

SET/7000
FIRE ALARM SYSTEM

TABLE OF CONTENTS

I. Theory of Operation

- A. SFA-1 Series Signal Modules
- B. Dual Zone Initiating Modules
- C. Class B Code Input Module
- D. General Alarm Module
- E. Class B DC Input/Output Module
- F. Dual Zone Smoke Detectors
- G. System Power Supply
- H. Signal Power Supply
- I. Battery Charger Modules
- J. Switching Regulator
- K. Timer Modules
- L. March Time Module
- M. Code Modules
- N. SFA-801 DC Signal Module

II. Field Service Test Procedure

- A. Module SFA-1-1
- B. Module SFA-1-2
- C. Module SFA-2-1
- D. Module SFA-3-1
- E. Module SFA-4-1

SET/7000
FIRE ALARM SYSTEM
FIELD SERVICE MANUAL
TIM-III

FOR INTERNAL USE ONLY

SET/7000
FIRE ALARM SYSTEM
FIELD SERVICE MANUAL

I Table of Contents

II Introduction

III Theory of Operation

- A. SFA-1 Series/ Alarm Signal Modules
- B. SFA-2 Series/ Dual Zone Initiating Modules w/ lock-in
- C. SFA-2-4/ Class B Code Input Module
- D. SFA-2-6/ General Alarm Module, Class B Closed Loop
- E. SFA-2-8/ Class B, DC, Input/Output Signal Module
- F. Dual Zone Smoke Detectors
- G. System Power Supply
- H. Signal Power Supply
- I. Battery Charger Modules
- J. Switching Regulator
- K. Timer Modules
- L. March Time Module
- M. Code Modules
- N. SFA-801/DC Signal Module (Stand-Alone)

IV Field Service Test Procedure

A. Signal Modules

- 1. SFA - 1 - 1
- 2. " - 1 - 2
- 3. " - 1 - 3
- 4. " - 1 - 4
- 5. " - 1 - 5
- 6. " - 1 - 6
- 7. " - 1 - 7
- 8. " - 1 - 9

B. Initiating Modules

- 1. SFA - 2 - 1
- 2. " - 2 - 2
- 3. " - 2 - 4
- 4. " - 2 - 6
- 5. " - 2 - 8
- 6. " - 2 - 11 and 2 - 12
- 7. " - 2 - 13 and 2 - 14

TABLE OF CONTENTS (cont)

- C. Power Supplies
 - 1. SFA - 3 - 1
 - 2. " - 3 - 2
 - 3. " - 3 - 3
 - 4. " - 3 - 4
 - 5. " - 3 - 5
 - 6. " - 3 - 6
 - 7. " - 3 - 9
 - 8. " - 3 - 10
 - 9. " - 3 - 11

- D. Auxilliary Modules
 - 1. SFA - 4 - 1
 - 2. " - 4 - 2
 - 3. " - 4 - 3

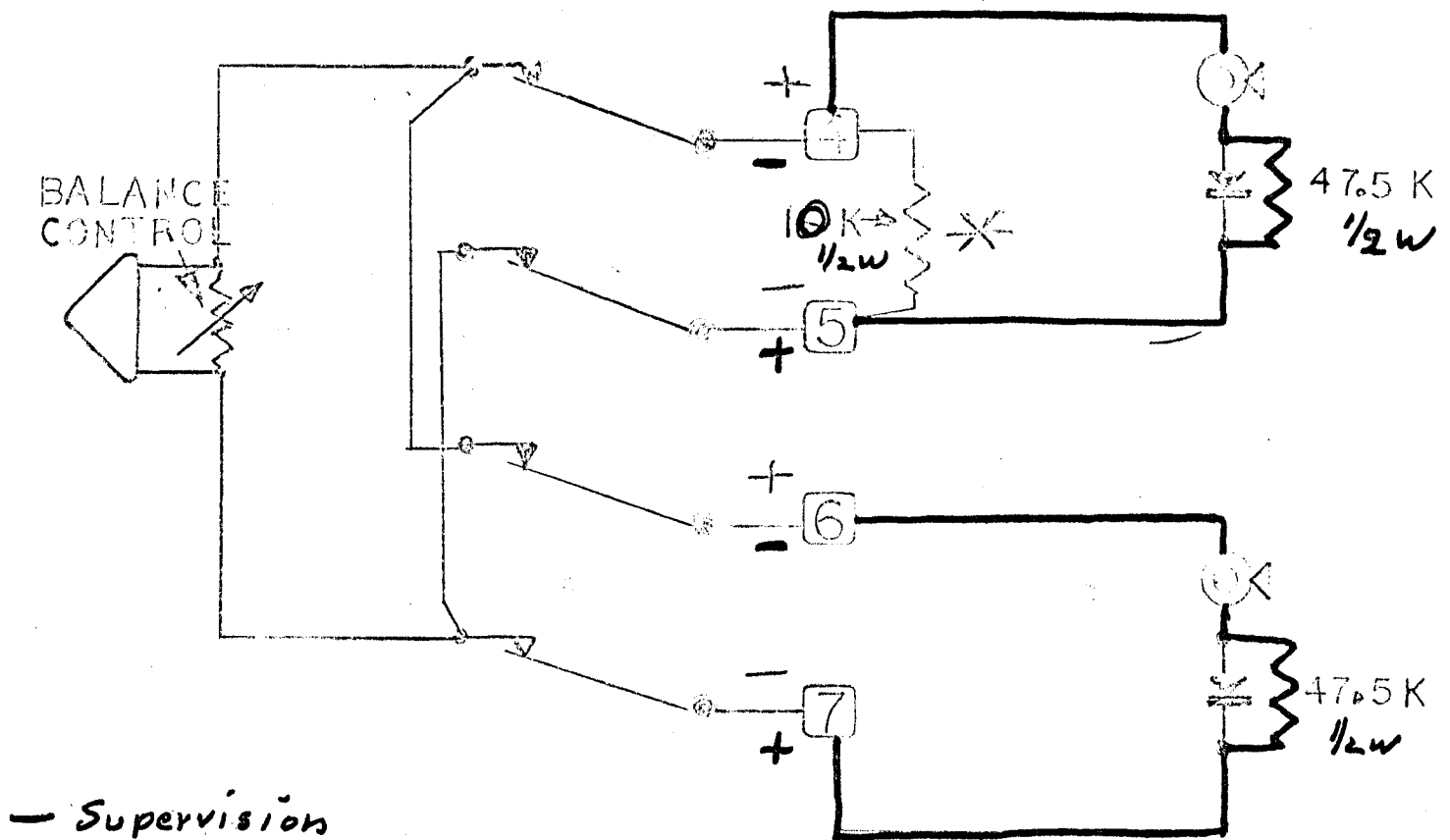
- E. Function Modules
 - 1. SFA - 5 - 1
 - 2. " - 5 - 2
 - 3. " - 5 - 3
 - 4. " - 5 - 4
 - 5. " - 5 - 5

- F. Inter Connect Program Modules
 - 1. SFA - 6 - 1
 - 2. " - 6 - 2
 - 3. " - 6 - 4
 - 4. " - 6 - 5
 - 5. " - 701

- G. System Module
 - 1. SFA - 801

V Test Components

- A. Lamp Test Ass'y

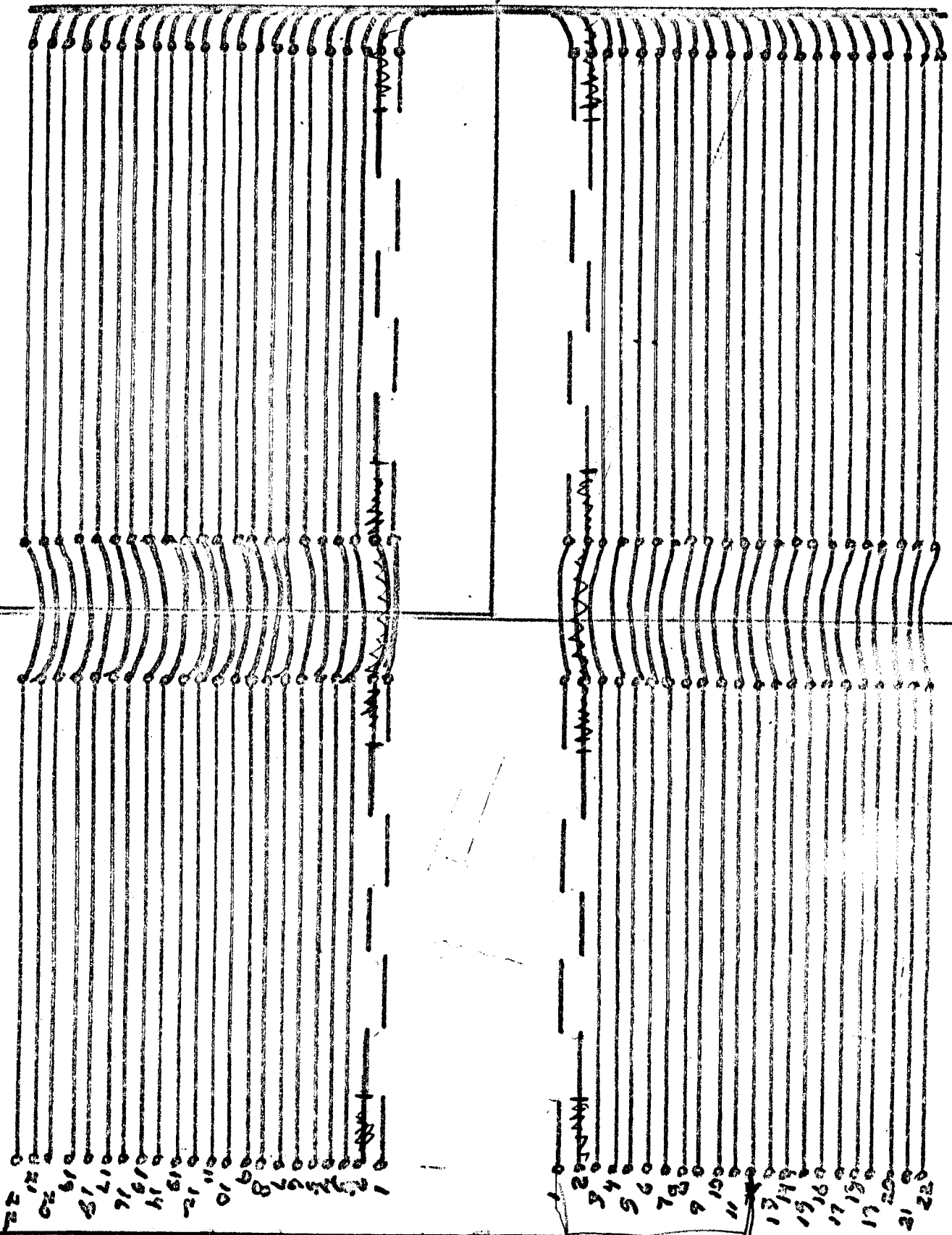


SFA-1-6 & 1-9
 PARALLEL SUPERVISION

X- WHEN MORE THAN "4" SIGNALS
 USED REMOVE 10K RESISTOR

4+5 only

"Mother Board"



1 Rack — 1 Rack — Double Rack

TOP of Mother Board

SFA-1-2
Alarm Sig.
Unit

1-2
1-1
(+) 4
7
8
10
(-) 12

SFA-2-2
Dual Zone
Initiating
Unit

1-1
1-2
(+) 4
6
10
(-) 12

SFA-2-11
Dual Low
Voltage
Smoke Det.

1-2
1-1
3
(+) 4
6
10
(-) 12

SFA-5-2
March Time
Unit

1-1
1-2
(-) 12
17
20
21

SFA 5-5
Timer
Unit

1-2
1-1
6
(-) 12
13
14
15

SFA-3-11
Smoke
Regulator

1-1
1-2
3
(+) 4
(-) 12

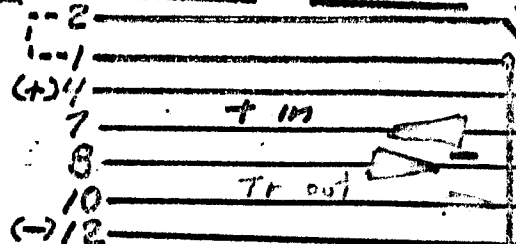
SFA-3-1
Power
Supply

1-2
1-1
(+) 4
10
11
(-) 12

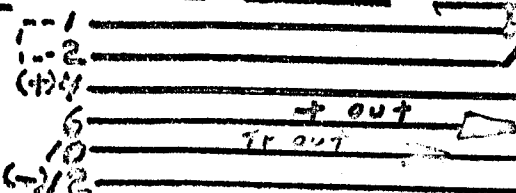
10 11 12 13 14 15 16 17 18 19 20 21 22

Continuous Alarm Bells From Tripped Station or Smoke Head.

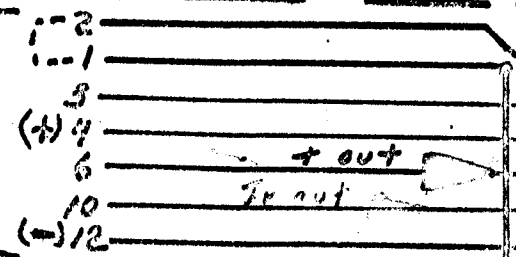
Power for SFA-1-2
Bells From
Separate Alarm Sig.
Source Unit
SFA-3-2 or 3-3



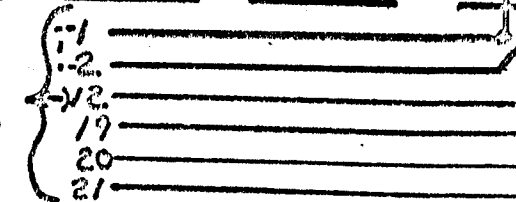
SFA-2-2
Dual Zone
Initiating
Unit



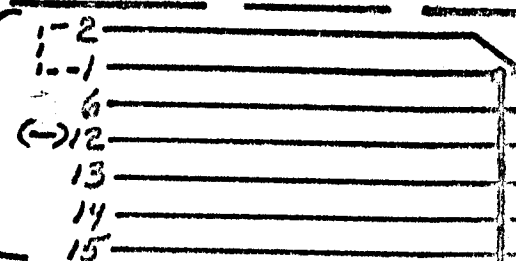
SFA-2-11
Dual Low
Voltage
Smoke Det.



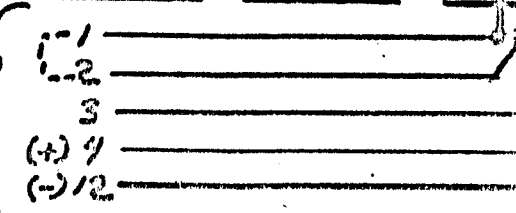
SFA-5-2
March Time
Unit



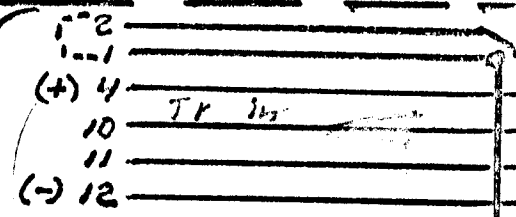
SFA 5-5
Timer
Unit



SFA-3-11
Smoke
Regulator



SFA-3-1
Power
Supply



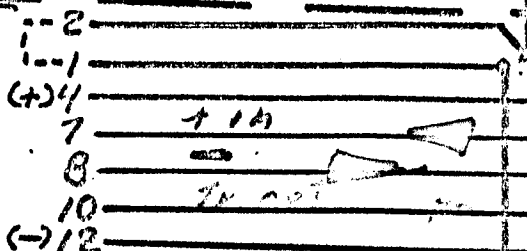
— Trouble — Alarm

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Tripped Station or Smoke
Head w/ March Time 110 Beat

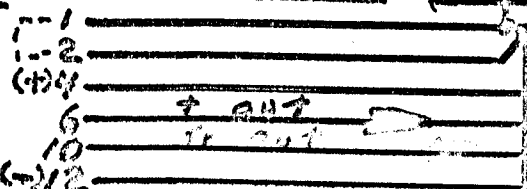
SFA-1-2

Alarm Sig.
Unit



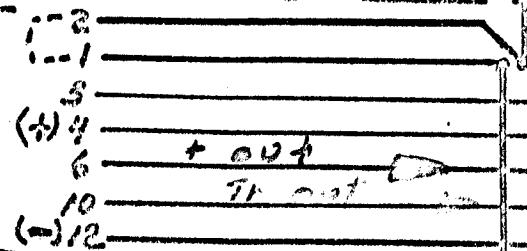
SFA-2-2

Dual Zone
Initiating
Unit



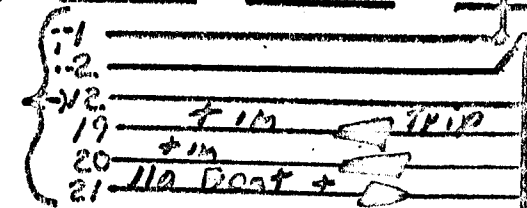
SFA-2-11

Dual Low
Voltage
Smoke Det.



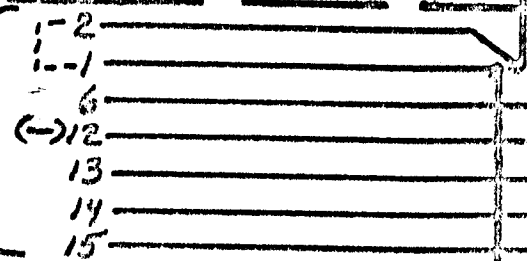
SFA-5-2

March Time
Unit



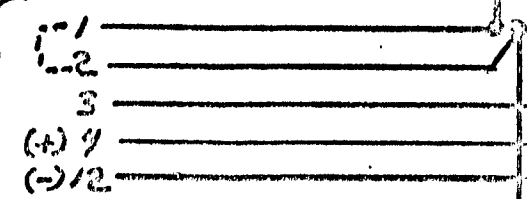
SFA 5-5

Timer
Unit



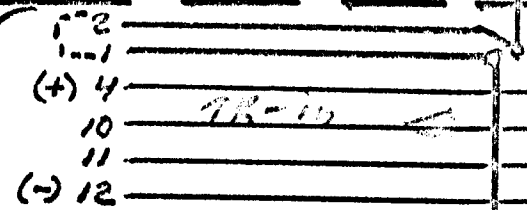
SFA-3-11

Smoke
Regulator



SFA-3-1

Power
Supply



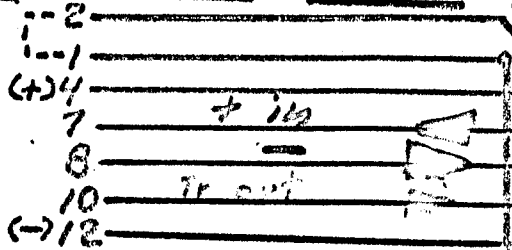
— Trouble

— Alarm

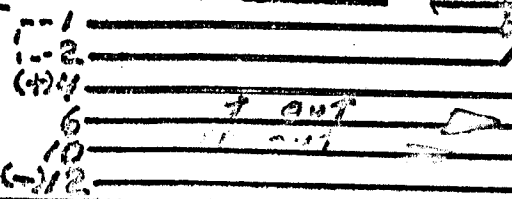
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Continuous Alarm From Tripped
Station or Smoke Head w/ 0-3
min Delay

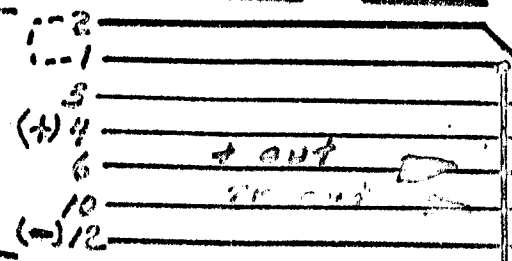
SFA-1-2
Alarm Sig.
Unit



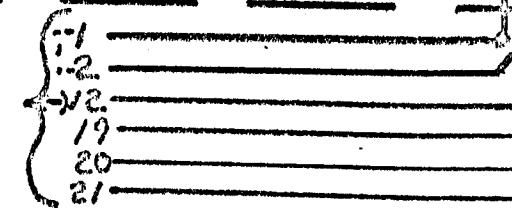
SFA-2-2
Dual Zone
Initiating
Unit



SFA-2-11
Dual Low
Voltage
Smoke Det.

