTROL
7	PRESET A	SWITCH CONTROLS
8	SW1 COM	SWITCH CONTROLS
9	A AIR	REMOTE CONTROL
10	PRESET A	SWITCH CONTROLS
11	A+B LOAD OFF	REMOTE CONTROL
12	B AIR	REMOTE CONTROL

SWITCH JUMPERS

WIRE #	SWITCH	CONNECTION
17	S3-4 ↔	S2-5
18	S3-2 ↔	DS1-1
19	S5-4 ↔	S4-2
20	S6-4 ↔	S5-2
21	S4-4 ↔	S3-2
22	S2-2 ↔	S1-1
23	S2-5 ↔	S1-3
----	DS2-1 ↔	DS1-1
----	S6-2 ↔	S6-4
----	S5-2 ↔	S5-4
----	S4-2 ↔	S4-4
----	S3-2 ↔	S3-4
----	S1-3 ↔	S1-4

P2 ↔ FRONT PANEL COMPONENTS

PIN #	TERMINAL	PIN #	TERMINAL	PIN #	TERMINAL
1	S1-2	10	S6-3	19	N.C.
2	S1-5	11	S5-3	20	N.C.
3	S6-5	12	S4-3	21	N.C.
4	S4-5	13	S3-3	22	N.C.
5	S5-5	14	DS2-2	23	N.C.
6	S3-5	15	DS1-2	24	N.C.
7	S2-4	16	S2-2	25	DS2-1
8	S2-3	17	N.C.		
9	S2-1	18	N.C.		

J10 ↔ J110

PIN #	DESCRIPTION
1	A+B AIR (TRANS ON)
2	B AIR
3	A AIR
4	A+B LOAD (TRANS OFF)
5	RMT CNT OFF
6	AUTO MODE
7	N.C.
8	N.C.
9	STATUS SUPPLY
10	STATUS SUPPLY
11	STATUS SUPPLY
12	STATUS SUPPLY
13	STATUS SUPPLY
14	STATUS SUPPLY
15	STATUS SUPPLY
16	STATUS SUPPLY

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TOLERANCE (DECIMAL) U.O.S.  
 .x ± .030 .xxx ± .005  
 .xx ± .015 ANGLES ± 1°

DWN. BY: TLL 4-20-87  
 CKD  
 NE: J. STEINKAMP 9-11-87  
 PROJ. ENGR: J. TUCKER 3-18-88  
 MFG:

MATERIAL: SEE DWG RA582-0000  
 FINISH: NEXT ASSY.

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**BROADCAST ELECTRONICS, INC.**  
 4100 N. 24TH ST., P.O. BOX 3606 BUNEV, IL 62305 217/224-9600  
 TELEX 250142 CABLE BROADCAST

TITLE: FA-2/FD-2 OVERALL SCHEMATIC

TYPE: S SIZE: D DWG. NO.: 909-0117 & 909-0200 REV: C

MODEL: SCALE: NONE SHEET: 1 OF 1

420-6104  
423-6002  
441-8153  
423-6108  
TYP. 12 PLCS TO MT.  
919-0093 & 919-0094.

-919-0193-CU1-002

919-0094

-471-0541. REF.

420-6604, 2 PLCS

471-0711 MT WITH  
(2) 423-8002, (2) 421-8001

-471-0450-001

DETAIL 'A'  
TYP. 2 PLCS

NOTE POSITION OF  
JUMPERS ON J3-J8.

420-6104  
423-6002  
441-8153  
423-6108  
TYP. 2 PLCS

412-0020, 2 PLCS  
MTS. WITH (6) 420-6110,  
(6) 423-6002, (6) 421-6001,  
SEE DETAIL 'B' SHT. 2  
FOR WIRING.

407-0155, 2 PLCS  
LOCATION, TYR.

418-3227  
423-4002  
421-4001,  
TYP. 2 PLCS

471-0542, MT. WITH (4) 420-6505

471-0543, MT. WITH (4) 420-6505

REF.  
402-0000,  
4 PLCS, SEE DETAIL 'D'  
SHT. 2.

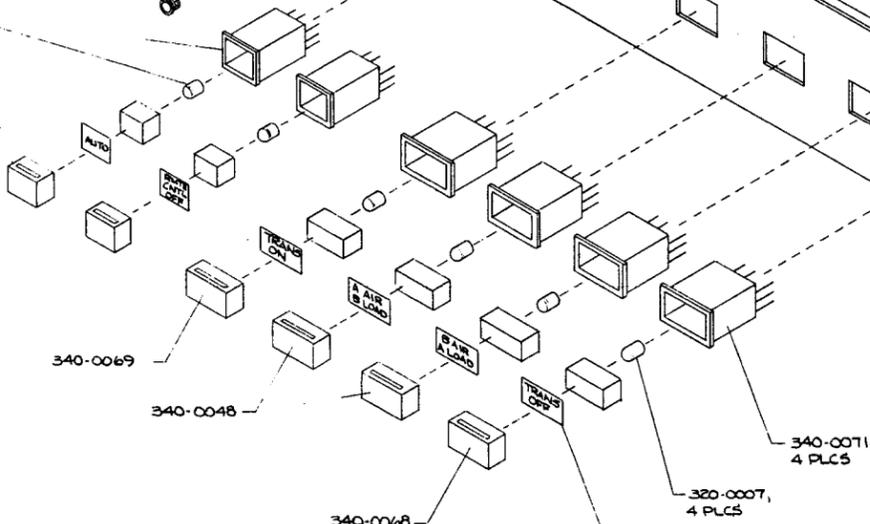
478-0050,  
4 PLCS, MT. TO 471-  
0541 WITH (8) 420-6508

400-6700,  
2 PLCS

693-0180, 10 LG.,  
611-0938, 38 LG.,  
TYP. 4 PLCS

454-0004  
323-9217  
APPLY SMALL AMOUNT OF  
100-0021 TO 323-9217 BEFORE  
ASSEMBLY, 2 PLCS.