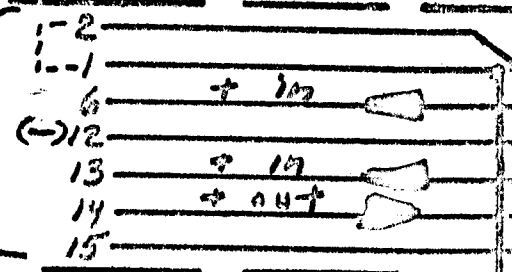


SFA-5-2
March Time
Unit

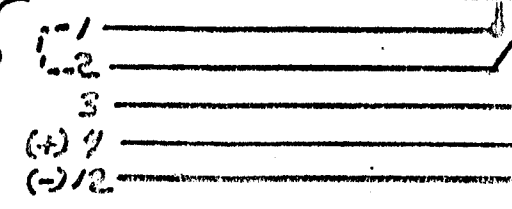


SFA 5-5
Timer
Unit

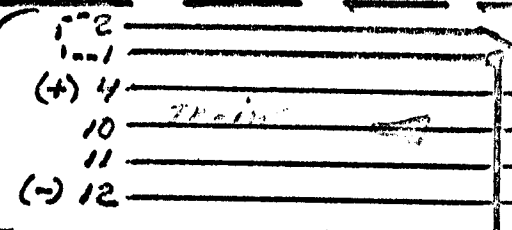
(0-3
side
used



SFA-3-11
Smoke
Regulator



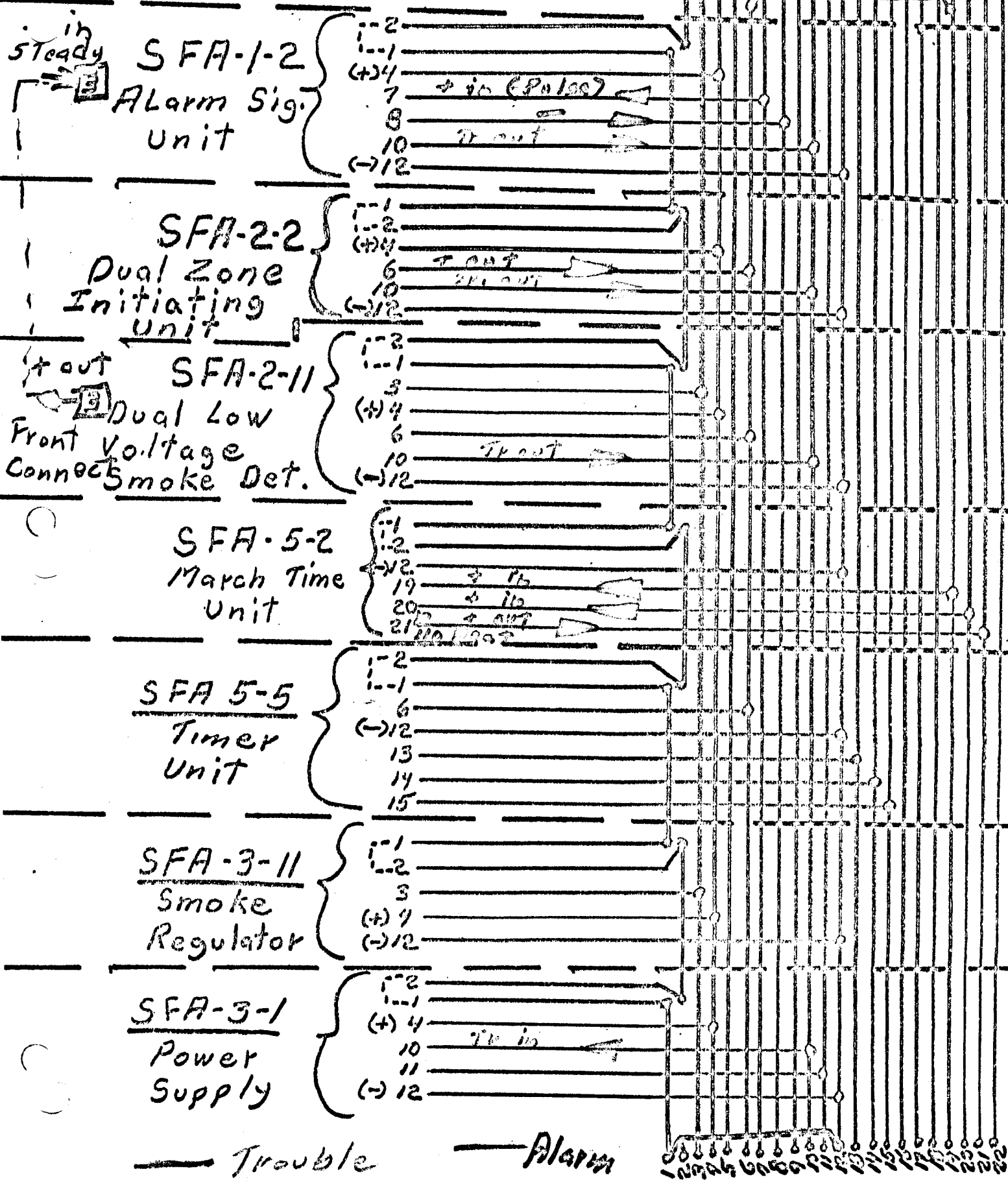
SFA-3-1
Power
Supply



— Trouble — Alarm



Continuous Alarm on Smoke + March Time on Pull Stations

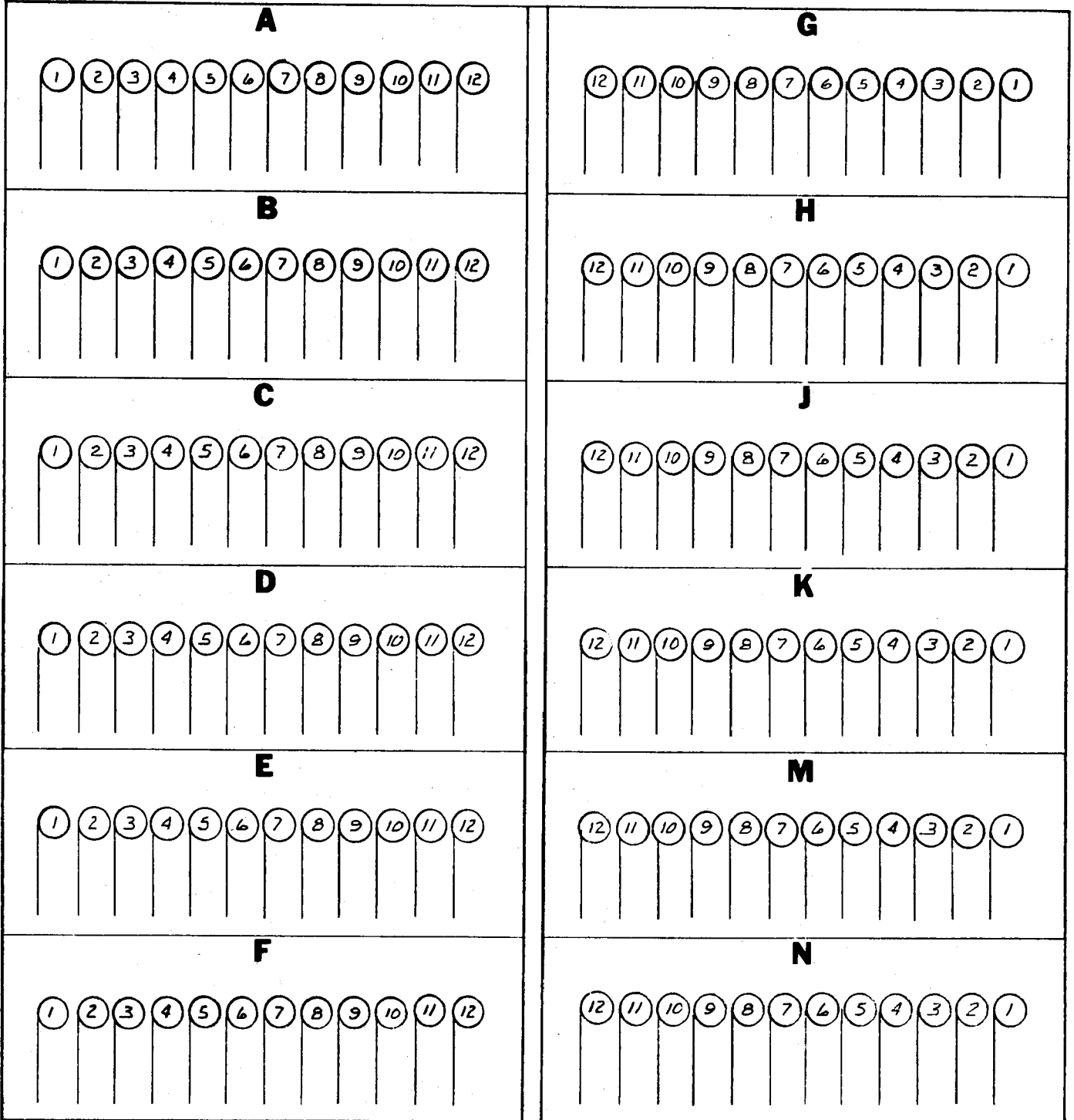


SYSTEM WORKSHEET

JOB _____
 LOCATION _____

BY _____
 DATE _____

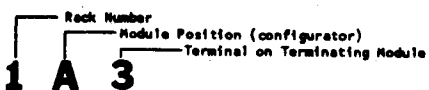
RACK _____ OF _____



TERMINAL DIAGRAM LEGEND

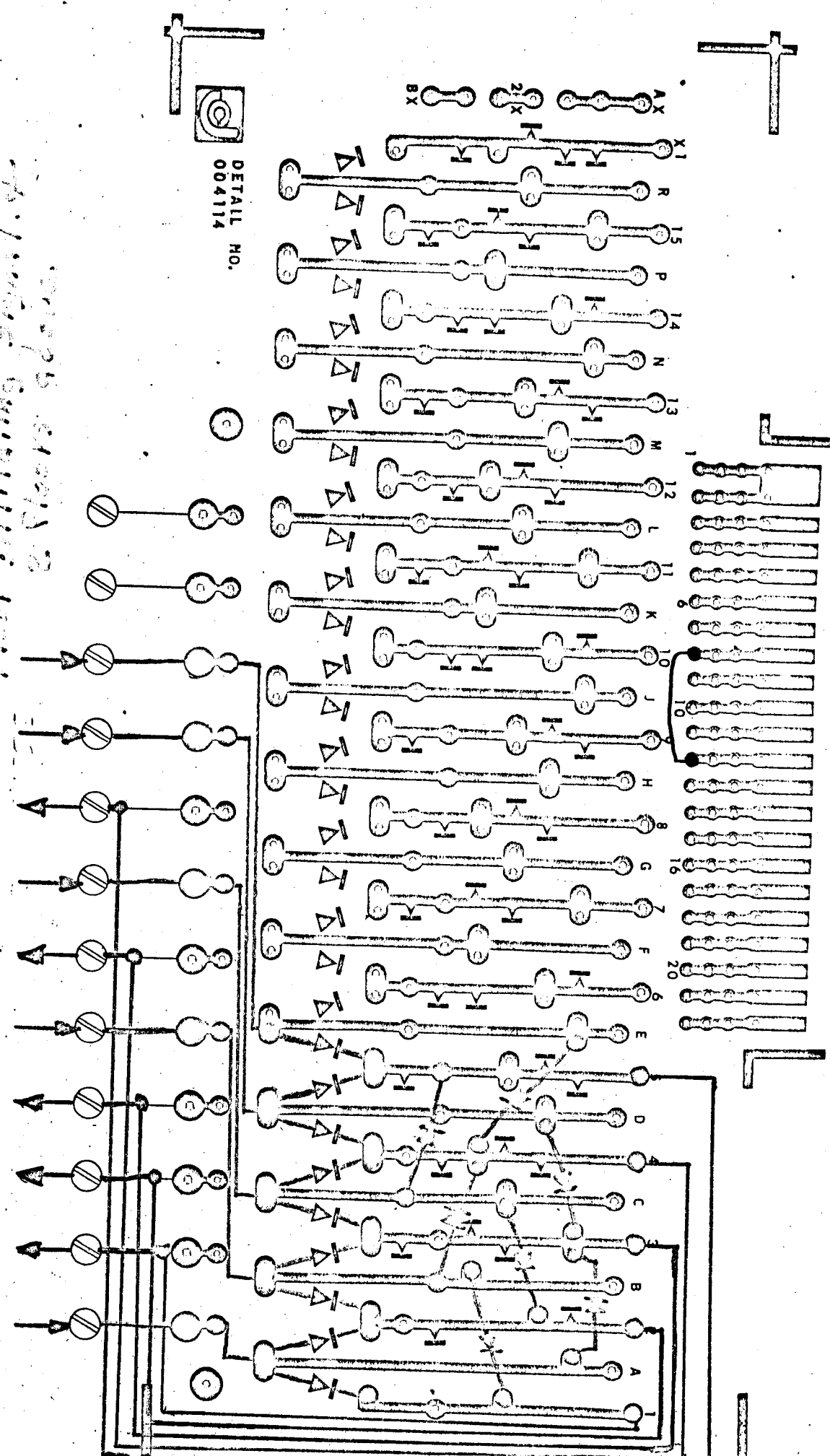
Interconnection Between Module

Sample Code: **1A3**



— Zone feed out
 — Zone feed in

B Floor Bldg.
 Signal Ring Floor Below
 Floor Initiating Signal
 2 Floors Below



DETAIL NO.
 004114

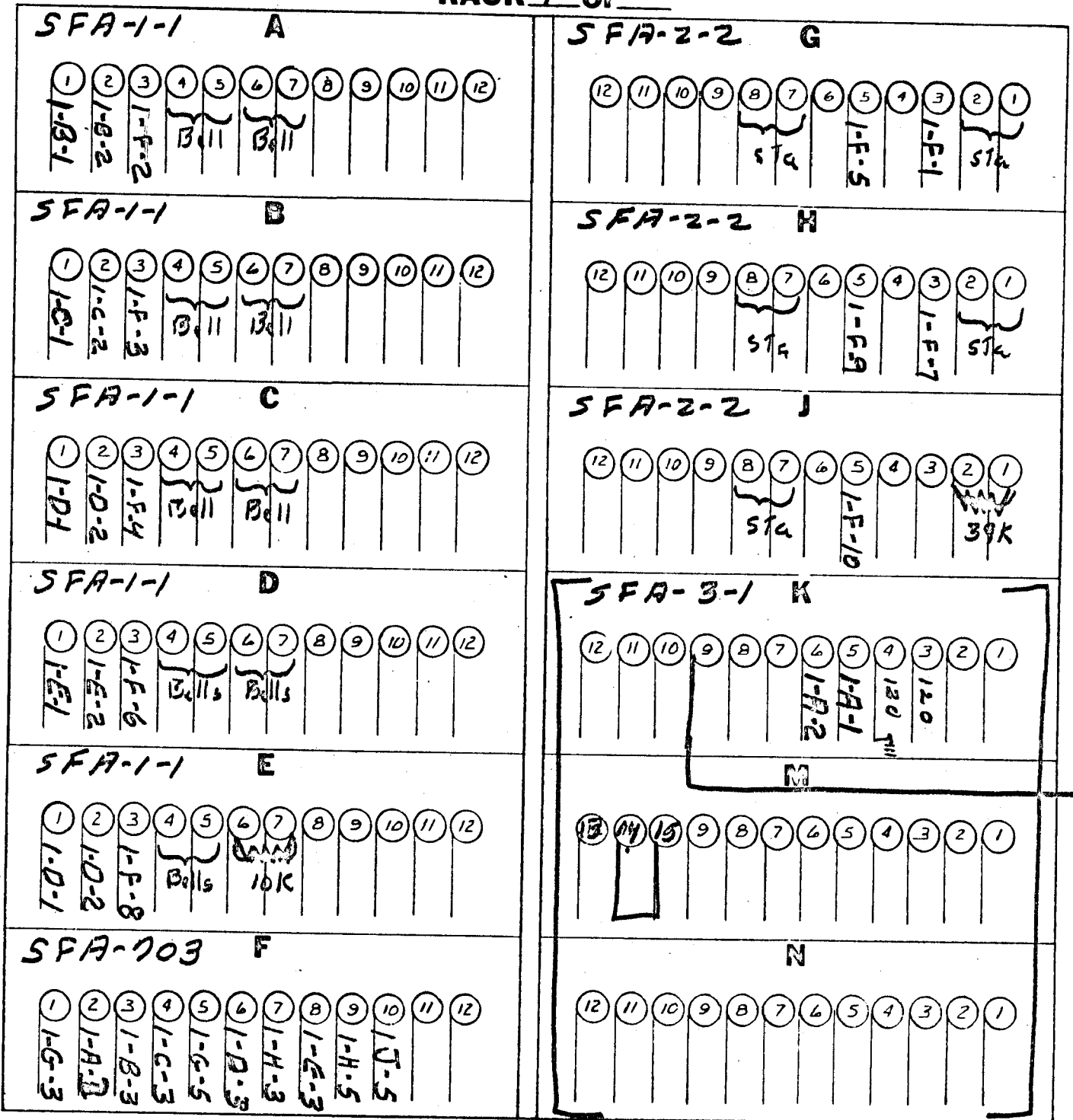
FLOOR PROGRAM

004-11

JOB SPR-6969 SYSTEM WORKSHEET
 LOCATION Spr. Mass

BY DJM
 DATE 8/10/73

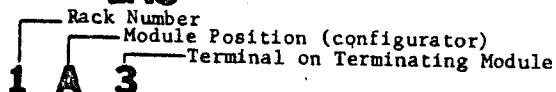
RACK 1 OF



TERMINAL DIAGRAM LEGEND

Interconnection Between Module

Sample Code: **1A3**



TYPE SERVICE AM SIGNALING
 REFERENCE NFPA

(See ER-3010)

SET/7000
FIRE ALARM SYSTEM
FIELD SERVICE MANUAL

SET/7000

FIELD SERVICE MANUAL

INTRODUCTION

This manual consists of two sections. Part I contains the descriptions and theory of operation of a selected number of the SET/7000 Fire Alarm modules. Functional diagrams are included. Part II contains detailed test procedures for each module in the SET/7000 System that is currently scheduled for production.

The major objective of this manual is to provide sufficient information to troubleshoot, isolate and repair SFA circuit modules on installed SET/7000 systems. Defective modules should be replaced by an identical model, or an approved substitute, if one exists. No attempt to repair the internal components or printed circuit board should be made. All defective modules should be properly identified (i.e., date of failure, installation, service personnel, etc.) and returned to the factory.

Some module test procedures are a complete step-by-step description, while others have set-up instructions followed by a troubleshooting chart. This chart indicates the outputs generated by a particular input signal.

Inputs and outputs to the circuit modules are made via the front panel terminal strip and the P.C. card connector (Molex type) which plugs into the mother board in the equipment rack.

In the following description the word "terminal" shall indicate the front panel connection point, and the word "pin" shall indicate the connection point on the mother board or Molex connector. A typical circuit module is shown in FIGURE A.

SET/7000

SFA-1 SERIES ALARM SIGNAL MODULES

THEORY OF OPERATION

A simplified circuit diagram of the SET/7000 Alarm Signal Modules is shown in Figure 1. Relay "A" is de-energized in the normal supervisory mode. All modules except SFA-1-6 and SFA-1-9 have series supervision of the external signal lines. Module SFA-1-6 and SFA-1-9 supervise the signal lines as a parallel connection. These two modules have an additional balance circuit that must be adjusted at the time of installation. (See Insert B).

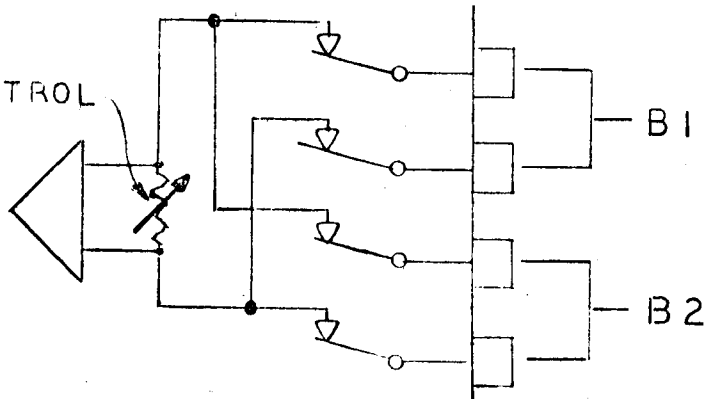
Under normal conditions, the signal power is not connected to the signal device lines, and the supervisory circuit continually senses the condition of the external lines. The trouble output is normally low. When a fault is detected on the signal lines, the supervisory circuit turns on a transistor switch placing a high (voltage) level on the trouble output terminal.

The signal devices are activated whenever positive (+) appears at either the program alarm input or terminal 7 and a negative appears at terminal 8. Relay "A" is energized and the signal power is connected to the signal horns or bells.

SIGNAL MODULES

- SFA-1-1 Class B Polarized 2-Circuit Module
- SFA-1-2 Class B DC Series, 2-Circuit Module (Note: Requires SFA-3-4)
- SFA-1-3 Class B AC Series, Single Stroke, 2-Circuit Module
- SFA-1-4 Class B AC Series, Vibrating, 2-Circuit Module
- SFA-1-5 Class B AC Polarized Module
- SFA-1-6 Class B Parallel Supervision, 2-Circuit Module
- SFA-1-7 Class A Polarized, 2-Circuit Module
- SFA-1-9 Class A Parallel Supervision, 2-Circuit Module

BALANCE CONTROL



B: PARALLEL SUPERVISION
MODULES SFA-1-6 AND
SFA-1-9

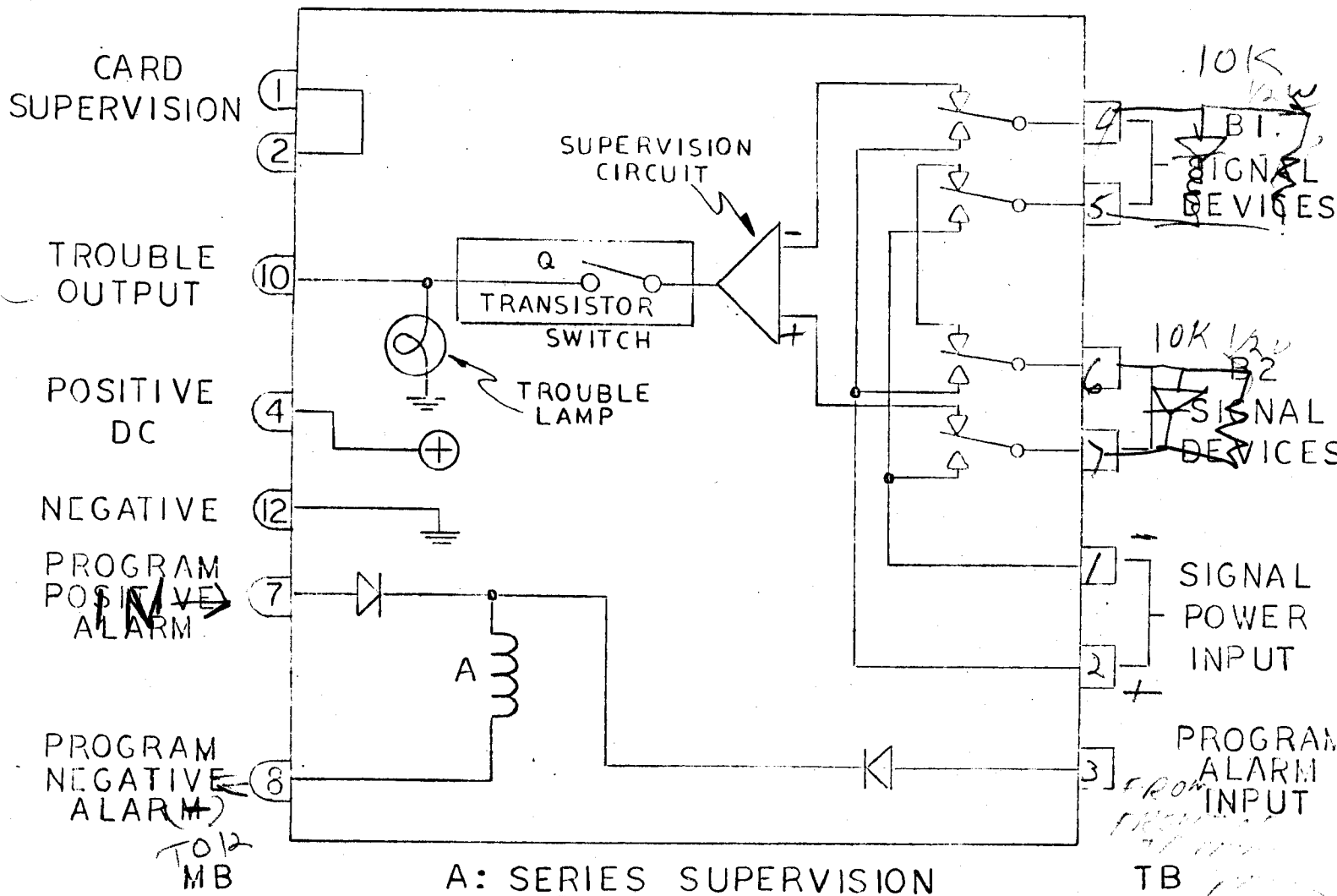


FIGURE I

SFA-1 SERIES
ALARM SIGNAL MODULES
FUNCTIONAL DIAGRAM

SET/7000

SFA-2 SERIES

DUAL-ZONE INITIATING MODULES W/LOCK-IN

THEORY OF OPERATION

The basic functional diagram for these initiating modules is shown in FIGURE II. These dual-zone initiating modules have supervised trouble and alarm acknowledgement indicators for each circuit. A positive lock-in feature provides for a continuous alarm output once an alarm signal is received, whether or not the initiating device remains on.

The diagram shows the circuit in the normal supervisory mode, with the alarm relays de-energized, and all module lamps off. The trouble and alarm outputs are all low (0 VDC nominal). When an initiating device is actuated, the input terminals are short-circuited. The alarm control circuit generates an output to turn on the zone alarm relay and light. As soon as the relay contacts close, the relay is latched on, and a high output appears at the program alarm and common alarm outputs. The trouble circuit is not activated by the alarm condition.

If the circuit module is operating in the normal supervisory mode, and a fault (open circuit) occurs on the initiating device lines, the trouble control circuit is activated. The trouble circuit turns on a transistor which generates a trouble output (high level) and turns on the zone trouble lamp.

All of these modules have provisions for connecting a remote annunciator to each zone. Some modules supervise the remote annunciator and generate a trouble signal if a fault exists.

On Class B modules, a fault in the initiating line will prevent an alarm signal from being registered. Class A modules have four wire initiating circuits. A fault may exist in the line but an alarm signal could still be registered.

SFA-2-1 Class B, Dual-Zone Initiating Module w/Lock-In and Remote Annunciator

SFA-2-2 Class B, Dual-Zone Initiating Module w/Lock-In

SFA-2-13 Class A, Dual-Zone Initiating Module w/Lock-In and Remote Annunciator

SFA-2-14 Class A, Dual-Zone Initiating Module w/Lock-In

004-888
Bulb

004-111
END OF LINE RESISTOR

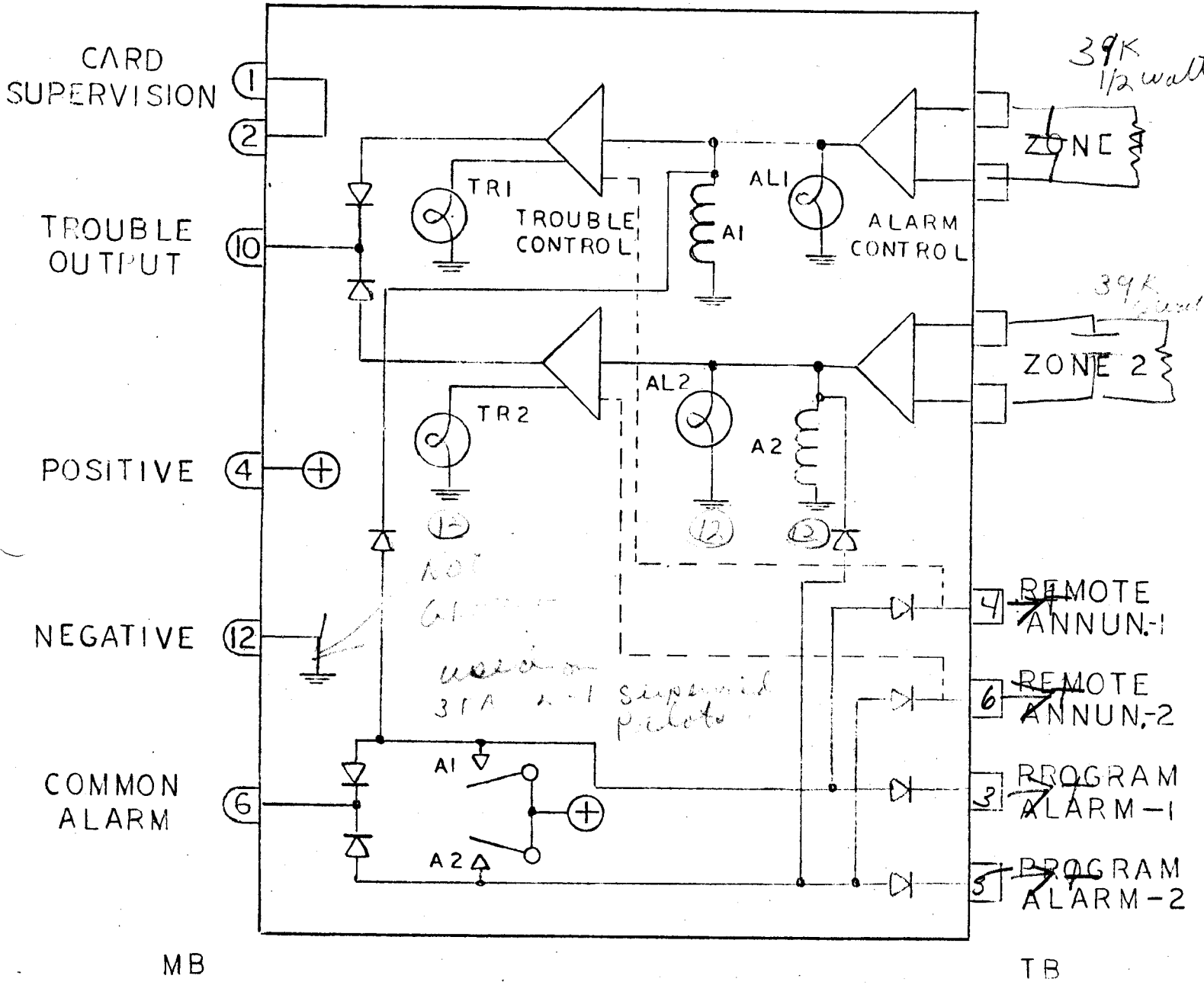


FIGURE II

SFA-2 SERIES
DUAL ZONE INITIATING MODULES
WITH LOCK IN

SET/7000

SFA-2-4
CLASS B CODE INPUT MODULE

THEORY OF OPERATION

The functional diagram for the single zone Class B coded input module is shown in Figure III. In the normal supervisory mode, relays "A" and "B" are de-energized, the module lamps are off and all outputs are low (0 VDC). When a coded initiating device is actuated, the alarm control circuit energizes relay "A". The contact of relay "A" repeats the code applied to the input terminals. The first time that the contact of relay "A" closes, relay "B" is energized and latched on. Relay "B" also applies a high output to the alarm and annunciator outputs, and remains energized until the module is reset by removing power from pin 4.

A fault condition in the initiating device lines is detected by the trouble circuit. The trouble control circuit turns on the module trouble lamp and places a high level on the trouble and TP outputs. Since this module is designed for Class "B" operation, a fault in the initiating lines prevents any alarm signals from being registered.

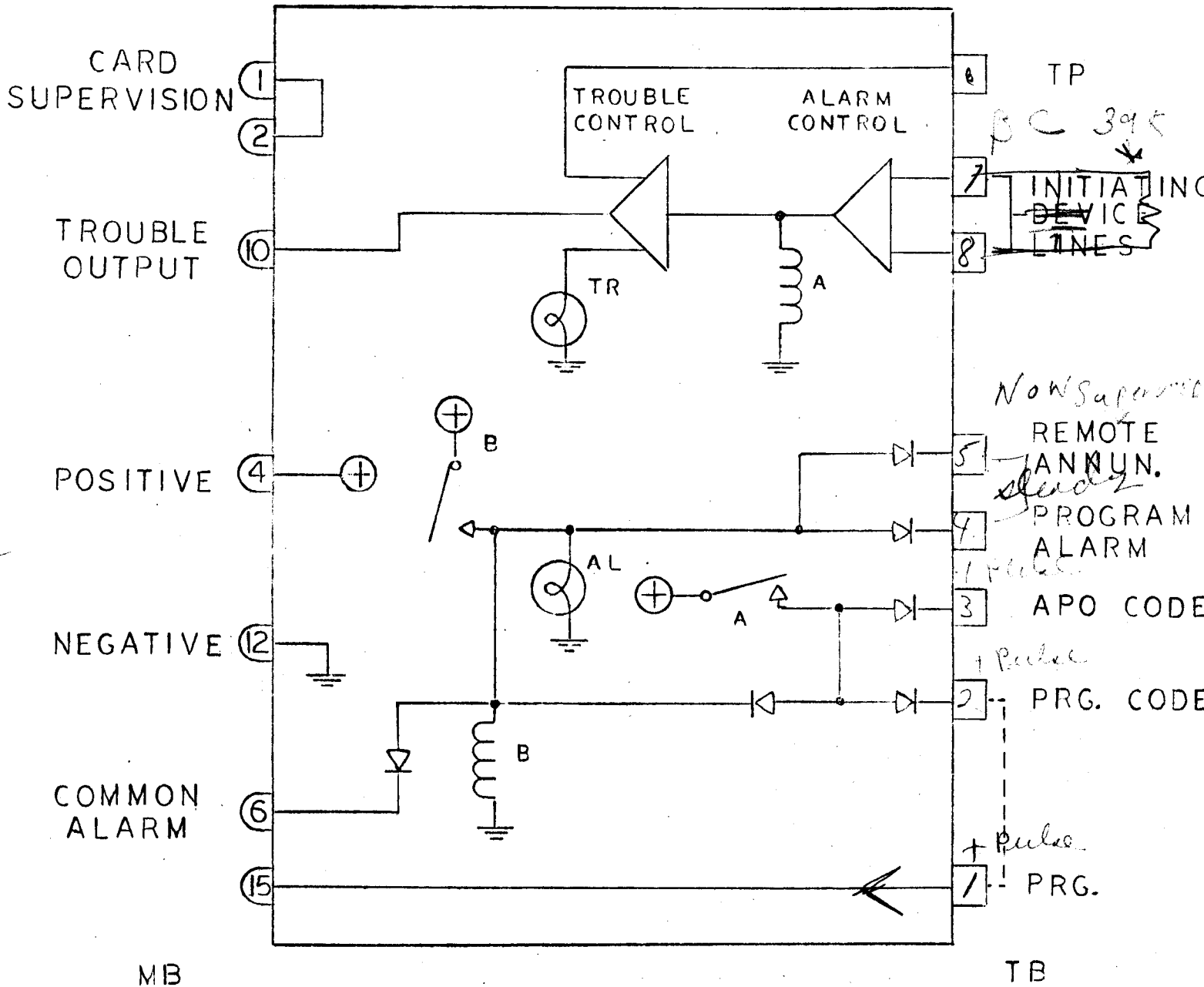


FIGURE III

SFA-2-4
 CLASS B MODULE
 CODE INPUT

SET/7000

SFA-2-6

CLASS B CLOSED LOOP GENERAL ALARM MODULE

THEORY OF OPERATION

The functional diagram for the closed loop general alarm module is shown in Figure IV. The initiating devices for this module are normally closed. No distinction is made between an alarm condition and a fault condition.

Under normal supervisory conditions, the module lamps are off and the relays are de-energized. All outputs are inactive. When an initiating device or line is open-circuited, the associated relay and module lamp go on, and the trouble output goes high. The contacts of the relay close to place the program signal to the appropriate output (APO). By the use of an external jumper on the terminal strip, the common alarm bus on the mother board may be activated when an alarm is received. The alarm signal is on only during the time that the initiating device is active.

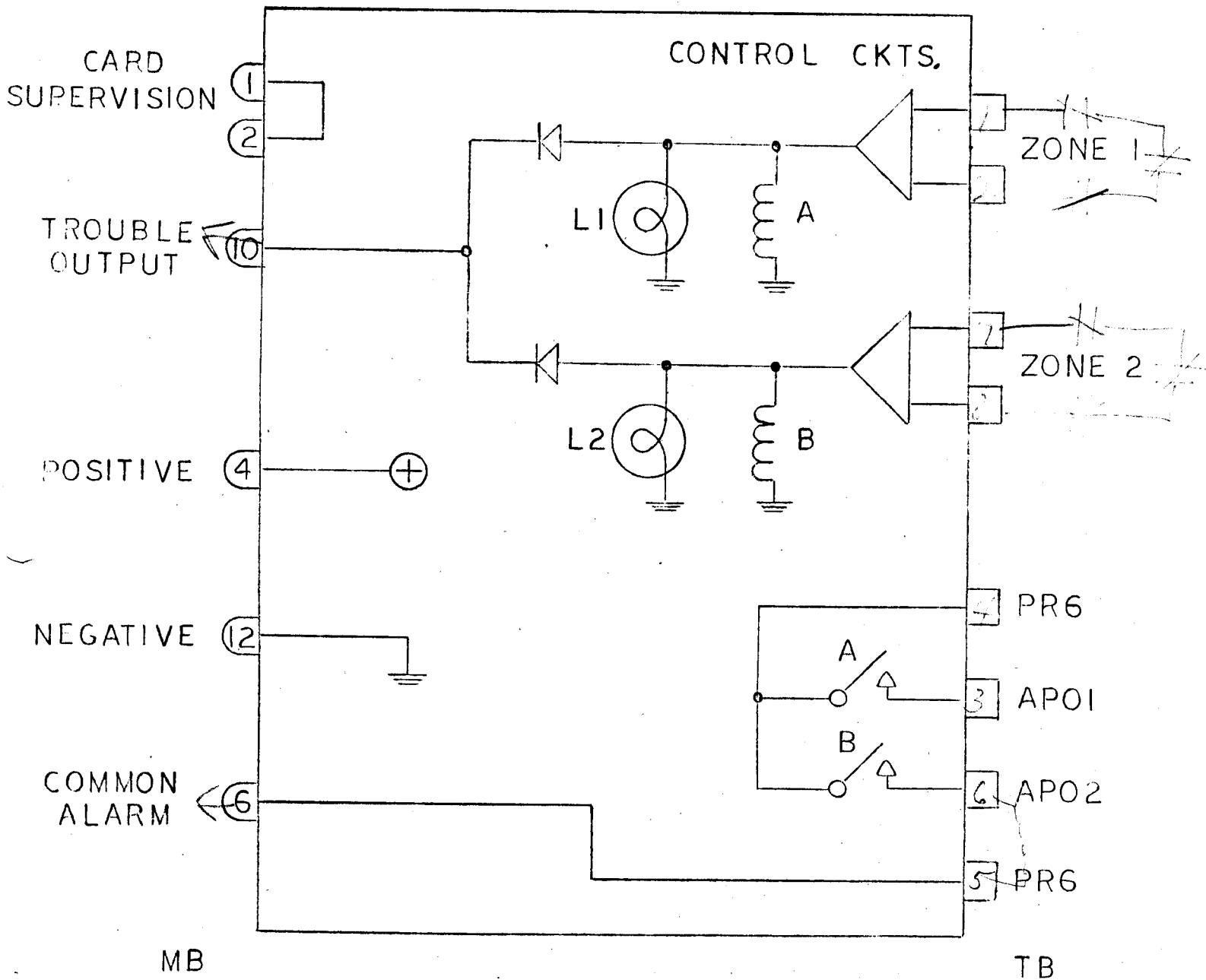


FIGURE IV

SFA-2-6

CLASS B MODULE
CLOSED LOOP GENERAL ALARM

SET/7000

SFA-2-8

CLASS B INPUT, CLASS B
REVERSE POLARITY SIGNAL MODULE

THEORY OF OPERATION

Figure V shows the functional diagram for the Class B Input/Output Signal Module. Under normal supervisory conditions, the lamps are off and the relays are de-energized. Separate trouble amplifier circuits monitor the initiating and signal lines. The amplifiers control a common output circuit which generates a trouble output and turns on the module trouble lamp.

A short circuit on the initiating input activates the alarm circuit. The alarm amplifier energizes relay "B", generates a trouble output without turning on the module trouble lamp, and places a high level (Nominal System DC) on the program alarm and common alarm outputs. When relay "B" energizes, its contact latches the relay on, turns on the module alarm lamp and turns on the remote annunciator. After the initiating device has been reset, the module is reset by removing power from pin 4. This de-energizes relay "B" and returns the control circuits to the normal supervisory state when the power is turned back on.

Two other circuits exist in the module. One of these accepts an input signal from the terminal strip and applies it through isolation diodes to the mother board bus lines at pins 19 and 20. The other circuit consists of a relay ("A") and isolation diodes. The relay is normally de-energized and the signal lines for both zones are connected in series through the relay contacts. The relay is energized whenever a positive signal appears on pin 7 or 21, and a negative appears on pin 8. The PROGRAM LINE on the terminal board will be high whenever relay "A" is energized from either positive input on the mother board. This terminal could also be used as an alarm input. The signal power is connected to the normally open contacts of relay "A". When the relay is activated, power is connected directly to each signal zone (parallel connection).