340-0067  
340-0070  
320-0007  
TYP. 2 PLCS



P100  
P1  
471-0541,  
2 PLCS

471-0711, SEE DETAIL 'A'  
FOR MOUNTING TO 471-0541,  
SEE DETAIL 'C' SHT 2  
FOR SWITCH WIRING.

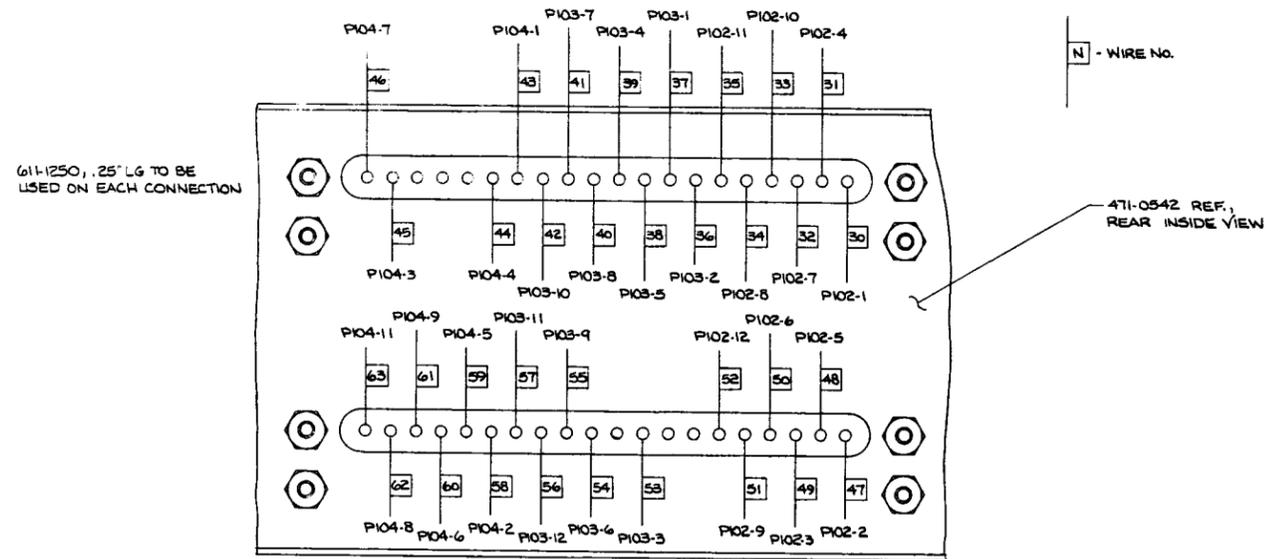
403-0002, MT.  
5 AWAY FROM  
CORNER, TYP. 4 PLCS

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	CHWD MSE 11-2-83	FINISH		
	ME	PROJ. ENGR. J. T. ...	SEE DWG RAS82-0000 NEXT ASSY.	TITLE ASSEMBLY, FAZ OUTPUT SWITCHER
	TOLERANCE (DECIMAL) U.S.S. .x ± .030 .xx ± .015 ANGLE ± 1°	TYPE A	SIZE D	DWG. NO. 909-0200-004
	MODEL FA 2	SCALE 	SHEET 1 OF 2	

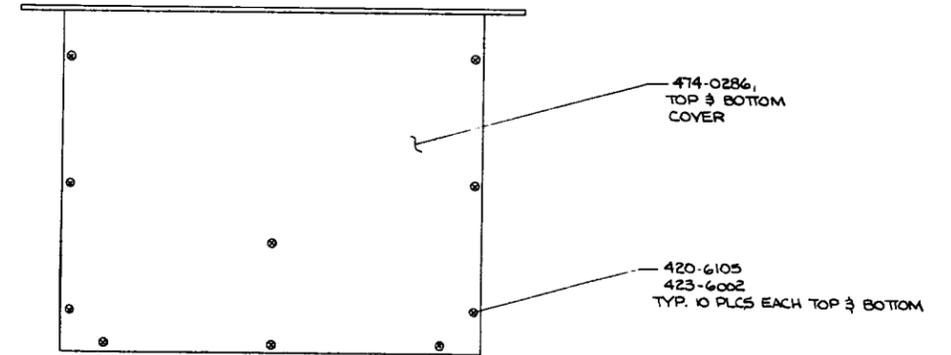
DETAIL 'B'



611-1250, .25" LG TO BE USED ON EACH CONNECTION

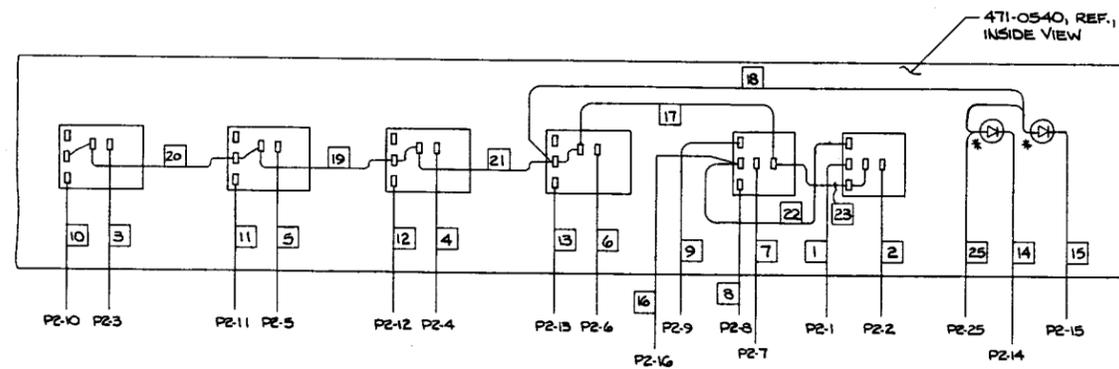
N - WIRE No.