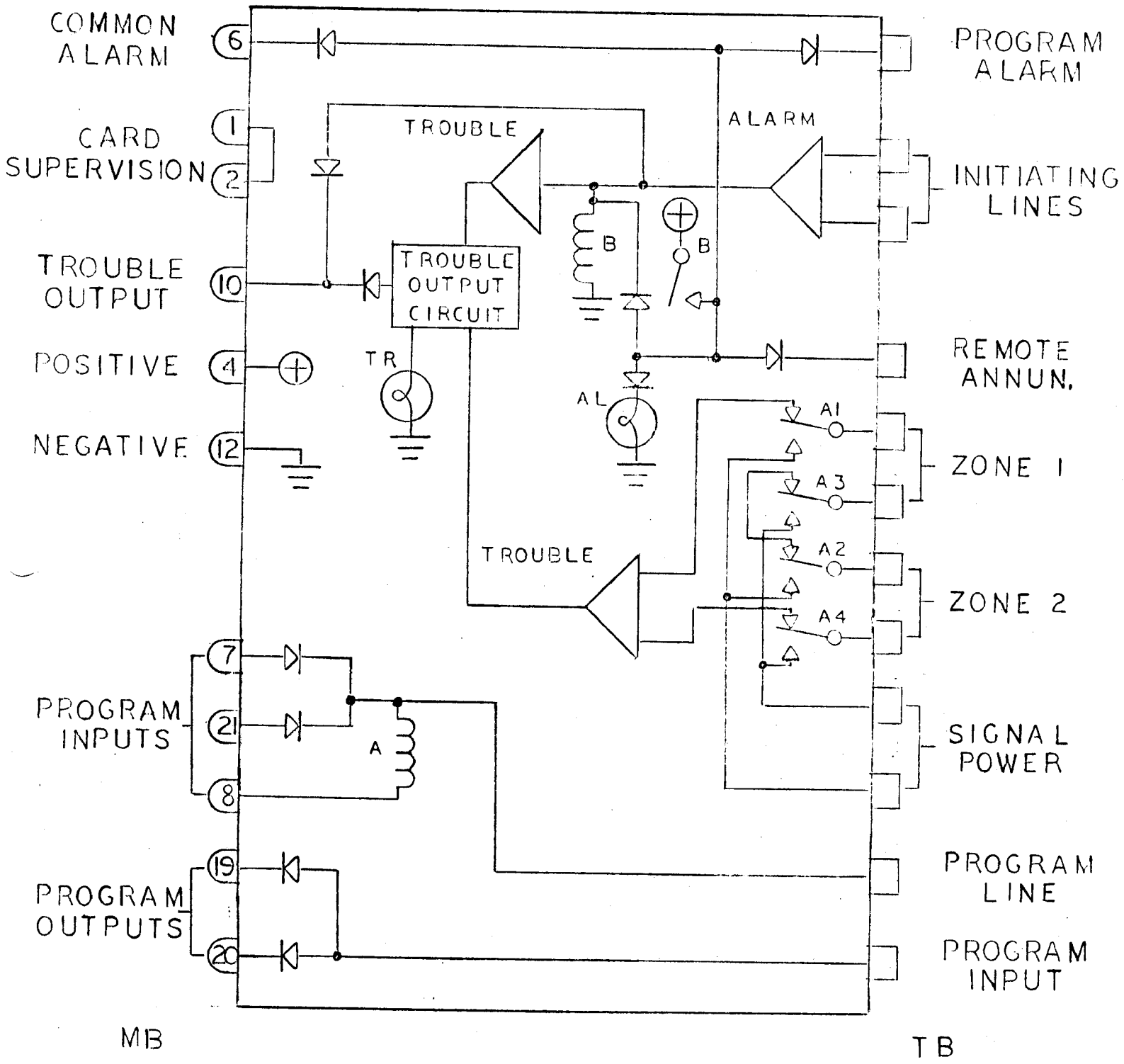


FIGURE V

CLASS B INPUT
 CLASS B OUTPUT
 REVERSE POLARITY SIGNAL MODULE

SET/7000

DUAL ZONE LOW VOLTAGE SMOKE DETECTORS

THEORY OF OPERATION

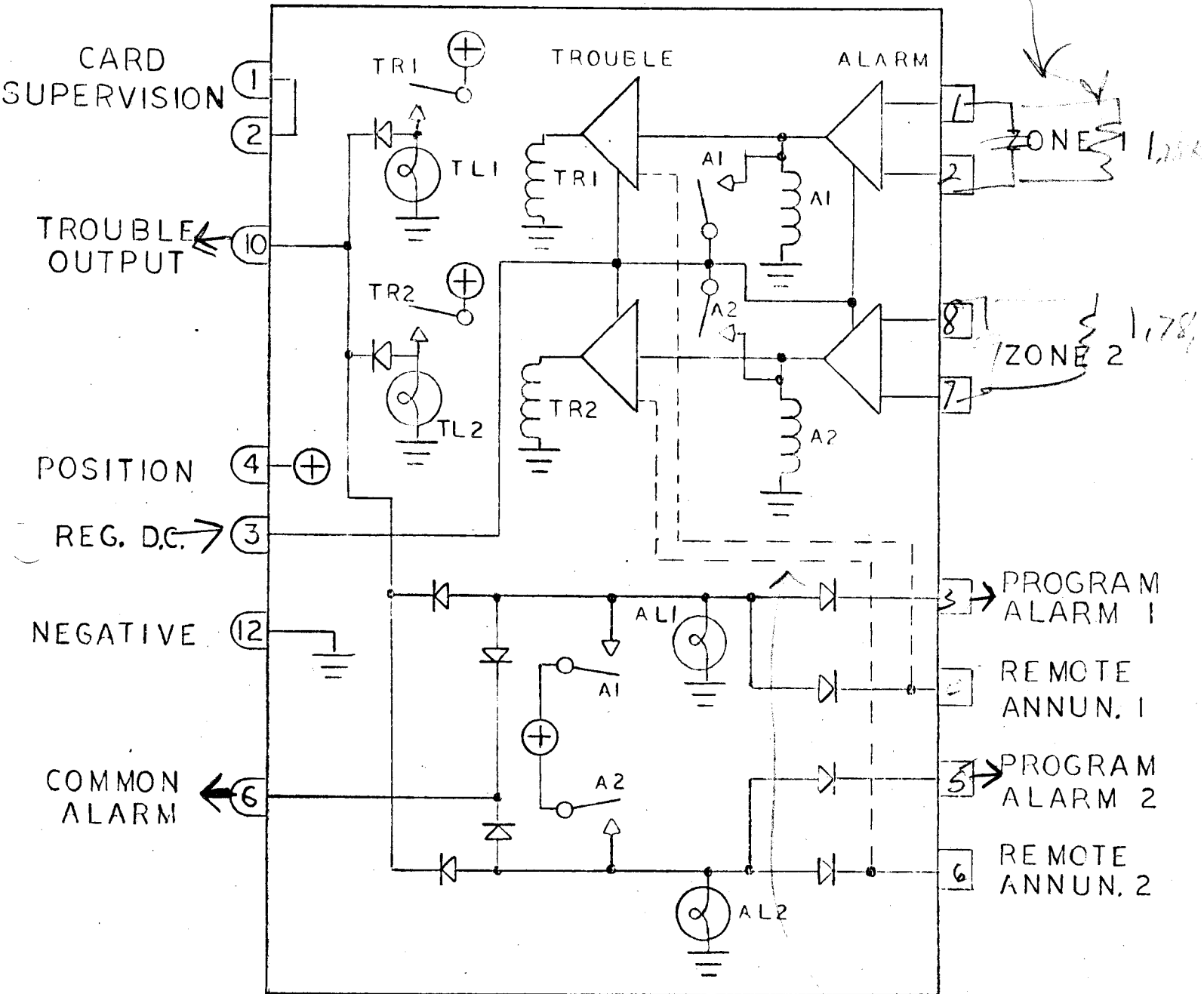
The smoke detector modules require two supply voltages, system DC power for the module lamps and output signals, and a regulated input for the electronic control circuits. In Figure VI, the circuit is shown in the normal supervisory state with the alarm relays de-energized and the trouble relays energized. All module lamps are off.

A fault in the smoke detector lines is detected by the trouble control circuit and the TR relay is de-energized. This allows the contacts to close placing system DC voltage on the trouble output line and turning on the zone trouble lamp. When the fault is corrected, the trouble amplifier automatically returns to the normal state and energizes the trouble relay.

Whenever a smoke detector is activated, the alarm control amplifier detects the condition and energizes relay "A". The contacts close and system DC voltage appears at the following outputs: zone program alarm, zone remote annunciator, common alarm and trouble output. The module's zone alarm lamp is also turned on. Diodes are used to isolate outputs and to prevent signals originating at one zone from interfering with the control circuits in another zone. One set of contacts on the alarm relay ("A") is used to latch the coil in the energized state after an alarm signal has been registered. In order to reset the module, the initiating smoke detector must return to its normal state, and the regulated DC power must be removed from pin 3.

NOTES:

1. -----SUPERVISION ON SOME MODULES
- 2 POWER IS ON, "TR" RELAYS ARE ENERGIZED



MB

TB

SFA (Smoke Detector) (unsupervised power)

FIGURE VI

DUAL ZONE LOW VOLTAGE SMOKE DETECTOR

SYSTEM POWER SUPPLY

THEORY OF OPERATION

The system power supply provides DC power for all of the circuit modules in the system and system supervision circuits. The functional diagram for this module is shown in Figure VII. The module requires a power source of 120VAC, single phase, 60 Hz. An internal transformer steps down the 120VAC line input to 30VAC. An AC power failure relay (PF) and a power-on lamp are connected to the transformer secondary. The lamp is on and the relay is energized when AC power is on. The transformer also feeds a DC power supply. The negative of the DC supply is connected to pin 12 on the mother board, and the positive output is connected to the contacts of the power failure relay and a normally-closed system reset switch to pin 4. If AC power should fail, the PF relay is de-energized automatically connecting battery power to the positive output line.

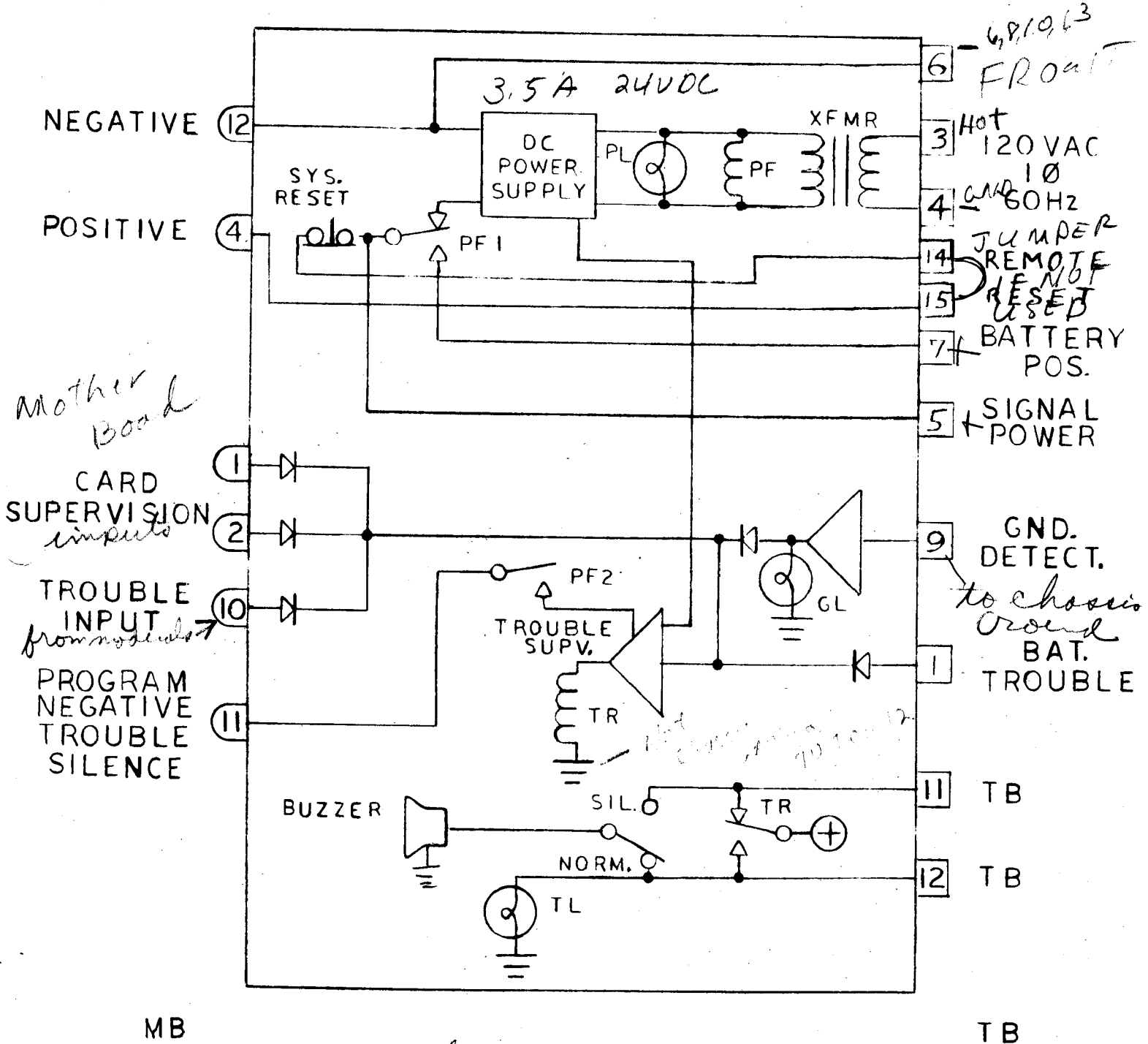
If the modules in a fire alarm system require less than 0.5 amp from the system power supply, the signal power output terminal may be used to supply some of the system DC signal devices.

A ground detection circuit in the module monitors the system ground (chassis ground). If either the positive or negative side of the system DC output becomes shorted to the chassis, the ground detection circuit turns on a warning lamp and sends a trouble signal to the system trouble supervisory circuit which is also part of this module.

The trouble supervision circuit accepts a number of inputs from the system to generate a warning signal. A card supervision circuit monitors the modules that are plugged into the mother board. The bus lines at pins 1 and 2 alternate from module to module. At the end of each mother board the last pin (1 or 2) is tied to the negative output line (pin 12). Under normal conditions, the card supervision inputs to the system power supply are at the negative reference. If any card is removed from the rack, the circuit is open and the trouble supervision circuit detects the fault. Another input to the trouble circuit is from pin 10. Any trouble output signals generated by other modules in the system are received by the system power supply on this bus. A trouble input is shown on the diagram via the terminal board from the battery charger module. Finally, a trouble input is generated if AC power is lost.

When an input signal is received by the trouble supervision circuit, the trouble relay is energized. The relay contact connects the system DC, through the SILENCE/NORMAL switch, to the module trouble lamp and the system trouble buzzer. The panel mounted SILENCE/NORMAL switch is used to silence the alarm buzzer after a trouble signal has been received. The trouble light remains on until the fault is corrected. After the fault is corrected, the trouble lamp will go off and the buzzer turns on indicating that the switch must be returned to the NORMAL position.

One set of contacts of the PF relay is connected to pin 11 of the mother board (PROGRAM NEGATIVE SILENCE) and the trouble circuit. By connecting pin 11 to negative, the trouble signal generated by the loss of AC power is canceled.



This Board is 3 sections.

Jump 12 on unused section

12 to 0v - term for time delay tube

FIGURE VII for testing only

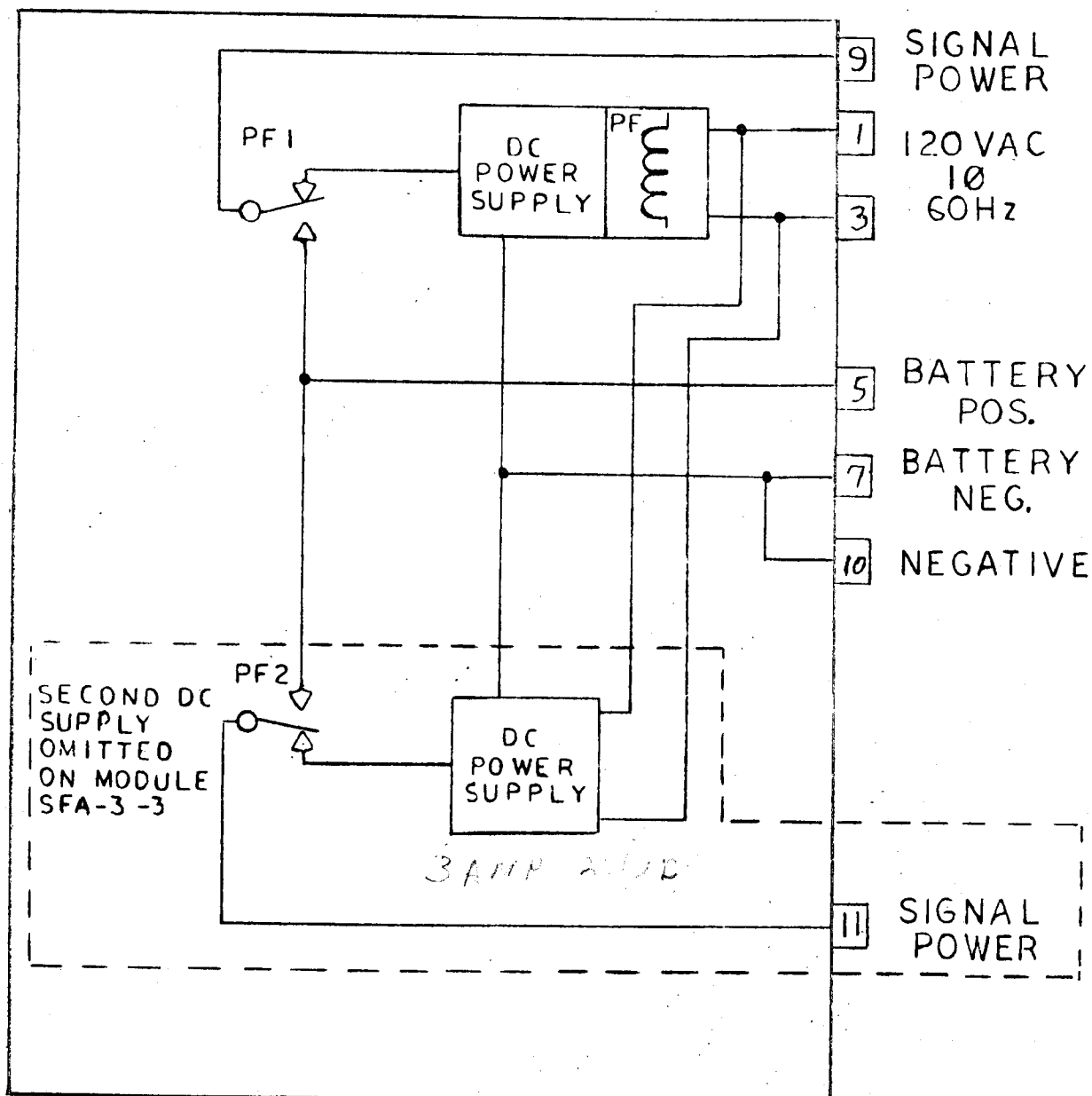
SYSTEM POWER SUPPLY

SET/7000

SIGNAL POWER SUPPLY

THEORY OF OPERATION

Two signal power modules are available for SET/7000 systems. The SFA-3-2 is a dual output module, as shown in Figure VIII, and module SFA-3-3 is a single output module. The input to these modules is 120VAC single phase, 60 Hz. A power failure relay is used to automatically switch from the DC power supply to the battery when the AC power fails. The PF relay is energized when AC power is applied to the input terminals. The negative of the DC power supplies, battery input and output terminals are all common.



MB

TB

3 sections high

FIGURE VIII

SIGNAL POWER SUPPLY

SFA-3-2 (DUAL CK'T)

SFA-3-3 (SINGLE CK'T)

SET/7000

BATTERY CHARGERS

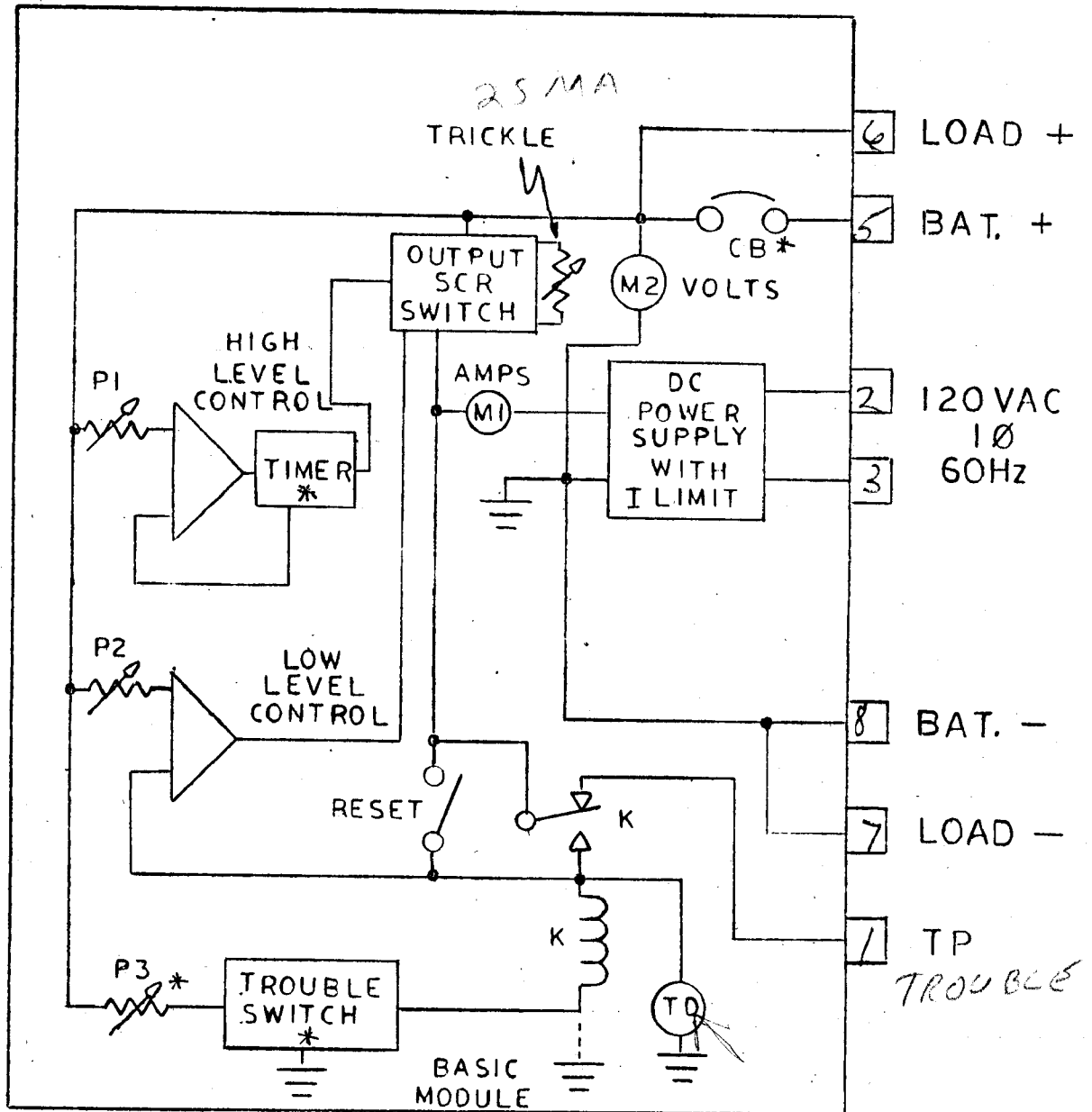
THEORY OF OPERATION

The automatic battery charger, module SFA-3-6, is the most complex of the battery charger units. The functional diagram for this unit is shown in Figure IX. A DC power supply with current limiting (I limit) requires an input of 120VAC, single phase, 60 Hz. The output is monitored by a front panel mounted ammeter and voltmeter. When power is initially turned on, the target drop (TD) remains red, and the TP output is high. Activating the momentary contact reset switch energizes the K relay and TD. The relay is locked on by its contact, and TD shows white, indicating normal conditions.

Activating the reset switch initially turns on the low level control circuit and the output switch so that the battery will charge. When the battery reaches the voltage set by P1, the high level control circuit activates a timer circuit. The timer holds the output switch on for approximately one hour and charges the battery above its nominal capacity. P2 and the low level control circuit turn on the output switch when the battery voltage drops to a preset value. If the low level control fails to turn on and the voltage continues to drop to a preset level determined by P3, the trouble switch opens. This de-energizes the K relay, causes the target drop to show red, and places a high level on the TP output.

An adjustable power resistor in the module allows the unit to supply a nominal trickle charge current of approximately 0.5 milliamps to the battery. A circuit breaker in the output line protects the battery from a short circuit in the load lines.

The circuit breaker, one hour timer and P3/trouble switch are omitted on the basic battery charger module.



MB

TB

SFA 3.7

* OMIT ON BASIC BATTERY CHARGER

Red when first started, Reset System. Turns white in normal operation.

FIGURE IX

AUTOMATIC BATTERY CHARGER

SET/7000

SWITCHING REGULATOR MODULE FOR SMOKE DETECTORS

THEORY OF OPERATION

The switching regulator accepts the standard system DC input from pin 4 of the mother board and produces a well regulated DC output on pin 3 for the smoke detectors and associated control modules. (Figure X).

The major part of the regulator consists of the power switching circuit and energy storage devices. Under normal conditions the current output is small, and the circuit switches at a slow rate to store energy in the module inductors and capacitors. As the load increases, the circuit operates at a faster rate to maintain a constant output voltage.

The voltage sensing circuit, which consists of a resistor network at the output, is selected to give an output voltage between 19 and 22VDC. Small variations in output voltage (typically millivolts) are connected to the input of an error amplifier which controls the switching network. If the output voltage begins to drop, the error amplifier causes the switching circuit to supply more current to the output to maintain a constant output voltage. If the output voltage begins to increase, the error amplifier causes the switching circuit to supply less load current and maintains a constant output voltage.

An electronic protection circuit has been included in the module. The current limit circuit allows the output voltage to remain constant for loads up to 3.0 amps. If the load increases above this value, the output voltage decreases rapidly, and power dissipation within the module is limited to a safe value.

5-2000-1000

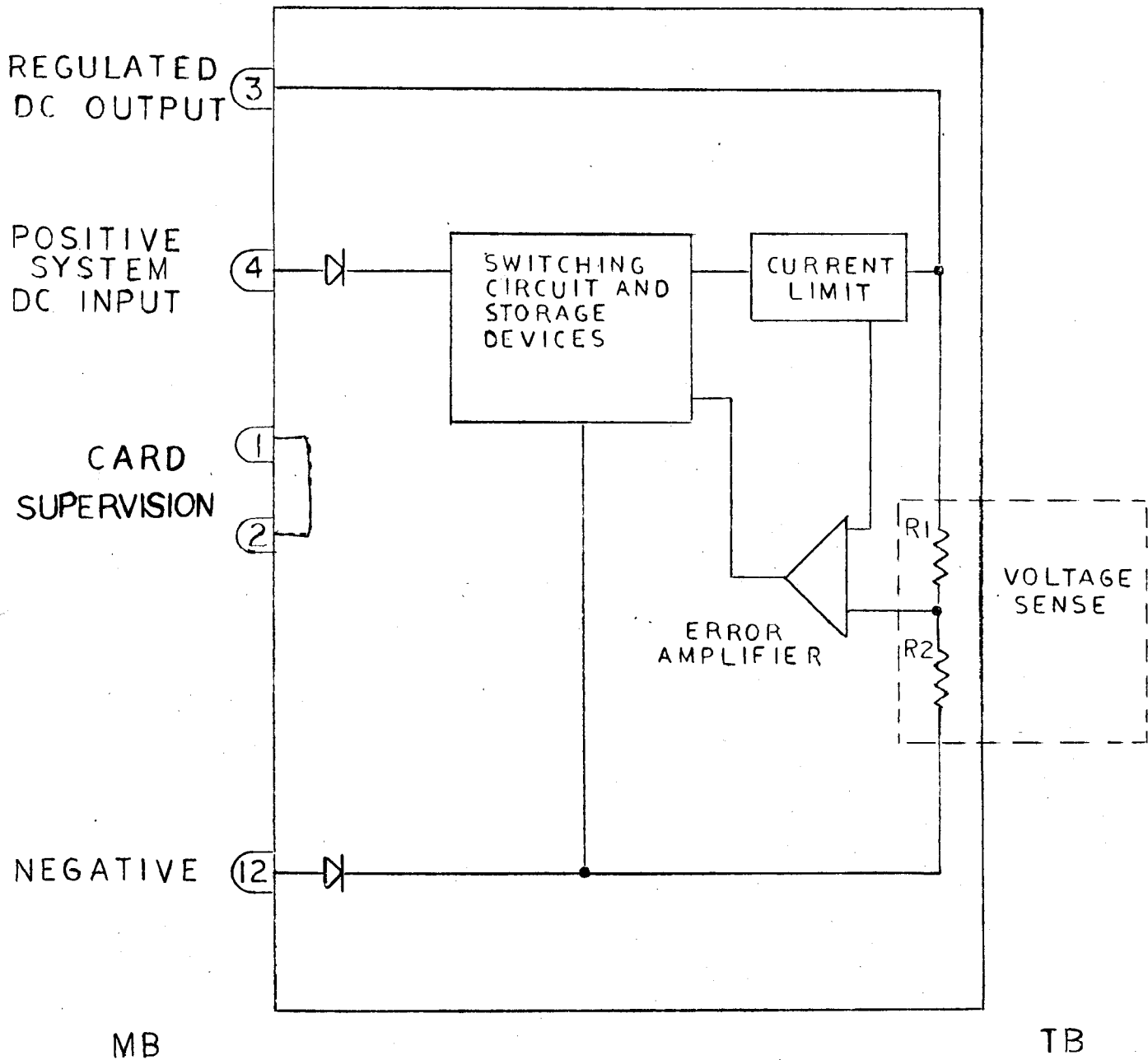


FIGURE X

SWITCHING REGULATOR FOR SMOKE DETECTORS

SET/7000

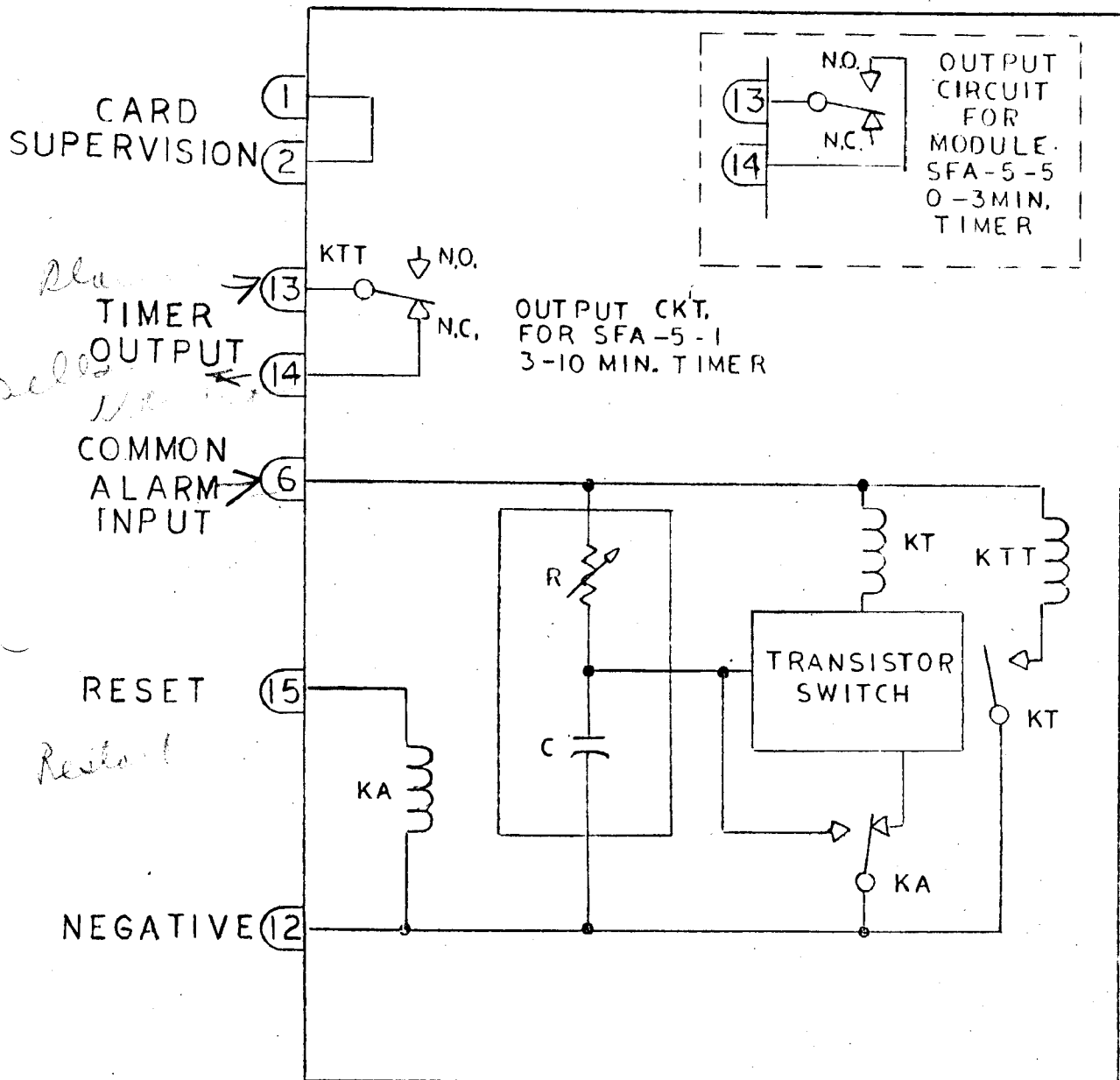
TIMER MODULES

THEORY OF OPERATION

All of the timer modules have the same control circuitry as shown in Figure XI. The difference is at the relay contact connection for the output (pins 13 and 14). The SFA-5-1, 3 to 10 Minute Timer, has closed contacts until the circuit times out, then the contacts open, breaking the circuit. Module SFA-5-3, the 0-3 Minute Timer, has open contacts until the circuit times out.

The timer control circuit consists of three relays, a time interval control and a switching network. In Figure XI, the circuit is shown with all relays de-energized and no input signals are applied. A potentiometer and capacitor make up the basic RC time control network. When a common alarm input appears at pin 6, the capacitor begins to charge through the variable resistance. The greater the resistance the longer it takes for the voltage across the capacitor to reach the value necessary to activate the solid state switch. Turning on the transistor switch allows the KT relay to energize. The contact of KT closes and relay KTT is energized to control the timer output contacts.

At any time after a common alarm signal is applied, and any time before or after the circuit has timed out, the module can be reset to its initial state by applying a signal (System DC) to pin 15. Relay KA is energized and the KA contacts accomplish two things. First, the transistor switch is turned off, de-energizing relay KT and the output relay KTT. Second, the KA contact allows the timing capacitor to completely discharge, restarting the timing cycle.



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SFA-5-5 0-3 MIN. TIMER
SFA-5-1 3-10 MIN. TIMER

FIGURE XI

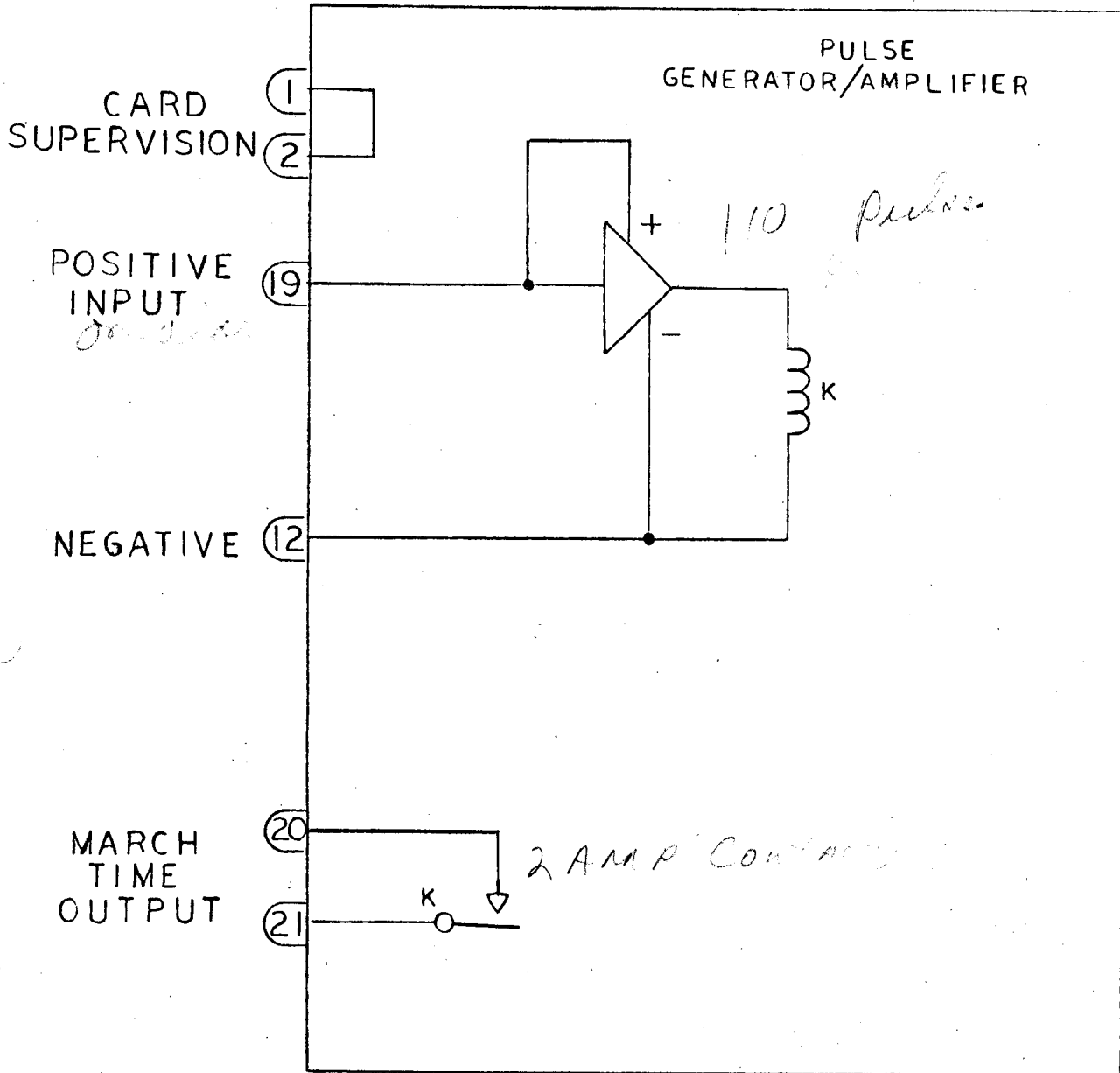
TIMER MODULES

SET/7000

MARCH TIME MODULE

THEORY OF OPERATION

The march time module is shown in Figure XII with power off and relay K1 de-energized. To produce a continuous march time code output, a continuous system DC signal must be at pin 19. This signal activates a pulse generator with an output of approximately 110 pulses per minute. These control pulses are applied to amplifier which energizes and de-energizes the K relay. The march time output is at pins 20 and 21 of the module.



MB

TB

FIGURE XII

MARCH TIME MODULE

SET/7000

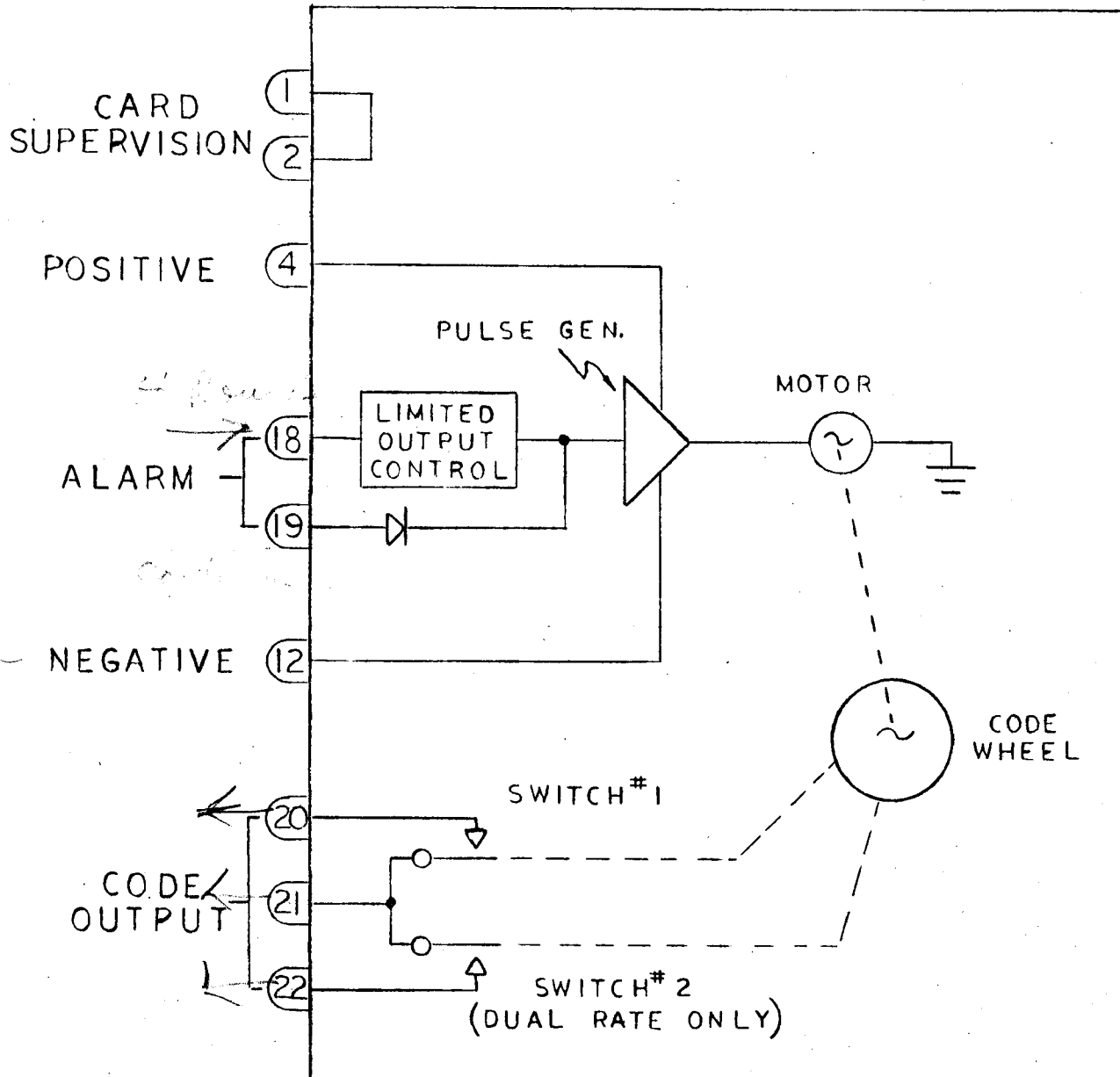
CODE MODULES

THEORY OF OPERATION

The master code and dual rate code module have electronic control circuits similar to the march time module, and a mechanical assembly to produce the desired code. The functional diagram is shown in Figure XIII. The master code module interfaces initiating circuits with signal circuits to form a master code system. The dual rate code module provides a dual switching rate of 8 times per minute for pre-signal alarm circuits and 68 times per minute for general alarm signal circuits.

When a system alarm is received, pin 19 goes positive. This initiates a pulse generator to oscillate and drive a DC stepping motor. The motor drives a code wheel which is programmed at the time of system fabrication at the factory. The code wheel operates switch No. 1 on the master code module and both switches on the dual rate module to generate output codes.

Pin 18 on the code module is capable of accepting a pulse input signal. It is connected to a control circuit which allows only a limited number of cycles of code to be produced, and then stops the pulse generator.