471-0542 REF., REAR INSIDE VIEW



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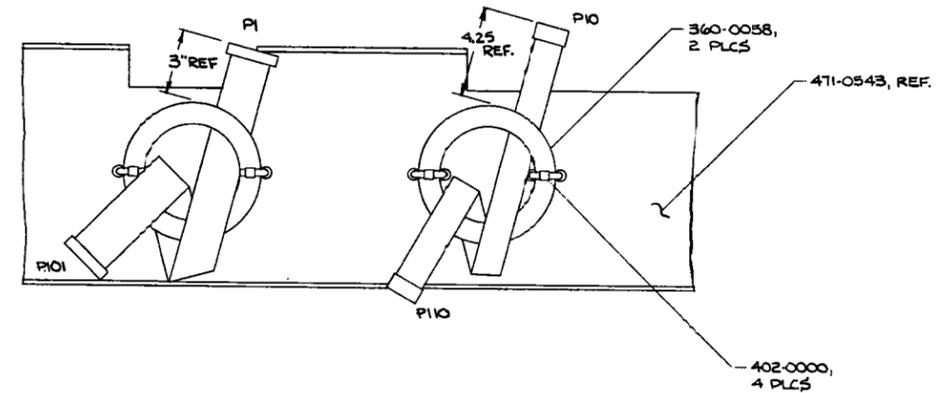
DETAIL 'C'



471-0540, REF., INSIDE VIEW

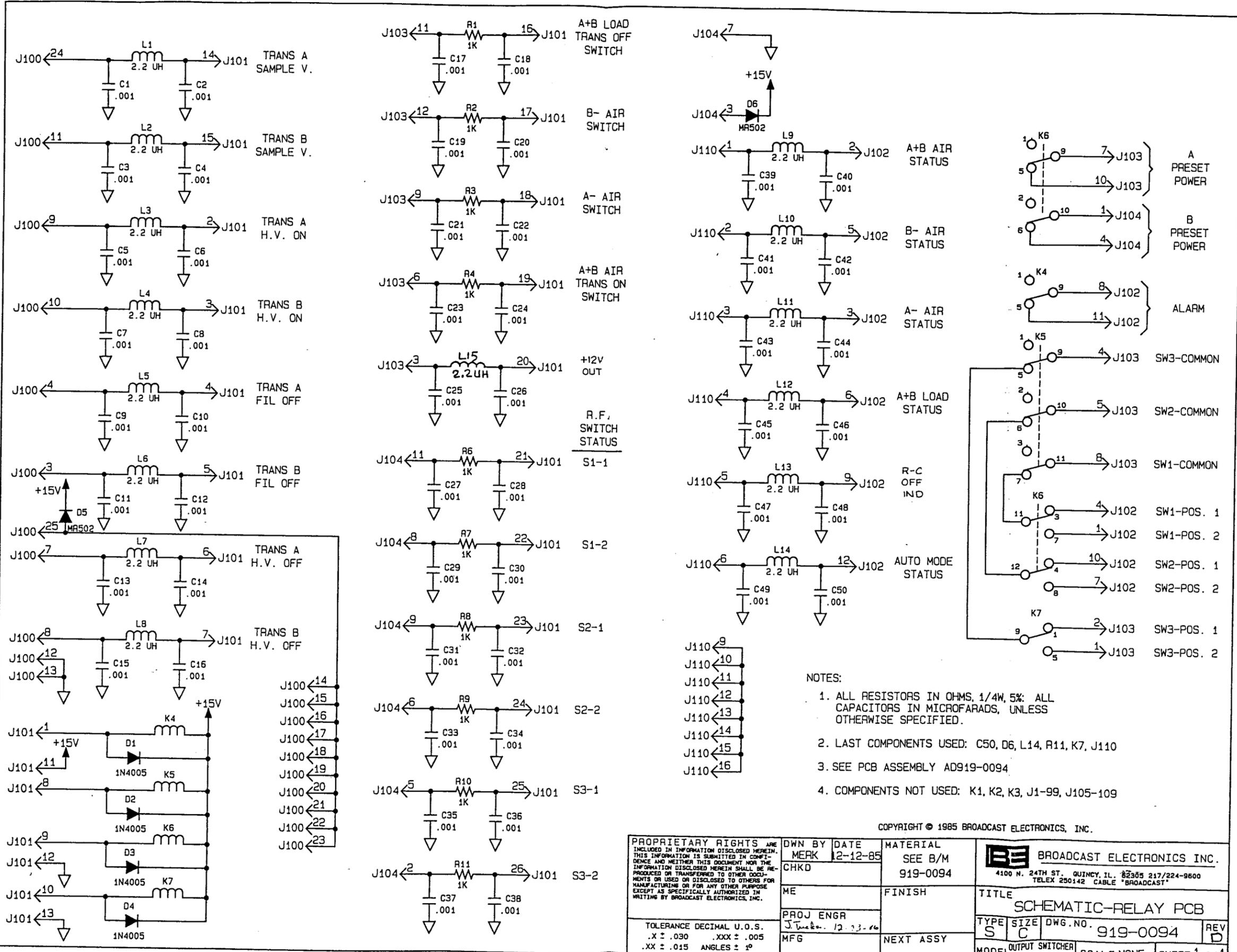


DETAIL 'D'



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	DWG. NO. 11-3-88	FINISH		
	PRD. ENGR. S. Tucker 11-1-88	SEE DWG RA882-004	TITLE ASSEMBLY, FA2 OUTPUT SWITCHER	TYPE A
	TOLERANCE (DECIMAL) U.O.S. .1 ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°	MFG. NEXT ASSY.	TYPE A	SIZE D
		DWG. NO. 909-0200-004	REV C	
		MODEL FA2	SCALE SHEET 2 OF 2	