MB

TB

20/21/22 Master Code STA-53

20/22 Dual Rate STA-5-4

20 Simple Code

FIGURE XIII

CODE MODULES

SET/7000

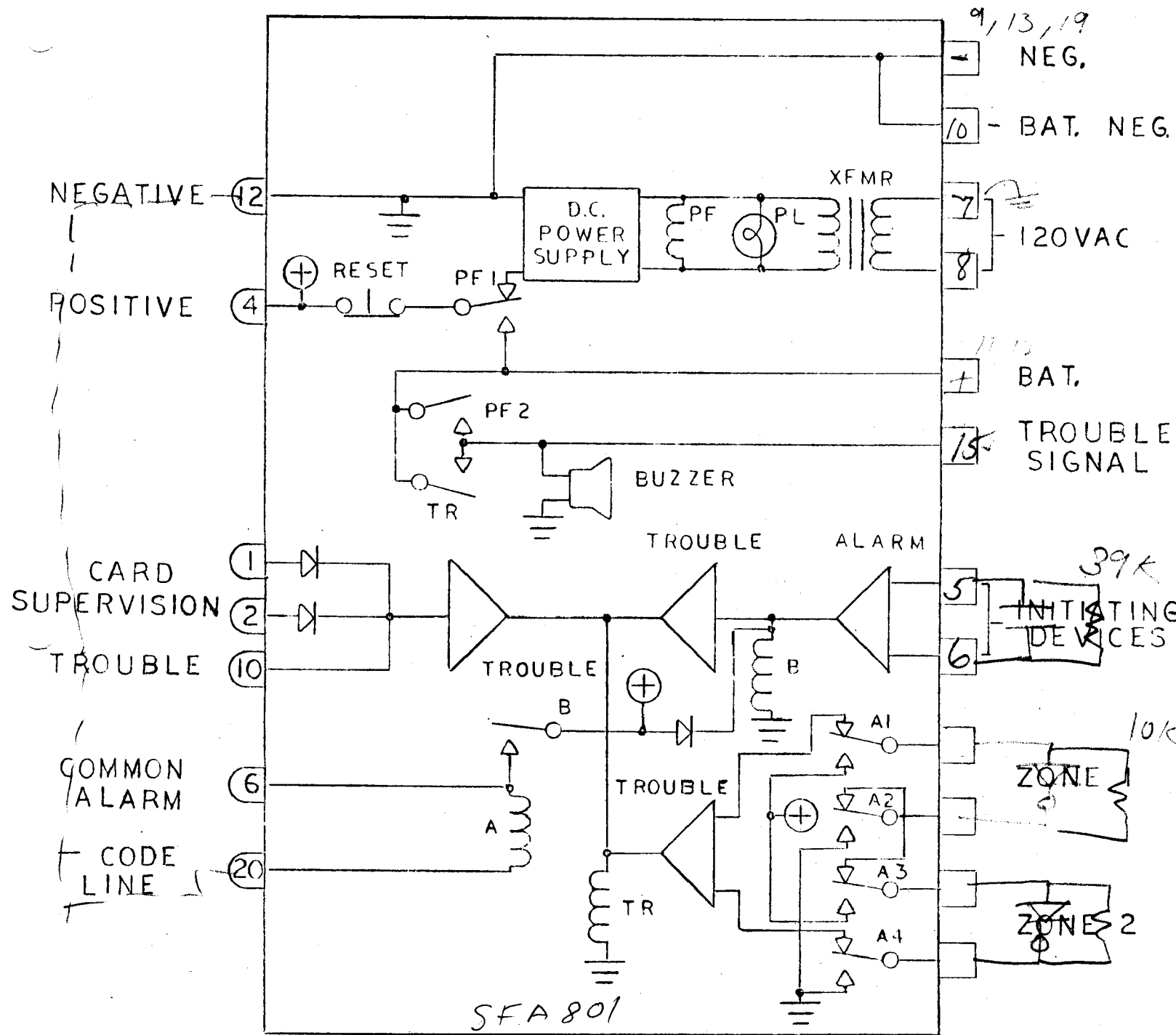
DC SIGNAL MODULE

THEORY OF OPERATION

The DC signal module has a power supply, initiating device input, signal output and system supervisory circuits. Main power input to the module is 120VAC, single phase, 60 Hz. With AC power on, the power lamp is on (PL) and the power failure (PF) relay is energized. The negative of the DC supply is connected to terminals on the front of the module and to pin 12 of the mother board. The positive output is connected to pin 4 through the PF relay (energized) and a system reset switch. If AC power fails, the contacts of the PF relay automatically switch the standby battery to the positive output (pin 4), and turn on the trouble buzzer. The reset switch on the DC power line is used to cancel the locking type alarm circuits on this and other system modules.

This module has an initiating signal output. An alarm signal input energizes relay B. Its contact connects system DC to the common alarm output and relay A. In order for relay A to operate, the negative code line must be connected to the negative of the DC supply.

Separate trouble supervision circuits are used for the initiating lines, signal lines and mother board signal lines. The outputs of these trouble amplifiers energize a trouble relay. The contacts of the relay sound the buzzer and connect the positive battery voltage to an output terminal for external use.



MB

TB

*Can be used with
out of the Board
terminals 12 to 15, 2 to 20*

FIGURE XIV

DC SIGNAL MODULE

CATALOG NO. SFA-1-1
FACTORY NO. 210756

CLASS B SIGNALS MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required

Bell Power Supply
System Power Supply
Multimeter (VOM)
Printed Circuit Card Extender
Test Leads (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, the module lamp should not be on. If the module trouble lamp is on, all external signal lines should be checked for fault conditions.
2. After checking all external wiring connected to the front panel terminal strip, unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. If it is desirable not to activate the system signal devices during the following tests, disconnect the wiring from terminal numbers 4, 5, 6 and 7. After disconnecting the lines, an end-of-line resistor must be connected across the bell signal terminals.
5. The system DC is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 1-1. All voltages are nominal positive DC with respect to negative (pin 12) unless otherwise noted.

CHART 1-1

INPUTS	4	5	6	7	10	TR
NORMAL CONDITION	1	5.7	5.7	11	1	Off
SYSTEM LAMP TEST (9)	1	5.7	5.7	11	8	On
OPEN CKT. (4) - (5)	0	28	28	28	8	On
OPEN CKT. (6) - (7)	0	0	0	28	8	On
PROGRAM ALARM (3)	28 / Neg.	#	28 / Neg.	#	8	On
PROGRAM POSITIVE ALARM (7)	28 / Neg.	#	28 / Neg.	#	8	On

POWER

- 4 Positive DC System Voltage 28VDC (Nom.)
- 12 Negative Reference
- 1 Positive DC Bell Power Input
- 2 Negative Bell Power Input

* Negative program alarm must appear on pin 8 simultaneously.

Meter should be connected directly to the signal terminals; Red (pos.) on terminal 4 (6), black (neg.) on terminal 5 (7).

CATALOG NO. SFA-1-2
FACTORY NO. 210779

CLASS B SIGNALS MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Bell Power Supply
System Power Supply
Multimeter (VOM)
Printed Circuit Card Extender
Test Leads (Jumpers)
End-of-Line Resistors (2)

Test Setup and Procedure:

1. Under normal supervisory conditions, the module lamp should not be on. If the module trouble lamp is on, all external signal lines should be checked for fault conditions.
2. After checking all external wiring connected to the front panel terminal strip, unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. Disconnect the wiring at terminal numbers 4, 5, 6 and 7. These lines are connected to the Resistor Module, SFA-3-4. An end-of-line resistor must be connected across each bell signal circuit. The resistor module should be tested separately.
5. The system DC is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 1-1. This module without the resistor module connected is identical to SFA-1-1. All voltages are nominal positive DC with respect to negative (pin 12) unless otherwise noted.

CATALOG NO. SFA-1-3
FACTORY NO. 210757

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Bell Power Supply
System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Leads (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, the module lamp should not be on. If the module trouble lamp is on, all external signal lines should be checked for fault conditions.
2. After checking all external wiring connected to the front panel terminal strip, unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. The bell power outputs are determined by the connection at the multi-tap transformer. With the input at terminals Nos. 1 and 2 of 120VAC (Nominal), the voltage output across the bell terminals should be 12VAC for each signal device connected to the line. The maximum number of devices allowable in each series loop is ten ($10 \times 12\text{VAC} = 120\text{VAC}$). Using the VOM, measure the AC input at terminals 1 and 2. The acceptable limits are 102VAC minimum to 132VAC maximum.
5. The system DC is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 1-3. All voltages are nominal positive DC with respect to negative (pin 12) unless otherwise noted. (Nominal input at pin 4 is 28VDC).

CHART 1-3

OUTPUTS		4	5	6	7	10	TR LAMP
INPUTS							
NORMAL CONDITIONS		1	5.7	5.7	11	1	Off
SYSTEM LAMP TEST (9)		x	x	x	x	8	On
OPEN CKT. (4) - (5)		0	28	0	0	8	On
OPEN CKT. (6) - (7)		28	28	0	28	8	On
PROGRAM ALARM (8)*		12VAC/Device	#	12VAC/Device	#	8	On
PROGRAM POSITIVE ALARM* (7)		12VAC/Device	#	12VAC/Device	#	8	On

Positive DC System Voltage 28VDC (Nom.)

Negative Reference

1 - 2 120VAC Nominal Bell Power

x Depends on the number of devices in the signal lines.

* Negative program alarm must appear on pin 8 simultaneously.

Meter should be connected directly to the signal terminals.

CATALOG NO. SFA-1-4
FACTORY NO. 210758

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Bell Power Supply (120VAC)
System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Leads (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, the module lamp should not be on. If the module trouble lamp is on, all external signal lines should be checked for fault conditions.
2. After checking all external wiring connected to the front panel terminal strip, unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. This module is designed for use with vibrating AC series signal devices. The common line on the AC input is connected to terminal No. 2. The acceptable limits of the AC input at terminals 1 and 2 are 102VAC (minimum) to 132VAC (maximum). The transformer output should be 12VAC for each device connected to the bell signal lines.
5. The system DC is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 1-4. All voltages are nominal positive DC with respect to negative (pin 12) unless otherwise noted. (Nominal input at pin 4 is 28VDC).

CHART 1-4

INPUTS		OUTPUTS		4	5	6	7	10	TR LAMP
NORMAL CONDITION		x	x	5.7	11	1	5.7	1	Off
SYSTEM LAMP TEST (9)		x	x	5.7	11	1	5.7	8	On
OPEN CKT. (4) - (5)		0	28	0	28	0	0	8	On
OPEN CKT. (6) - (7)		28	28	28	28	0	28	8	On
PROGRAM ALARM (8)*		-6/Ref.	#	-6/Ref.	#	-6/Ref.	#	8	On
PROGRAM POSITIVE ALARM* (7)		-6/Ref.	#	-6/Ref.	#	-6/Ref.	#	8	On

(4) Positive DC System Voltage 28VDC (Nom.)

(12) Negative Reference

(1) - (2) 120VAC Nominal Bell Power

x Depends on the number of devices in the line.

* Negative program alarm must appear on pin 8 simultaneously.

Meter should be connected directly to the signal terminals. Approximately 6VDC should be at the output for each signal device on the line.

CATALOG NO. SFA-1-5
FACTORY NO. 210778

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Bell Power Supply (120VAC)
System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Leads (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, the module lamp should not be on. If the module trouble lamp is on, all external signal lines should be checked for fault conditions.
2. After checking all external wiring connected to the front panel terminal strip, unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. If it is desirable not to activate the system signal devices during the following tests, disconnect the wiring from terminal numbers 4, 5, 6 and 7. After disconnecting the lines, an end-of-line resistor must be connected across the bell signal terminals. (20K ohm 5W 10%).
5. The system DC is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 1-5. All voltages are nominal positive DC with respect to negative (pin 12) unless otherwise noted. (Nominal system voltage is 28VDC).

CHART 1-5

INPUTS	4	5	6	7	10	TR LAMP
NORMAL CONDITION	1	6.7	6.7	15	1	Off
SYSTEM LAMP TEST (9)	1	6.7	6.7	15	8	On
OPEN CKT. (4) - (5)	0	28	28	28	8	On
OPEN CKT. (6) - (7)	0	0	0	28	8	On
PROGRAM ALARM (3)*	120 VAC	#	120 VAC	#	8	On
PROGRAM POSITIVE ALARM (7)*	120 VAC	#	120 VAC	#	8	On

(4) Positive DC System Voltage 28VDC (Nom.)

(12) Negative Reference

(1) - (2) 120VAC Bell Power

* Negative program alarm must appear on pin 8 simultaneously.

Meter should be connected directly to the signal terminals.

CATALOG NO. SFA-1-6
FACTORY NO. 211480

CLASS B SIGNALS MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Bell Power Supply (DC)
System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Leads (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, the module lamp should not be on. If the module trouble lamp is on, all external signal lines should be checked for fault conditions. (Check fuses).
2. After checking all external wiring connected to the front panel terminal strip, unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. Set the VOM to the +50VDC scale, and connect the negative (black) lead to the system negative (pin 12) on the P.C. card connectors. Connect the read lead to terminal 8. The voltmeter should read less than 10 volts.

If the reading is more than 10 volts, remove the cover on the front panel to allow access to the potentiometer mounted on the P.C. board. Adjust the potentiometer until the voltage is less than 10VDC.

5. Switch the voltmeter to the 10 volt scale. Adjust the potentiometer if necessary until the voltmeter reads $8.0 \text{ VDC} \pm .25\text{VDC}$. If no faults exist in the signal lines, and all connections to the signal module are correct, yet the circuit cannot be adjusted, a fault exists in the module's integrated circuit amplifier section. The module must be returned to the factory.
6. The system DC is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 1-6. All voltages are nominal positive DC with respect to negative (pin 12) unless otherwise noted.

CHART 1-6

POWER

INPUTS	4	5	6	7	10	TR LAMP
NORMAL CONDITION	0	7	0	7	0	Off
LAMP TEST (9)	0	7	0	7	8	On
OPEN CKT. 4 - 5	0	7	0	7	8	On
OPEN CKT. 6 - 7	0	7	0	7	8	On
PROGRAM ALARM * (3)	28VDC/Neg.	#	28VDC/Neg.	#	8	On
PROGRAM POSITIVE ALARM * (7)	28VDC/Neg.	#	28VDC/Neg.	#	8	On

(4)

(12)

(1)

(2)

Positive DC System Voltage 28VDC (Nom.)

Negative Reference

Positive DC Bell Power Input

Negative Bell Power Input

* Negative program alarm must appear on pin 8 simultaneously.

Meter should be connected directly to the signal terminals; Red (pos.) on terminal 4 (6), black (neg.) on terminal 5 (7).

CATALOG NO. SFA-1-7
FACTORY NO. 210759

CLASS A SIGNALS MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Bell Power Supply (DC)
System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Leads (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, the module lamp should not be on. If the module trouble lamp is on, all external signal lines should be checked for fault conditions. (Check fuses).
2. After checking all external wiring connected to the front panel terminal strip, unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. The bell signal power is 28VDC (nom.) with the positive input at terminal 1 and negative input at terminal 2. Output signal lines are four-wire circuits for Class A operation.
5. The system DC (28VDC Nom.) is applied to the PC card through pin 4 of the PC card connector.
6. Activate the system LAMP TEST. A 28VDC signal should be on pin 9 of the PC connector, the module lamp should be on and a trouble output signal of 8VDC should be at pin 10.

Test Setup and Procedure (Cont.)

7. The module trouble lamp should be on and a trouble output signal of 8VDC should appear at pin 10 if the line at any one of the following terminals is disconnected: terminals 4, 5, 6, 7, 8, 9, 10 or 11.
8. To test the Class A signal capability of the module, disconnect the external wiring at these terminals: 4, 5, 6 and 7. A trouble output signal is generated, and will remain on for the remainder of the alarm signal test.
9. If the PROGRAM NEGATIVE ALARM line (pin 8) is not connected to the negative of the power supply, a jumper should be connected to pin 8 and pin 12. The alarm relays can be activated by connecting a jumper from pin 4 (System +DC) to the program input terminal (No. 3). Both of the module relays should be activated, placing +28VDC at terminal 10 with respect to terminal 11, and +28VDC at terminal 8 with respect to terminal 9. All signal devices are now activated.
10. Disconnect the jumper at the PROGRAM input terminal 3 and connect it to the PROGRAM POSITIVE ALARM input at pin 7. Both relays should be activated with signal power appearing at the terminals indicated in the previous step.
11. Remove the jumper at pin 7 and pin 4.
12. Connect all external signal circuits to the proper terminals.
13. The module trouble lamp and trouble signal output should now be off.
14. Unplug the module from the PC card extender, and remove the extender from the rack.

Mount the circuit in the equipment rack. (Replace if defective).

CHART 1-9

POWER
 Positive DC System Voltage 28VDC (Nom.)
 Negative Reference

INPUTS	4 and 10	5 and 11	6 and 8	7 and 9	10	TR LAMP
NORMAL CONDITION	0	7	0	7	0	Off
LAMP TEST (9)	0	7	0	7	8	On
OPEN CKT. Bell Lines B1, B2, B3, B4 (one at time)	0	7	0	7	8	On
PROGRAM ALARM (3)*	28VDC	28VDC/Neg. #	28VDC/Neg.	#	8	On
PROGRAM POSITIVE ALARM (7)*	28VDC	28VDC/Neg. #	28VDC/Neg.	#	8	On

Positive DC Bell Power Input

Negative Bell Power Input

* Negative program alarm must appear on pin 8 simultaneously.
 Test the alarm output with the following lines disconnected:
 Terminals 4, 5, 6, 7.

Meter should be connected directly to the signal terminals;
 Red (pos.) on terminal 10 (8), black (neg.) on terminal 11 (9).

CATALOG NO. SFA-2-1
FACTORY NO. 210745

CLASS B INITIATING MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Multimeter (VOM)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions no module lamps should be on. If any lamps are on, all supervised input and output lines connected to the terminal strip should be checked for trouble or alarm conditions. Supervised lines are S1, S2 and the remote annunciators. Normal conditions for other terminals may be checked by the following procedure.
2. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the module printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. The system DC voltage is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 2-1.

CHART 2-1

POWER

- ④ Positive DC System Voltage (28VDC Nom.)
- ⑫ Negative Reference

↓ INPUTS	⑥	⑩	③	④	⑤	⑥	TR1	TR2	AL1	AL2
NORMAL CONDITION	1	1	1	1	1	1	Off	Off	Off	Off
SYSTEM LAMP TEST ⑨	1	7 ^m	1	22 ^m	1	22 ^m	On	On	On	On
SHORT CKT. ① - ② *	22 ^m	12 ^m	22 ^m	22 ^m	1	1	Off	Off	On	Off
OPEN CKT. ① - ②	1	12 ^m	1	1	1	1	On	Off	Off	Off
SHORT CKT. ⑦ - ⑧ *	22 ^m	12 ^m	1	1	22 ^m	22 ^m	Off	Off	Off	On
OPEN CKT. ⑦ - ⑧	1	12 ^m	1	1	1	1	Off	On	Off	Off
OPEN CKT. ④	1	6 ^m	1	7 ^m	1	1	Off	Off	Off	Off
OPEN CKT. ⑥	1	6 ^m	1	1	1	7 ^m	Off	Off	Off	Off
Remove Each Lamp Individually	1	6 ^m	1	1	1	1	X	X	X	X

* - Push System Reset switch to return module to normal supervisory mode.
^m - Indicates minimum reading, all others are maximum.
 □ - P.C. Card Connector
 ○ - Terminal Strip Connector.

CATALOG NO. SFA-2-2

FACTORY NO. 210746

CLASS B INITIATING MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, no module lamps should be on. If any lamps are on, all supervised input and output lines connected to the terminal strip should be checked for trouble or alarm conditions. Supervised lines are S1, S2 and the remote annunciators. Normal conditions for other terminals may be checked by the following procedure.
2. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the module printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. The system DC voltage is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 2-2.

CHART 2-2

4 Positive DC System Voltage 28VDC (Nom.)

12 Negative Reference

INPUTS	OUTPUTS						AL1	AL2
	6	10	3	4	5	6		
NORMAL CONDITION	1	1	1	1	1	1	Off	Off
SYSTEM LAMP TEST 9	1	7 ^m	1	22 ^m	1	22 ^m	On	On
SHORT CKT. 1 - 2 *	22 ^m	12 ^m	22 ^m	22 ^m	1	1	Off	Off
OPEN CKT. 1 - 2	1	12 ^m	1	1	1	1	On	Off
SHORT CKT. 7 - 8 *	22 ^m	12 ^m	1	1	22 ^m	22 ^m	Off	On
OPEN CKT. 7 - 8	1	12 ^m	1	1	1	1	On	Off
OPEN CKT. 4	1	1	1	7 ^m	1	1	Off	Off
OPEN CKT. 6	1	1	1	1	1	7 ^m	Off	Off
Remove Each Lamp Individually	1	6 ^m	1	1	1	1	X	X

* Push system reset switch to return module to normal supervisory mode.
 m Indicates minimum reading, all others are maximum.

PC Card Connector - Terminal Strip Connector.

CATALOG NO. SFA-2-4
FACTORY NO. 210748

CLASS B CODE INPUT MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, no module lamps should be on. If any lamps are on, all supervised input and output lines connected to the terminal strip should be checked for trouble or alarm conditions. The supervised line is the indicating circuit. Normal conditions for other terminals may be checked by the following procedure.
2. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the module printed circuit card connector. Reading should be zero ohms. Check continuity from terminal 1 (+) to pin 15 (-). Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. The system DC voltage is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 2-4.

CHART 2-4

	6	10	2	3	4	5	6	TR	AL
OUTPUTS									
INPUTS									
NORMAL CONDITION	1	1	1	1	1	1	1	Off	Off
SYSTEM LAMP TEST 9	1	7 ^m	1	22 ^m	1	22 ^m	4	On	On
SHORT CKT. 7 - 8 *	22 ^m	12 ^m	22	22	22 ^m	22 ^m	1	Off	On
OPEN CKT. 7 - 8	1	12 ^m	1	1	1	1	22 ^m	On	Off
Remove Each Lamp Individually	1	6 ^m	1	1	1	1		X	X

POWER

Positive DC System Voltage 28VDC (Nom.)

Negative Reference

4

12

* Push system reset switch to return module to normal supervisory mode.
 m Indicates minimum reading, all others are maximum.