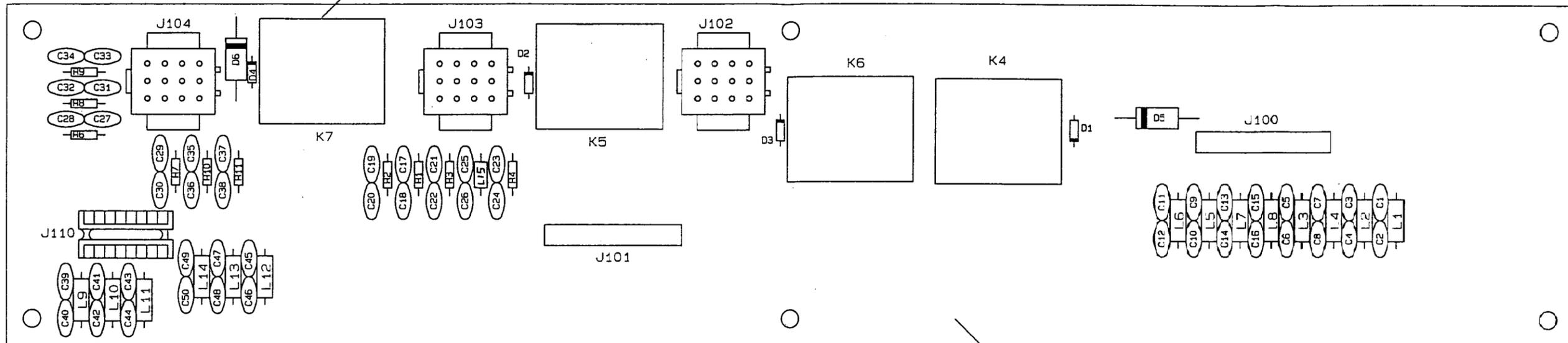


- NOTES:
1. ALL RESISTORS IN OHMS, 1/4W, 5%; ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
  2. LAST COMPONENTS USED: C50, D6, L14, R11, K7, J110
  3. SEE PCB ASSEMBLY AD919-0094
  4. COMPONENTS NOT USED: K1, K2, K3, J1-99, J105-109

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TOLERANCE DECIMAL U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°		ME PROJ ENGR J. T. ... 12-13-85 MFG	FINISH NEXT ASSY	TITLE SCHEMATIC-RELAY PCB	
TYPE S SIZE C DWG. NO. 919-0094 REV D			MODEL OUTPUT SWITCHER SCALE NONE SHEET 1 OF 1		

RELAYS K4, K5, K6, K7 PLUG INTO SOCKET 270-0055.  
4 PLCS.



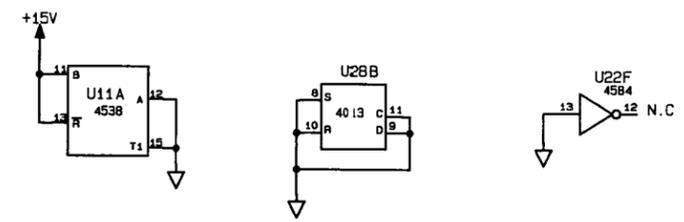
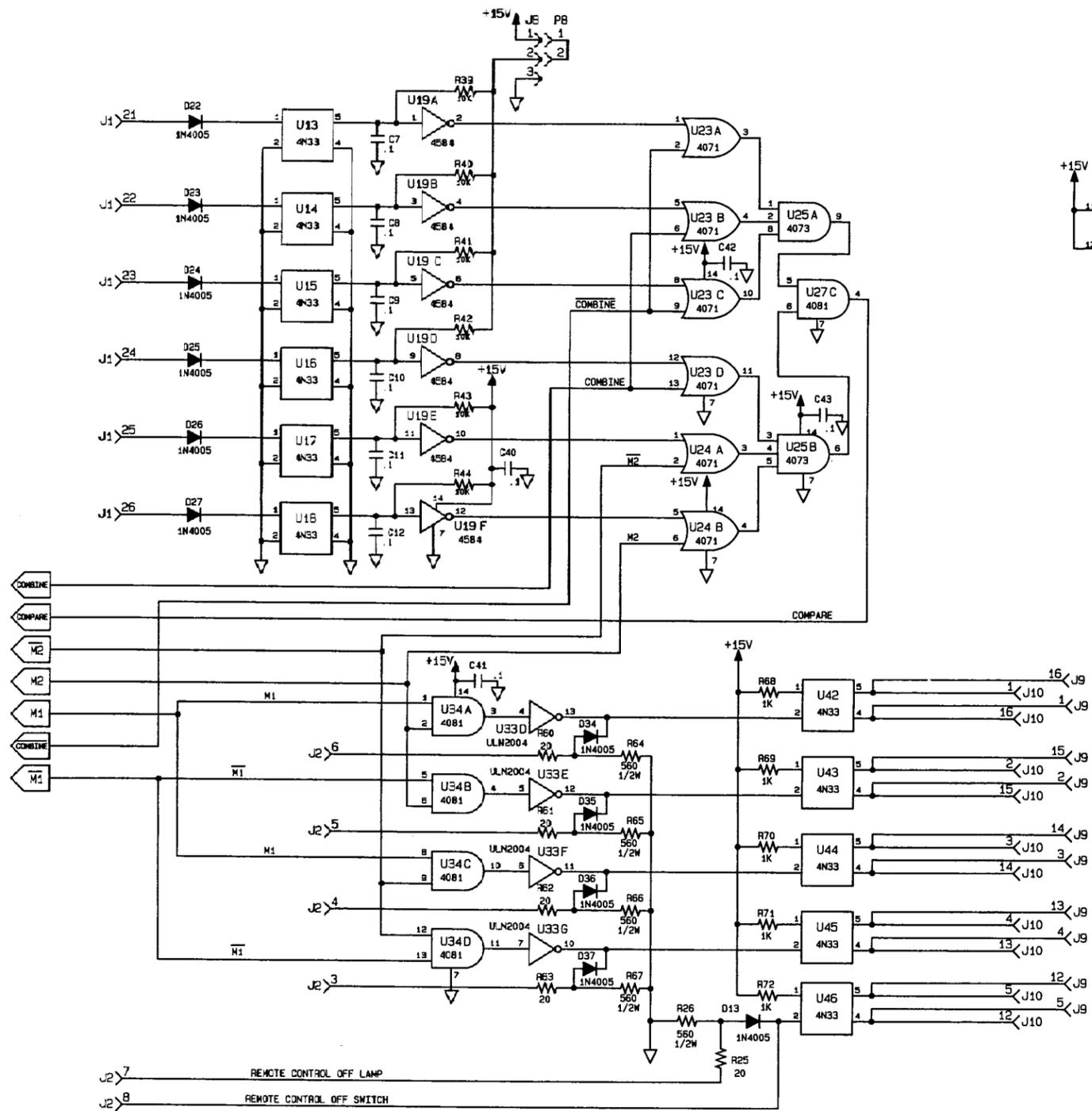
519-0094

NOTE:  
1. SEE SCHEMATIC SC919-0094.

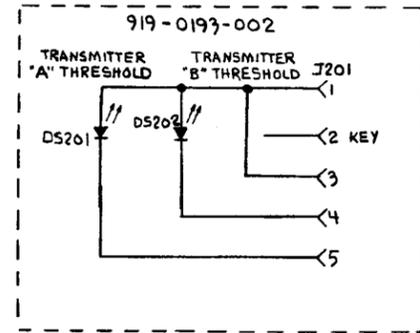
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	CHKD	7-9-86	
TOLERANCE DECIMAL U.S.S.	PRJ ENGR	FINISH	TITLE
.1 ± .030 .504 ± .045 .001 ± .015 ANGLES ± 0°	MFG	NEXT ASSY	PCB ASSEMBLY- RELAY BOARD
			TYPE SIZE DWG. NO. REV
			A D 919-0094 C
			MODEL SWITCHER SCALE 2/1 SHEET 1 OF 1



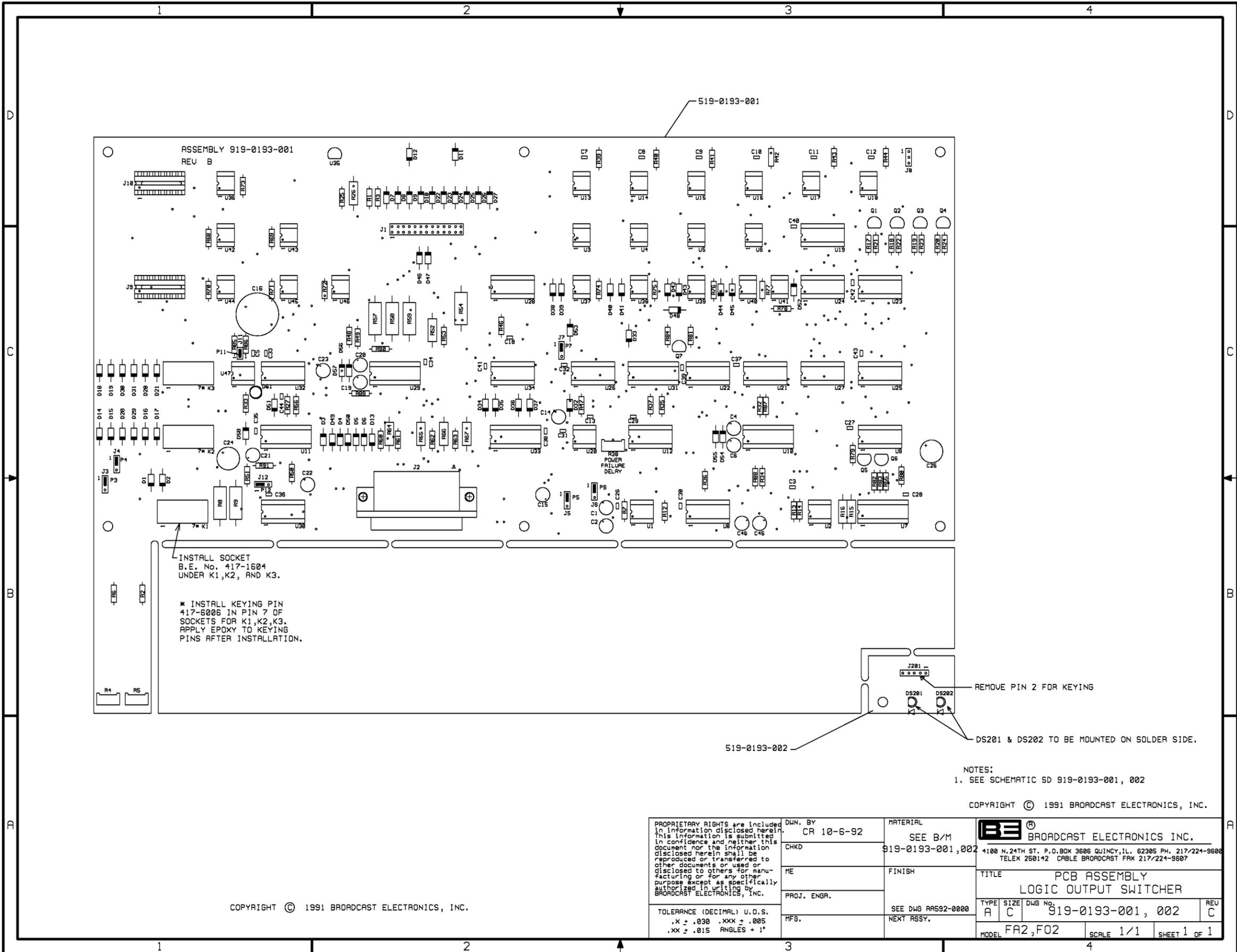


- NOTES:
1. ALL RESISTORS IN OHMS, 1/4W, 5%; ALL CAPACITORS IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
  2. LAST COMPONENTS USED: C46, D58, J12, K3, G7, R91, U47, DS1
  3. SEE PCB ASSEMBLY AC919-0193
  4. COMPONENTS NOT USED: C17, R10-R11, R28-R31, R45



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	CHKD WE	FINISH	
PROJ. ENGR. J. TUCKER 4-22-88 WFB. PR BROSE 4-22-88	NEXT ASSY AC919-0193-001,002	TYPE SIZE DWG. NO. S D 919-0193-001,002	MODEL FA2, F02 SCALE NONE SHEET 2 OF 2



ASSEMBLY 919-0193-001  
REV B

INSTALL SOCKET  
B.E. No. 417-1604  
UNDER K1, K2, AND K3.