PC Card Connector



Terminal Strip Connector.

CATALOG NO. SFA-2-6
FACTORY NO. 210750

CLASS B CLOSED LOOP GENERAL ALARM MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 250 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Under normal conditions no module lamps should be on. The external signal lines should be a closed loop.
2. Unplug the circuit module from the equipment rack, and check the continuity between pins 1 and 2. Reading should be zero ohms.
3. Disconnect the line at terminal 5, and check the continuity between it and pin 6. Reading should be zero ohms. Reconnect wire to terminal.
4. Disconnect the line at terminal 4 and do not connect it until all tests are complete. Check the continuity between terminals 4 and 3, and between terminals 4 and 6. Meter should indicate an open circuit.
5. Plug the printed circuit card extender into the equipment rack, and mount the module on the extender.
6. Disconnect the external wiring at terminals 3 and 6. Connect a test cable from pin 4 to terminal 4.
7. The system DC is applied through pin 4. Pin 12 is the negative reference. The conditions of all outputs for normal, trouble and alarm conditions are given in Chart 2-6. All voltages are nominal positive DC with respect to negative unless otherwise noted.
8. Remove all test equipment, connect all wiring to the module and mount it into the equipment rack.

INPUTS		OUTPUTS						
NORMAL CONDITIONS				3	6	10	4	Positive DC System Voltage 28VDC (Nom.)
LAMP TEST		9		0	0	8	12	Negative Reference
OPEN CKT. 1 - 2				0	28	8		
OPEN CKT. 7 - 8				28	0	8		

CATALOG NO. SFA-2-8
FACTORY NO. 210955

CLASS B INPUT/OUTPUT MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Signal Power Supply (DC)
System Power Supply
Multimeter (VOM)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, no module lamps should be on. If any lamps are on, all supervised input and output lines connected to the terminal strip should be checked for trouble or alarm conditions. Supervised lines are S1, B1 and B2. Normal conditions for other terminals may be checked by the following procedure.
2. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the module printed circuit card connector. Reading should be zero ohms.
3. Connect the positive (+) meter lead to terminal 1. Connect the negative lead to pin 19 and then to pin 20. Meter should indicate 200 ohms or less at each pin.
4. Reverse the meter leads at these points. Meter should read 100,000 ohms or more.
5. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
6. The system DC voltage is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 2-8. All voltage measurements are with respect to negative (pin 12) unless otherwise noted.

CHART 2-8

POWER

Positive DC System Voltage (28 VDC Nom.)

4

Negative Reference

12

Positive Bell Power Input

3

Negative Bell Power Input

2

INPUTS	4	5	6	7			6	10	TR LAMP	AL LAMP
NORMAL CONDITION	11	5.7	5.7	1	1	1	1	1	Off	Off
SYSTEM LAMP TEST 9	11	5.7	5.7	1	1	22	1	22	On	On
OPEN CKT. 11 - 12	11	5.7	5.7	1	1	1	1	7	On	Off
SHORT CKT. 11 - 12 *	Neg.	28	Neg.	28	22	22	22	7	Off	On
OPEN CKT. 4 - 5	28	1	1	1	1	1	1	7	On	Off
OPEN CKT. 6 - 7	28	28	28	1	1	1	1	7	On	Off
PROGRAM ALARM 8 #	Neg.	28	Neg.	28	1	1	1	7	On	Off
PROGRAM ALARM 7 #	Neg.	28	Neg.	28	1	1	1	7	On	Off
PROGRAM ALARM 21 #	Neg.	28	Neg.	28	1	1	1	7	On	Off

* An alarm on the input circuit may or may not connect bell power to the outputs, depending on how the module is wired.
 # Bell outputs should be measured directly across the bell signal terminals.

CATALOG NOS. SFA-2-11 & SFA-2-12
FACTORY NOS. 211485 & 211774

DUAL ZONE SMOKE DETECTOR MODULES

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Switching Regulator (SFA-3-11)
System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)
0-5ADC Meter

Test Setup and Procedure:

1. Under normal supervisory conditions, no module lamps should be on. If any lamps are on, all supervised input and output lines connected to the terminal strip should be checked for trouble or alarm conditions. Supervised lines are S1, S2 and the remote annunciators (SFA-2-11 only). Normal conditions for other terminals may be checked by the following procedure.
2. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the module printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender. Connect the ammeter across the the test pins in line 3. Current flow is into the module.

Pin 3 is the regulated DC voltage for the smoke detectors. The acceptable limits are 19VDC (min.) and 22VDC (max.). The current should be less than 1.0 amp under normal supervisory conditions.

4. The system DC voltage is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 2-11.

CHART 2-11

POWER

INPUTS	OUTPUTS									
	3	4	5	6	6	40	TR1 LAMP	TR2 LAMP	AL1 LAMP	AL2 LAMP
NORMAL CONDITION	1	1	1	1	1	1	Off	Off	Off	Off
LAMP TEST	1	22	1	22	1	7	On	On	On	On
OPEN CKT. [1] - [2]	1	1	1	1	1	7	On	Off	Off	Off
OPEN CKT. [7] - [8]	1	1	1	1	1	7	Off	On	Off	Off
CONNECT 500 OHMS [1] - [2]	22	22	1	1	22	7	Off	Off	On	Off
CONNECT 500 OHMS [7] - [8]	1	1	22	22	22	7	Off	Off	Off	On
OPEN CKT. [4]*	1	22	1	1	1	7	Off	Off	Off	Off
OPEN CKT. [6]*	1	1	1	22	1	7	Off	Off	Off	Off
Remove Each Lamp Individually	1	1	1	1	1	7	X	X	X	X

4 Positive System DC (28VDC Nom.)

3 Regulated DC (20VDC Nom.)

12 Negative Reference

* SFA-2-11 Only

CATALOG NOS. SFA-2-13 & SFA-2-14
FACTORY NOS. 210751 & 210752

CLASS A INITIATING MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Multimeter (VOM)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Under normal supervisory conditions, no module lamps should be on. If any lamps are on, all supervised input and output lines connected to the terminal strip should be checked for trouble or alarm conditions. Supervised lines are S1, S2 and the remote annunciators (for SFA-2-13 only). Normal conditions for other terminals may be checked by the following procedure.
2. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2 of the module printed circuit card connector. Reading should be zero ohms.
3. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender.
4. The system DC voltage is applied to the PC card through pin 4 of the PC card connector. Pin 12 is the negative reference. Conditions of all output lines for normal, trouble and alarm inputs are detailed in Chart 2-13.
5. To verify that the module is operating as Class A circuit, disconnect one terminal on each signal input line as indicated on chart (*) and initiate an alarm. The trouble light will be on during this test.

Disconnect the lines at terminals 1, 4, 9 and 12. To initiate an alarm, touch the line from terminal 1 to the line from terminal 4 (S1), or the line from terminal 9 to the line from terminal 12 (S2).

CHART 2-13

INPUTS		OUTPUTS									
		6	10	5	6	7	8	TR1	TR2	AL1	AL2
NORMAL CONDITION		1	1	1	1	1	1	Off	Off	Off	Off
SYSTEM LAMP TEST (9)		1	7	1	22	1	22	On	On	On	On
SHORT CKT. 1 - 4		22	12	22	22	1	1	On*	Off	On	Off
OPEN CKT. 1 - 2 or 3 - 4		1	12	1	1	1	1	On	Off	Off	Off
SHORT CKT. 9 - 12		22	12	1	1	22	22	Off	On*	Off	On
OPEN CKT. 9 - 10 or 11 - 12		1	12	1	1	1	1	Off	On	Off	Off
OPEN CKT. 4 (2-13 only)		1	1	1	7	1	1	Off	Off	Off	Off
OPEN CKT. 6 (2-13 only)		1	1	1	1	1	7	Off	Off	Off	Off
Remove Each Lamp Individually		1	6	1	1	1	1	X	X	X	X

Positive DC System Voltage 28VDC (Nom.)

(4)

Negative Reference

(12)

* Push system reset switch to return module to normal supervisory mode.
 Test with one line open.

PC Card Connector

Terminal Strip Connector.

CATALOG NO. SFA-3-1
FACTORY NO. 210761

SYSTEM POWER SUPPLY

FIELD SERVICE TEST PROCEDURE

The objective of this test is to verify that the System Power Supply is functioning properly. After the power supply has been tested (and replaced if necessary), it may be used as the power supply and trouble detection circuit for testing most of the circuit modules in the system.

Test Equipment Required:

Multimeter
DC Ammeter 0-5ADC
Test Leads (Jumpers)

Test Procedure:

1. Turn off AC power to the module and unplug module from the equipment rack.
2. Remove the external wiring connected to terminal strip numbers 1, 2, 5, 7, 11 and 12.
3. Check the continuity between terminal number 5 and the following: terminal numbers 1, 7, 15, 11 and printed circuit card connector contact No. 4. Reading on meter should be zero ohms.
4. Check the continuity between terminal number 13 and the following: terminal numbers 6, 8, 10 and printed circuit card connector contact No. 12. Reading on meter should be zero ohms.
5. The wiring connected to the terminal strip should be: 120VAC input to numbers 3 and 4; Negative Reference for DC voltage to numbers 6, 8, 10, 13; Equipment Rack (safety ground) to number 9; Remote Reset or jumper between numbers 14 and 15. Place a jumper between pins 1 and 2 on the mother board, and the negative bus (pin 12).

Test Procedure (Cont.)

6. Turn on the AC power and measure the voltage across terminals 3 and 4. Voltage should be between 102 (min.) and 132 (max.) VAC, 60 Hz. Module pilot light should be on. The trouble buzzer should be off with the switch set for normal operation. Both the trouble light and the ground light should be off. If the ground light is on, check the connection from terminal number 9 to the equipment rack safety ground.
7. Measure the DC system voltage at the following points with respect to the negative reference. (All DC voltage levels shall be given with respect to negative; terminals 6, 8, 10, 13 or P.C. card connector contact No. 12). Terminal numbers 2, 5, 15, 11 and printed circuit connector No. 4. Voltage should be 26VDC \pm 4V.
8. Turn on buzzer switch. Buzzer should sound, but trouble light should remain off. Return switch to normal position.
9. Using a test lead, connect terminal number 5 (DC output) to P.C. card connector contact No. 9 (lamp test). The trouble light, ground light and trouble buzzer should be on. Remove the test lead from contact No. 9 and place it on contact No. 10. The trouble light and buzzer should be on. Measure the DC voltage at terminal 1; reading should be less than 1 volt. Remove the test lead from contact No. 10 and terminal 5. Remove the jumper from contact Nos. 1 and 2. The trouble light and buzzer should be on. Place a jumper between P.C. card connector contact Nos. 11 and 12. This should not silence the buzzer or turn off the lamp. Remove jumper, and turn off the AC power.
10. If the power supply module has not performed satisfactorily in the previous tests, it should be replaced. Before mounting the power supply in the equipment rack, check the continuity between pins 1 and 12 and 2 and 12 on the mother board. If all of the other circuit modules are in place on the unit, the reading should be zero ohms. If it is an open circuit or a very high reading, a fault exists in the equipment rack wiring of this circuit, or on a printed circuit card in one of the modules.

Test Procedure (Cont.)

11. Mount the power supply in the rack and connect the external wiring to the terminal strip. Turn on the AC power. If the trouble lamp/buzzer goes on, measure the voltage at terminal 1. A reading of more than 7VDC indicates trouble in the battery charger module. Reset the battery charger. If the voltage at terminal 1 remains high, the battery charger module must be tested. If the voltage at terminal 1 drops to 1VDC or less, but the trouble light/buzzer remains on, the trouble supervisory line (P.C. card connector contact No. 10) is high. Any modules with trouble lamps on should be checked for abnormal conditions.
12. A DC ammeter may be connected between terminals 14 and 15 of the power supply (remove external wiring) in order to monitor the current and the voltage output while performing a lamp test. No abnormal variation should occur in either reading. (Refer to system specifications). Check any lamps in the system which do not light, and if lamps are good, test the circuit modules for faults.
13. If the system is programmed to silence the trouble light and buzzer when AC power fails, perform the following test. The battery should be connected to terminal 7 (Pos.) and terminal 8 (Neg.). The voltage across these terminals should be within the limits acceptable for the type of battery used. Turn off the AC power. The full value of the battery voltage should appear at terminals 1 and 15. The trouble light and buzzer should remain off.

CHART 3-1

SYSTEM POWER SUPPLY

3 - 4 AC Input
120V (Nom.)

OUTPUTS ↓	1	2	5	11	12	15	BUZ.	TR	G.L.
NORMAL	1	22 ^m	22 ^m	22 ^m	1	22 ^m	Off	Off	Off
LAMP TEST	1	22 ^m	22 ^m	1	22 ^m	22 ^m	On	On	On
BATT. TROUBLE	22 ^m	22 ^m	22 ^m	1	22 ^m	22 ^m	On	On	Off
OPEN GND. CKT.	1	22 ^m	22 ^m	1	22 ^m	22	On	On	On
+28VDC ON TROUBLE SUPER.	1	22 ^m	22 ^m	1	22 ^m	22 ^m	On	On	Off
CARD SUPER. OPEN	1	22 ^m	22 ^m	1	22 ^m	22 ^m	On	On	Off
AC POWER OFF	22 ^m	1	22 ^m	1	22 ^m	22 ^m	On	On	Off
AC OFF/SILENCE	22 ^m	1	22 ^m	22 ^m	1	22 ^m	Off	Off	Off

- TERMINAL STRIP CONNECTOR

m - Indicates minimum reading, all others are maximum

DUAL CIRCUIT SIGNAL POWER SUPPLY

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Model 260 VOM (or equal)
DC Ammeter (0-5ADC)
Test Cables
Resistor Load (9.0 Ohm, 120 Watt)

Test Setup and Procedure:

1. Using the 250VAC scale of the Simpson VOM, verify that the line voltage is within the acceptable limits of 102VAC (minimum) and 132VAC (maximum). The line input is at terminal 1 or 2 and the neutral is at terminal 3 or 4. All meter readings given for this module shall be for a nominal input of 117VAC across the line and neutral terminals, unless otherwise noted.
2. Disconnect the battery lines at terminals 5 and 6, and the output lines at terminals 9 and 11.
3. Set the voltage to the +50VDC scale. Connect the negative (black) lead to any of the module's negative output terminals (No. 7, 8, 10 or 12). Connect the positive (red) lead to the first power supply circuit output at terminal No. 9.
4. With no load on the supply, the output should be 26VDC \pm 1.5VDC.
5. Turn the AC power off. Connect a 0-5A DC meter at the output of the first circuit. (Terminal No. 9). Connect a 3A load to the ammeter. The signal devices may be used as a load, however, if it is desirable not to sound these devices, a 9.0 ohm 120 watt (min.) resistor may be used. If a resistor load is used, connect one lead to the ammeter (-) terminal and the other lead to the negative on the power supply.
6. Turn on the AC power. The ammeter should read 2.3ADC minimum. The voltmeter should read 22VDC minimum.
7. Turn off the AC power. Disconnect the voltmeter, ammeter and load from terminal 9 and connect both to terminal 11. Connect a load to the ammeter (signal devices or resistor).
8. Repeat step 6.
9. Turn off AC power. Remove voltmeter, ammeter and load from terminal 11.
10. With the AC power off, test the continuity between terminal 5 and the following: terminals 6, 9 and 11. Reading should indicate a closed circuit.
11. Connect all of the input and output lines to the module. Turn on AC power.

SINGLE CIRCUIT SIGNAL POWER SUPPLY

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Model 260 VOM (or equal)
DC Ammeter (0-5ADC)
Test Cables
Resistor Load (9.0 Ohm, 120 Watt)

Test Setup and Procedure:

1. Using the 250VAC scale of the Simpson VOM, verify that the line voltage is within the acceptable limits of 102VAC (minimum) and 132VAC (maximum). The line input is at terminal 1 or 2 and the neutral is at terminal 3 or 4. All meter readings given for this module shall be for a nominal input of 117VAC across the line at neutral terminals, unless otherwise noted.
2. Disconnect the battery lines at terminals 5 and 6, and the output line at terminals 9.
3. Set the voltage to the +50VDC scale. Connect the negative (black) lead to any of the module's negative output terminals (No. 7, 8, 10 or 12). Connect the positive (red) lead to the first power supply circuit output at terminal No. 9.
4. With no load on the supply, the output should be 26VDC \pm 1.5VDC.
5. Turn the AC power off. Connect a 0-5A DC meter at the output of the circuit. (Terminal No. 9). Connect a 3A load to the ammeter. The signal devices may be used as a load, however, if it is desirable not to sound these devices, a 9.0 ohm 120 watt (min.) resistor may be used. If a resistor load is used, connect one lead to the ammeter (-) terminal and the other lead to the negative on the power supply.
6. Turn on the AC power. The ammeter should read 2.3ADC minimum. The voltmeter should read 22VDC minimum.
7. Turn off AC power. Remove voltmeter, ammeter and load from terminal 9.
8. With the AC power off, test the continuity between terminal 5 and the following: terminals 6 and 9.
9. Connect all of the input and output lines to the module.
Turn on AC power

CATALOG NO. SFA-3-4
FACTORY NO. 210964

RESISTOR MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Module 260 VOM (or equal)
Test Cable (Jumper)

Test Setup and Procedure

1. The SFA-3-4 Resistor Module is normally factory wired to the SFA-1-2 DC Series Circuit Signal Module. Disconnect the wiring at the resistor module terminal strip, and remove the blank panel on the module. It is not necessary to remove the module from the equipment rack.
2. Check the continuity between terminals 2 and 3, and between terminals 6 and 7. Meter should indicate a closed circuit.
3. A 15 ohm, 100 watt adjustable resistor is connected between terminals 1 and 4, and a second resistor is connected between terminals 5 and 8. Check the resistors with the ohmmeter to verify that the unit is not open or shorted. (An accurate reading may not be possible with the meter to verify the proper output setting).
4. Reconnect all wiring to the front panel.
5. Connect a jumper from the system DC (terminal 14 on the SFA-3-1) to terminal 3 to cause an alarm. Using the voltmeter, verify that the outputs of the resistor module are correct for the system (depends on the number of signal devices). If they are not, adjust the resistors until the correct outputs are obtained.

If the outputs cannot be correctly adjusted replace the module.

6. Remove the alarm jumper and reset the system (if necessary). Remove all test equipment and completely install the module on the rack.

CATALOG NO. SFA-3-5
FACTORY NO. 210965

POWER MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Model 260 VOM (or equal)

Test Setup and Procedure:

1. Disconnect all wiring from the front panel.
2. Test the continuity between terminal 1 and the following: terminals 3, 5, 7, 9 and 11. (Check fuse).
3. Test the continuity between terminal 2 and terminals 4, 6, 8, 10 and 12.
4. Connect all wiring to the power module.

CATALOG NO. SFA-3-6
FACTORY NO. 210763

AUTOMATIC BATTERY CHARGER MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Module 260 VOM (or equal)

Test Setup and Procedure:

1. Check all external wiring connected to the module, and the fuses in the battery lines.
2. Connect the VOM (set to the +50VDC scale) across the battery terminals. The voltmeter should indicate the battery voltage. The panel voltmeter on the battery charger module should indicate approximately the same voltage as the Simpson meter.
3. Connect the VOM to the TP input terminal No. 1. The meter should read zero under normal conditions.
4. Disconnect the AC power to the battery charger. The target drop (TD) should show red.
5. Reconnect the AC. The TD should still be red, and the TP output should be high (28VDC NOM). Press the module RESET switch and release. The TD should be white, TP should be low, and if the battery voltage is low, the module should be in the fast charge state (observe the ammeter).
6. Disconnect the load line from terminal 6, and connect an ammeter in the battery output line (100 ma scale). Check the trickle charge rate for the battery when it is charged to capacity. The accepted trickle rate is 0.5 milliamp per ampere-hour battery capacity. If the setting is not correct, the battery charger should be removed from the equipment, and the 25 ohm 200W adjustable resistor mounted in the rear of the front panel should be adjusted to the proper rate.

Test Setup and Procedure (Cont.)

7. Disconnect the AC input. Remove the battery (+) lead from the output cell. Connect the voltmeter across the load terminals of the module. Connect the battery line to the next lower cell. The meter should indicate the battery voltage. Connect the line to the other cells (decreasing the voltage) one by one, until the output voltage is low enough to trip the automatic disconnect (circuit breaker). If the output voltage decreases to 20VDC or less, the circuit is defective, and the module should be replaced.

Reconnect the battery lines to the proper terminals.

8. Disconnect the AC power from the system power supply, and allow the battery to power the system. Allow the battery voltage to drop below 28VDC. (An additional load may be necessary). The battery charger should turn on to allow the battery to charge. If the battery charger fails to turn on at the low voltage or turn off at the high voltage, it should be replaced. The panel ammeter, which normally reads zero, should show a charging current of approximately one amp.
9. While the battery is charging, connect the AC power to the system power supply. As the battery charges to its maximum capacity, the high level detection circuit should turn on the one-hour timer circuit. The timer allows the battery to charge for approximately one hour after it reaches its high voltage level. (See the system specifications for the current settings on the type of battery used).

If the timer does not remain on for one hour or for a longer period (± 10 min. tolerance), the module should be replaced.