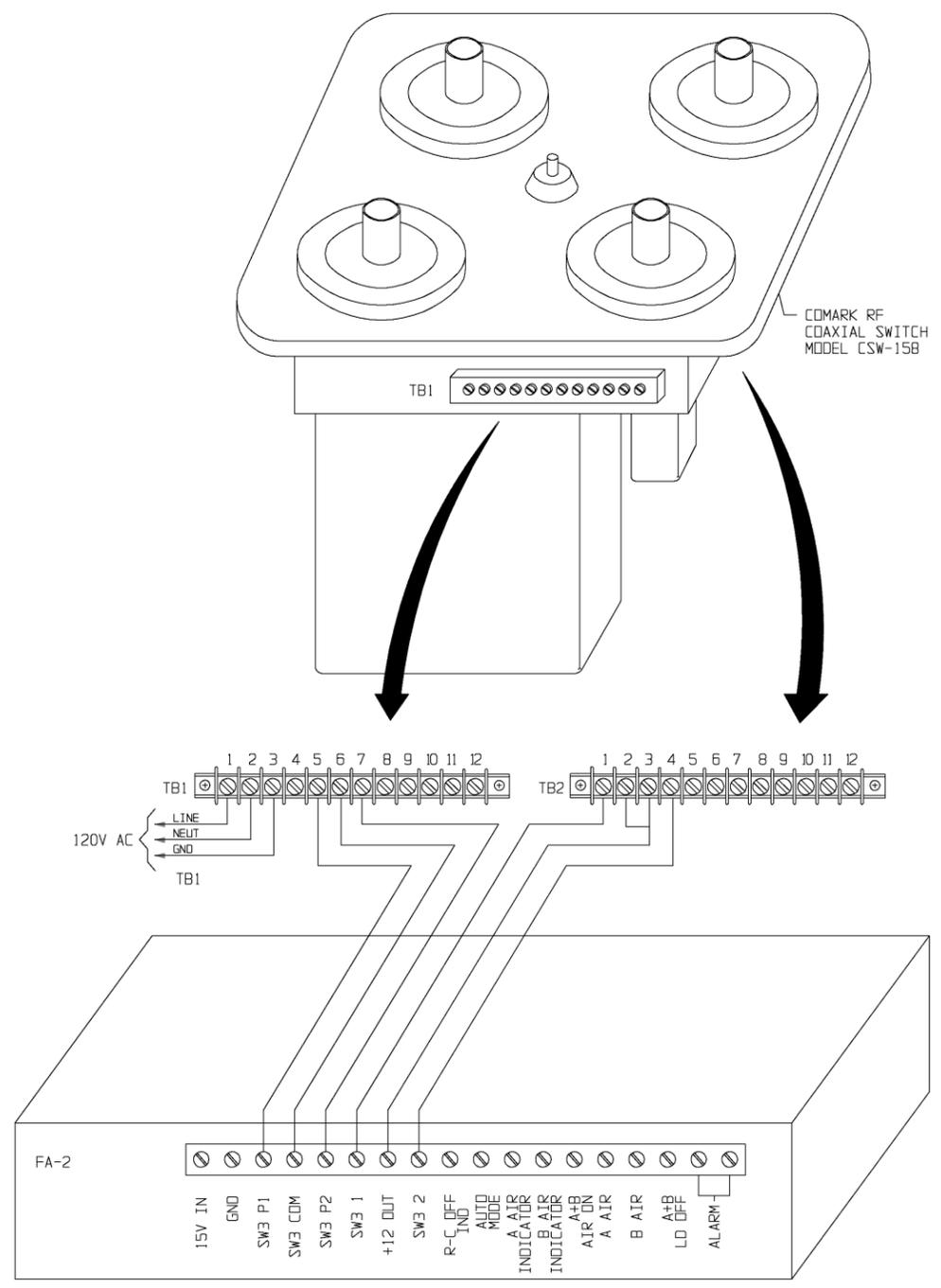
\* INSTALL KEYING PIN  
417-5006 IN PIN 7 OF  
SOCKETS FOR K1, K2, K3.  
APPLY EPOXY TO KEYING  
PINS AFTER INSTALLATION.

NOTES:  
1. SEE SCHEMATIC SD 919-0193-001, 002

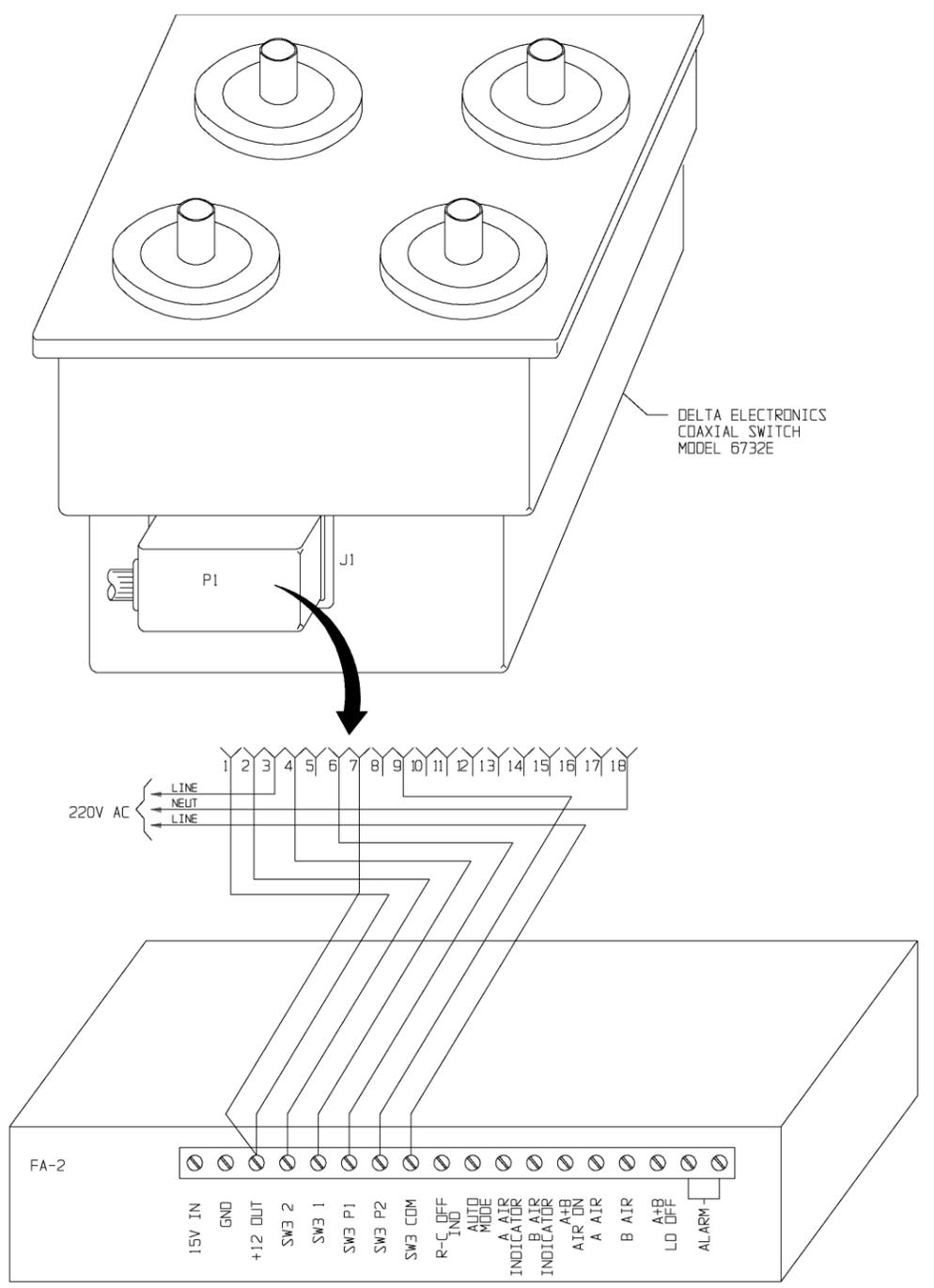
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	CHKD	919-0193-001, 002	
	ME	FINISH	TITLE PCB ASSEMBLY LOGIC OUTPUT SWITCHER
	PROJ. ENGR.	SEE DWG RA592-0020	TYPE SIZE DWG No. 919-0193-001, 002
MFG.	NEXT ASSY.	MODEL FA2, F02	SCALE 1/1
TOLERANCE (DECIMAL) U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES + 1°		SHEET 1 OF 1	

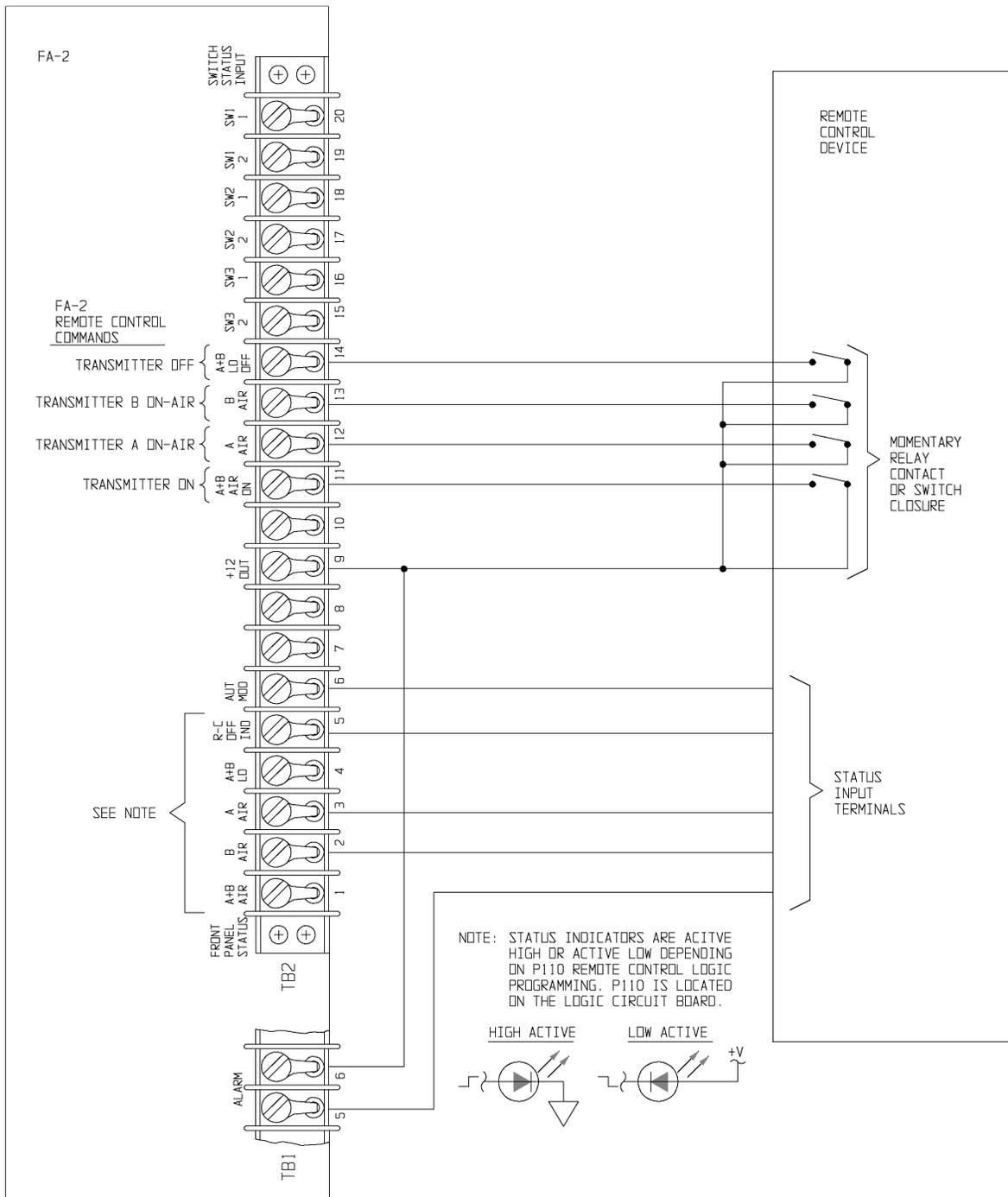


A  
FA-2 AND COMARK



B  
FA-2 AND DELTA ELECTRONICS

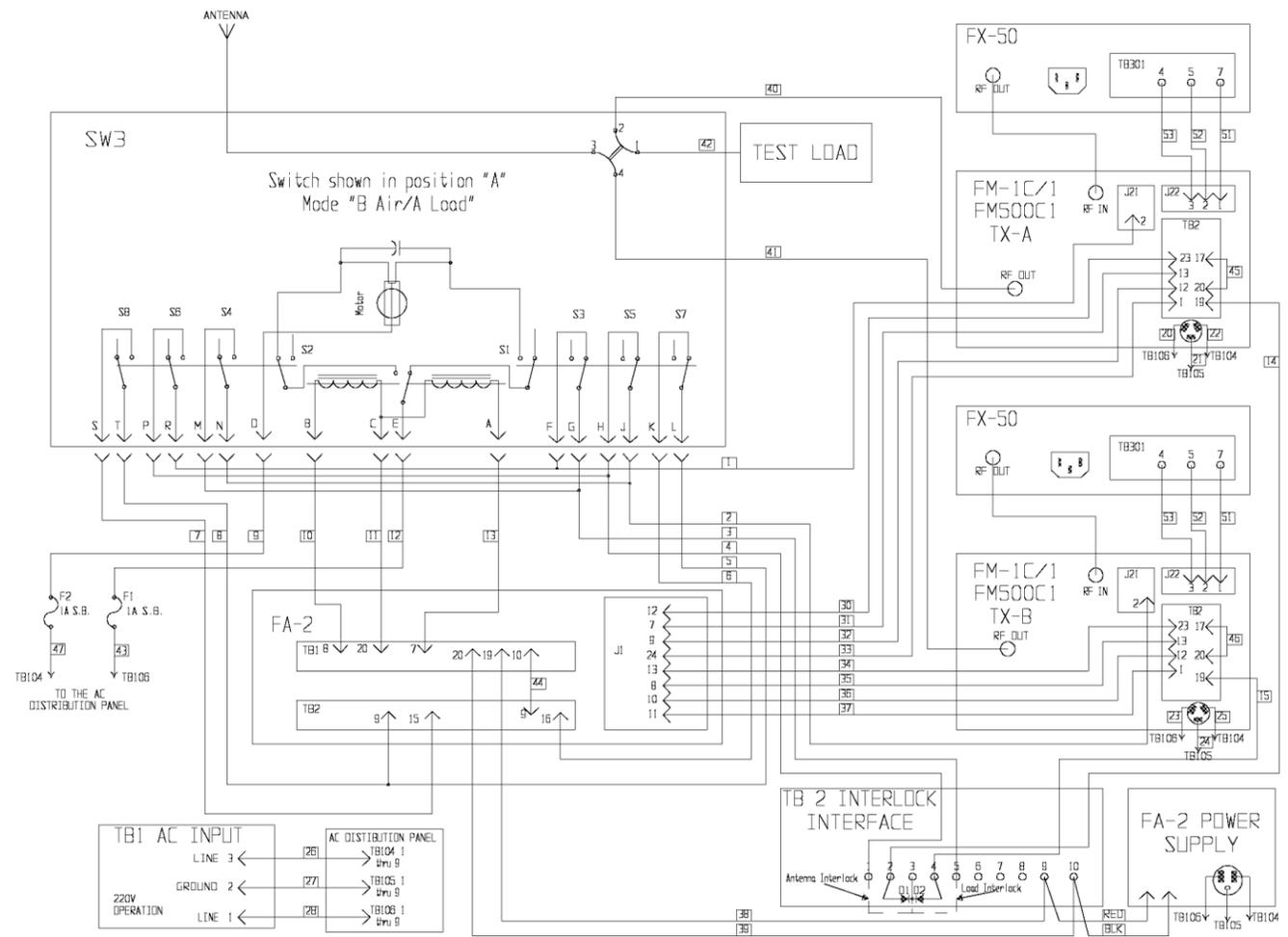
FIGURE 7-7.  
FA-2 AND COAXIAL SWITCH INTERFACING



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597-0107-17

FIGURE 7-8. FA-2 REMOTE CONTROL WIRING DIAGRAM



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	DESIGNER(S)  PROJ. LEADER DEAN LONG 1-30-95 MFG.	FINISH  SEE DWG RA592-0000 NEXT ASSY.	
		MODEL FM-1C1/FM-500C1	SCALE NONE SHEET 1 OF 1