BATTERY CHARGER MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Model 260 VOM (or equal)

Test Setup and Procedure:

1. Check all external wiring connected to the module, and the fuses in the battery lines.
2. Connect the VOM (set to the +50VDC scale) across the battery terminals. The voltmeter should indicate the battery voltage. The panel voltmeter on the battery charger module should indicate approximately the same voltage as the Simpson meter.
3. Disconnect the AC power from the system power supply, and allow the battery to power the system. Allow the battery voltage to drop below 28VDC. (An additional load may be necessary). The battery charger should turn on to allow the battery to charge. If the battery charger fails to turn on at the low voltage or turn off at the high voltage, it should be replaced. The panel ammeter, which normally reads zero, should show a charging current of approximately one amp.
4. While the battery is charging, connect the AC power to the system power supply. As the battery charges to its maximum capacity, the high level detection circuit should turn off the charger, and the ammeter indicator should drop to zero.
5. Connect the VOM to the TP input terminal No. 1. The meter should read zero under normal conditions.
6. Disconnect the AC power to the battery charger. The target drop (TD) should show red.
7. Reconnect the AC. The TD should still be red, and the TP output should be high (28VDC NOM.). Press the module RESET switch and release. The TD should be white, TP should be low, and if the battery voltage is low, the module should be in the fast charge state (observe the ammeter).
8. Disconnect the load line from terminal 6, and connect an ammeter in the battery output line (100 ma scale). Check the trickle charge rate for the battery when it is charged to capacity. The accepted trickle rate is 0.5 milliamp per ampere-hour battery capacity. If the setting is not correct, the battery charger should be removed from the equipment, and the 25 ohm 200W adjustable resistor mounted in the rear of the front panel should be adjusted to the proper rate.

After the adjustment is complete, install the module and

CATALOG NO. SFA-3-10
FACTORY NO. 210764

DOUBLE SUPERVISION MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)

Test Setup and Procedure:

1. Set the voltmeter to the 250VAC scale. Connect one lead to terminal 6. The meter should indicate 120VAC (NOM.) when the other lead is connected to terminal 3,4, or 5. The 120VAC should also be at terminal 1 with respect to terminal 3, 4 or 5.
2. Set the module switch to the SILENCE position. The trouble buzzer should sound. Return switch to TROUBLE position.
3. Disconnect the AC input at terminal 6. This should cause a trouble signal at the system power supply (light and buzzer). Connect the AC input.
4. Disconnect the DC input at terminal 8. The module buzzer and trouble lamp should be on, and 120VAC should be at terminal 2 but not at terminal 1 (with respect to terminal 3, 4 or 5).
5. Slide the module out of the equipment rack far enough so that the P.C. card is not connected to the mother board. This should activate the card supervision circuit at the power supply to sound the trouble buzzer and light the lamp.
6. Install the circuit module into the rack.

SWITCHING REGULATOR

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
0-5ADC Ammeter
Test Cables (Jumpers)
Load - 9 Ohm 120 Watt

Test Setup and Procedure:

1. Remove the module from the equipment rack and check the continuity between pins 1 and 2. Reading should be zero ohms.
2. Connect a 0-5ADC meter across the test pins in the output line (pin 3 - line 3 on the extender card).
3. Plug the card extender into the equipment rack, and plug the module into the extender.
4. The negative input is at pin 12. The input to the regulator is the system DC at pin 4. (28VDC nominal). The output is at pin 3 of the module. Connect the +50VDC scale of the voltmeter positive to pin 3 and negative to pin 12.

The output should be between 19 and 21VDC from no load to full load. (Disconnect one side of the ammeter for a no-load reading). With the system on and in normal supervisory condition, the switching regulator should be supplying less than 1.0 amp.

5. To verify the output capability, connect a load at the output of the ammeter. A 9-ohm load may be used. If the total current supplied is less than 3.0 amps, the output voltage should not change more than 0.5VDC from no load to full load. If the current is more than 3.0 to 3.2 amps, current limiting should take place and the output voltage will decrease noticeably.
6. Disconnect the test load and all test equipment.
7. Mount the switching regulator (or a replacement) in the equipment rack.

*Be sure that the main power source is capable of supplying adequate power to the switching regulator. System DC should not drop below 22VDC.

LOCAL ENERGY CITY TRIP MODULE

FIELD SERVICE TEST PROCEDURE

Objective: To verify the proper operation of the monitoring and output circuits in the module. If any of the following tests fail, the module should be replaced.

Equipment Required:

Printed Circuit Card Extender
Simpson Model 260 VOM (or equal)
Test Lamp Assembly
Test Leads (Jumpers)

Test Setup and Procedure:

1. The panel switch should be in the NORMAL position, and the lamp should be off.
2. Check the fuse. A fuse rated at 3 amps should be used.
3. Turn the panel switch to the DISCONNECT position. The module lamp should be on, and the module's supervision circuit should send a trouble signal to the system power supply to sound the trouble buzzer.
4. Unless it is necessary to activate the city trip coil during testing, disconnect the wiring on terminals 1 and 2. Connect a 28 volt test lamp assembly across these terminals as an alarm signal indicator.
5. Remove the module from the equipment rack. (The card supervision circuit should turn on the system trouble buzzer).
6. Using an ohmmeter, test the continuity between pins 1 and 2 on the P.C. card connector (PCC). Reading should be zero ohms.
7. Place the positive (red) lead of the ohmmeter on pin 6 (PCC) and the negative (black) lead on terminal number 1. Reading should be less than 300 ohms.
8. Reverse the leads on pin 6 and terminal number 1. The reading should be very high, 100K ohms or greater.
9. Plug the printed circuit card extender into the equipment rack, and plug the module into the card.
10. Turn the module switch to the DISCONNECT position. The module lamp should be on. The voltage on pin 10 (PCC) should be 7 volts or greater with respect to negative (pin 12). Return the switch to NORMAL.
11. Use a jumper lead to connect the system DC at pin 4 to the common alarm input (pin 6). The indicator lamp connected to terminals 1 and 2 should be on. Remove jumper.
12. Remove all test leads and devices. Unplug the printed circuit card extender and place the module back into the rack.

CATALOG NO. SFA-4-2
FACTORY NO. 210767

SUPPLEMENTARY CONTROL MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Disconnect the external wiring connected to the following terminals: 1, 2, 3, 4, 5, 6, 7, 8 and 9.
2. Disconnect the input line on terminal 11, or the jumper connecting terminals 11 and 12.
3. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2. Reading should be zero ohms.
4. Connect the positive lead of the ohmmeter to pin 6 and the negative lead to terminal 12. Meter reading should be less than 100 ohms.
5. Reverse the leads at these points. Meter reading should be more than 100,000 ohms.
6. With the module switch in the NORMAL position, connect the negative lead of the meter to pin 12 and positive to pin 10. The meter reading should be more than 100,000 ohms.
7. Reverse the meter leads. Meter reading should be less than 100 ohms.
8. With the meter connected as in step 7, set the module switch to the DISCONNECT position. Meter should indicate an open circuit.

Test Setup and Procedure (Cont.)

9. Check the continuity between terminal 1 and the following: 3, 4, 6, 7 and 9. Meter should indicate a closed circuit (zero ohms). Meter should indicate an open circuit between terminal 1 and the following: 2, 5 and 8.
10. Plug the printed circuit card extender into the equipment rack and plug the module into the card extender. The module lamp should be on. Return the module switch to the NORMAL position.
11. Connect a jumper between terminals 11 and 12. Connect a jumper from pin 4 to pin 6. The module relay should be energized. To verify that the relay contacts have closed, check the continuity between the following sets of terminals: 1 and 2, 4 and 5, 7 and 8. Meter should indicate a closed circuit.
12. Check the continuity between the sets of terminals indicated in step 9. Meter should indicate an open circuit between 1 and 3, 6 or 9, and a closed circuit between 1 and 4 or 7.
13. Set the meter to the +50VDC scale. Connect the positive lead to pin 10 and the negative lead to pin 12. Meter should read zero.
14. Set module switch to DISCONNECT. The meter should read 10VDC or more.
15. Remove the test equipment and test jumpers from the module. Remove the printed circuit card extender.
16. Plug the module into the equipment rack and connect all external wiring, as indicated on the system wiring diagram.

CATALOG NO. SFA-4-3
FACTORY NO. 210766

REMOTE STATION TRIP MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Disconnect the external wiring connected to the following terminals: 1, 2, 3, and 4.
2. Disconnect the input line on terminal 5, or the jumper connecting terminals 5 and 6.
3. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2. Reading should be zero ohms.
4. Connect the positive lead of the ohmmeter to pin 6 and the negative lead to terminal 6. Meter reading should be less than 100 ohms.
5. Reverse the leads at these points. Meter reading should be more than 100,000 ohms.
6. With the module switch in the NORMAL position, connect the negative lead of the meter to pin 12 and positive to pin 10. The meter reading should be more than 100,000 ohms.
7. Reverse the meter leads. Meter reading should be less than 100 ohms.
8. With the meter connected as in step 7, set the module switch to the DISCONNECT position. Meter should indicate an open circuit.

Test Setup and Procedure (Cont.)

9. Check the continuity between terminals 2 and 3. Meter should indicate a closed circuit (zero ohms). Connect positive meter lead to terminal 4 and negative to terminal 1. Reading should be less than 2000 ohms.

Reverse the leads. Meter should read 100,000 ohms or more.
10. Plug the printed circuit card extender into the equipment rack and plug the module into the card extender. The module lamp should be on. Return the module switch to the NORMAL position.
11. Connect a jumper between terminals 5 and 6. Connect a jumper from pin 4 to pin 6. The module relay should be energized. To verify that the relay contacts have closed, check the continuity between the following sets of terminals: 1 and 2; 1 and 3. Meter should indicate a closed circuit.
12. Set the meter to the +50VDC scale. Connect the positive lead to pin 10 and the negative lead to pin 12. Meter should read zero.
13. Set module switch to DISCONNECT. The meter should read 10VDC or more.
14. Remove the test equipment and test jumpers from the module. Remove the printed circuit card extender.
15. Plug the module into the equipment rack and connect all external wiring, as indicated on the system wiring diagram.

CATALOG NO. SFA-5-1
FACTORY NO. 210769

3-10 MINUTE TIMER

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)
Clock (or other timing device)

Test Setup and Procedure:

1. Under normal conditions, the timer module is completely inactive, and consumes no power.
2. Unplug the circuit module from the equipment rack. Check the continuity between pins 1 and 2. Reading should be zero ohms.
3. Check the continuity between timer output pins 13 and 14. The relay contacts for this output should be closed, and the meter should read zero ohms.
4. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender. Set the timer control for the 3 MINUTE limit (minimum).
5. Connect the positive lead of the voltmeter (+50VDC scale) to the output pin of the timer contacts (see system wiring diagram), and connect the negative to pin 12. The control signal should be present.
6. To start the timer, place a jumper from pin 4 (system DC) to pin 6. The time interval ends when the output relay is energized, opening the output contacts. The meter indicator should drop to zero.
7. An acceptable interval for the 3 MINUTE setting is 2 minutes (minimum) to 4 minutes (maximum).

Test Setup and Procedure (Cont.)

8. To test the RESTART feature on the module, connect a jumper from pin 4 to pin 15 on the module. The output contact should be closed, with the meter indicating the output signal.
9. Set the timer control to the 10 MINUTE limit and remove the jumper from pin 15 to pin 4 to start the timer again.
10. The acceptable limits for the maximum setting are 9 minutes (minimum) and 14 minutes (maximum).
11. Remove the jumper from pins 4 and 6 and connect a jumper from pin 4 to pin 15 to reset the module.
12. Remove all test equipment and test leads.
13. Read PC card extender and insert the module into the equipment rack.

CATALOG NO. SFA-5-2
FACTORY NO. 210772

MARCH TIME MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Lamp Assembly
Test Cables (Jumpers)

Test Setup and Procedure:

1. Unplug the circuit module from the rack, and check the continuity between pins 1 and 2. Reading should be zero ohms.
2. Insert the printed circuit card extender into the circuit and plug the module into the extender.
3. Set the VOM to the +50VDC scale. Connect the negative lead to pin 12. One of the march time pins (20 or 21) is connected to the System DC. Determine which one is connected by using the voltmeter. Connect the test lamp assembly to the output pin, and negative (pin 12).
4. Connect a jumper from pin 4 (System DC) to the code input pin (19) to initiate the march time code. The test lamp should go on each time the output relay closes. The acceptable limits for the output are 105 times/minute (minimum) and 130 times/minute (maximum).
5. If the output is not within the specified limits, the module should be returned to the factory, and a new module placed in the system.
6. Disconnect the jumper and test equipment from the module and equipment rack.
7. Mount the March Time unit in the equipment rack.

CATALOG NO. SFA-5-3
FACTORY NO. 210771

MASTER CODE MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Connector
Test Cables (Jumpers)
Test Lamp Assembly

Test Setup and Procedure:

1. Remove the module from the equipment rack, and check the continuity between pins 1 and 2. Reading should be zero ohms.
2. The code contacts are pins 20 and 21. If a DC signal is connected to either of these, use it as is. If both are inactive, use pin 21 by connecting a jumper from pin 21 to pin 4. Connect the test lamp assembly from the remaining code contact (pin 20) to negative (pin 12).
3. To generate a continuous code output, connect a jumper from pin 4 to pin 19. The acceptable motor speed is 2/3 RPM. (1 complete revolution every 90 seconds ± 10 seconds).
4. The code output will vary for each system. To test the exact code output, refer to the system specifications.
5. Remove the jumper connected at pin 19 and touch it to pin 18 until the code wheel begins to operate, then disconnect the jumper from pin 18. The input at pin 18 is designed to give a specified number of code outputs. (Motor should remain on for approximately 45 seconds).
6. Remove all jumpers and test equipment.
7. Mount the code module (or a replacement) in the equipment rack.

NOTE: If a new code module is installed, the code wheel must be taken from the original module and aligned to meet the system specification.

CATALOG NO. SFA-5-4
FACTORY NO. 210773

DUAL RATE CODE MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Connector
Test Cables (Jumpers)
Test Lamp Assembly

Test Setup and Procedure:

1. Remove the module from the equipment rack, and check the continuity between pins 1 and 2. Reading should be zero ohms.
2. The contacts are pins 20 and 22. If a DC signal is connected to pin 21, use it as is. If it is inactive, use pin 21 by connecting a jumper from pin 21 to pin 4. Connect the test lamp assembly from the main code contact (pin 20) to negative (pin 12).
3. To generate a continuous code output, connect a jumper from pin 4 to pin 19. The acceptable motor speed is $2/3$ RPM. (1 complete revolution every 90 seconds \pm 10 seconds).
4. The code output will vary for each system. To test the exact code output, refer to the system specifications.
5. Remove the jumper connected at pin 19 and touch it to pin 18 until the code wheel begins to operate, then disconnect the jumper from pin 18. The input at pin 18 is designed to give a specified number of code outputs. (Motor should remain on for approximately 45 seconds).
6. Remove the test lamp connected at pin 20 and connect it to pin 22 (slow code rate output). Repeat steps 3-5.
7. Remove all jumpers and test equipment.
8. Mount the code module (or a replacement) in the equipment rack.

NOTE: If a new code module is installed, the code wheel must be taken from the original module and aligned to meet the system specification.

0-3 MINUTE TIMER

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)
Clock (or other timing device)

Test Setup and Procedure:

1. Under normal conditions, the timer module is completely inactive, and consumes no power.
2. Unplug the circuit module from the equipment rack. Check the continuity between pins 1 and 2. Reading should be zero ohms.
3. Check the continuity between timer output pins 13 and 14. The relay contacts for this output should be open, and the meter should indicate an open circuit.
4. Insert the printed circuit card extender into the equipment rack and plug the circuit module into the extender. Set the timer control for the 0 MINUTE limit (minimum).
5. Connect the positive lead of the voltmeter (+50VDC scale) to the output pin of the timer contacts (see system wiring diagram), and connect the negative to pin 12. The control signal should not be present.
6. To start the timer, place a jumper from pin 4 (system DC) to pin 6. The time interval ends when the output relay is energized, opening the output contacts. The meter indicator should show the control signal is present.
7. An acceptable interval for the 0 MINUTE setting is 0 seconds to 20 seconds (maximum).
8. To test the RESTART feature on the module, connect a jumper from pin 4 to pin 15 on the module. The output contact should be open with the meter indicating no output signal.
9. Set the timer control to the 3 MINUTE limit and remove the jumper from pin 15 to pin 4 to start the timer again.
10. The acceptable limits for the maximum setting are 2 minutes 40 seconds (minimum) and 4 minutes (maximum).
11. Remove the jumper from pins 4 and 6 and connect a jumper from pin 4 to pin 15 to reset the module.
12. Remove all test equipment and test leads.
13. Read PC card extender and insert the module into the equipment rack.

CATALOG NO. SFA-6-1
FACTORY NO. 210768

SUPPLEMENTARY CONTROL MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Printed Circuit Card Extender
Test Cables (Jumpers)

Test Setup and Procedure:

1. Disconnect the external wiring connected to the following terminals: 1, 2, 3, 4, 5, 6, 7, 8 and 9.
2. Disconnect the input line on terminal 11, or the jumper connecting terminals 11 and 12.
3. Unplug the circuit module from the equipment rack and check the continuity between pins 1 and 2. Reading should be zero ohms.
4. Connect the positive lead of the ohmmeter to pin 6 and the negative lead to terminal 12. Meter reading should be less than 100 ohms.
5. Reverse the leads at these points. Meter reading should be more than 100,000 ohms.
6. With the module switch in the NORMAL position, connect the negative lead of the meter to pin 12 and positive to pin 10. The meter reading should be more than 100,000 ohms.
7. Reverse the meter leads. Meter reading should be less than 100 ohms.
8. With the meter connected as in step 7, set the module switch to the DISCONNECT position. Meter should indicate an open circuit.

Test Setup and Procedure (Cont.)

9. Check the continuity between the following sets of terminals: 1 and 3, 4 and 6, 7 and 9. Meter should indicate a closed circuit (zero ohms).
10. Plug the printed circuit card extender into the equipment rack and plug the module into the card extender. The module lamp should be on. Return the module switch to the NORMAL position.
11. Connect a jumper between terminals 11 and 12. Connect a jumper from pin 4 to pin 6. The module relay should be energized. To verify that the relay contacts have closed, check the continuity between the following sets of terminals: 1 and 2, 4 and 5, 7 and 8. Meter should indicate a closed circuit.
12. Check the continuity between the sets of terminals indicated in step 9. Meter should indicate an open circuit for each set. Remove jumper from pins 4 and 6.
13. Set the meter to the +50VDC scale. Connect the positive lead to pin 10 and the negative lead to pin 12. Meter should read zero.
14. Set module switch to DISCONNECT. The meter should read 10VDC or more.
15. Remove the test equipment and test jumpers from the module. Remove the printed circuit card extender.
16. Plug the module into the equipment rack and connect all external wiring, as indicated on the system wiring diagram.

CATALOG NO. SFA-6-2
FACTORY NO. 210775

ANNUNCIATOR MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Test Cable (Jumper)

Test Setup and Procedure:

1. All input connections to this annunciator module are at the front panel terminal strip. No connections are made at the mother board in the equipment rack. Therefore, it is not required to remove the module for testing. Terminal 2 is the LAMP TEST input and it is normally connected to the system LAMP TEST.
2. Activate the system LAMP TEST. All annunciators should be on. (Alternate: Connect System 28VDC to pin 2). Connect the meter's negative lead to terminal 12. Connect the positive to terminal 2. Observe reading. Now connect the positive meter lead to each of the terminals 3 - 11. Meter should read approximately 1 volt less at all terminals than at terminal 2.

If any reading is considerably less, an isolation diode is open. Release LAMP TEST.

3. Connect a jumper to a system DC output terminal (No. 5 on SFA-3-1) and to each one of the terminals 3 - 11 in turn. The corresponding LED should go on for each input that is activated, and no others.

If an LED annunciator fails, no attempt should be made to repair the module. Return it to the factory.

CATALOG NO. SFA-6-4
FACTORY NO. 210963

TWELVE POINT TERMINAL STRIP MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Model 260 VOM (or equal)

Test Setup and Procedure:

1. Disconnect all wiring from the circuit module.
2. Check the continuity between terminal 1 and terminals 2, 3, 4 and 5. Meter should indicate a closed circuit between each.
3. Check the continuity between terminal 6 and terminals 7, 8, 9 and 10. Meter should indicate a closed circuit.
4. Check the continuity between terminals 11 and 12. Meter should indicate a closed circuit.
5. Connect the meter leads to terminals 5 and 6. Meter should indicate an open circuit.
6. Connect the meter to terminals 10 and 11. Meter should indicate an open circuit.
7. Connect all external wiring as indicated in the system wiring diagram.

CATALOG NO. SFA-6-4
FACTORY NO. 210963

TWELVE POINT TERMINAL STRIP MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

Simpson Model 260 VOM (or equal)

Test Setup and Procedure:

1. Disconnect all wiring from the circuit module.
2. Check the continuity between terminal 1 and terminals 2, 3, 4 and 5. Meter should indicate a closed circuit between each.
3. Check the continuity between terminal 6 and terminals 7, 8, 9 and 10. Meter should indicate a closed circuit.
4. Check the continuity between terminals 11 and 12. Meter should indicate a closed circuit.
5. Connect the meter leads to terminals 5 and 6. Meter should indicate an open circuit.
6. Connect the meter to terminals 10 and 11. Meter should indicate an open circuit.
7. Connect all external wiring as indicated in the system wiring diagram.

CATALOG NO. SFA-6-5
FACTORY NO. 210961

METER MODULE

FIELD SERVICE TEST PROCEDURE

Test Equipment Required:

System Power Supply
Simpson Model 260 VOM (or equal)
Test Cables (Jumpers)
Printed Circuit Card Extender

Test Setup and Procedure:

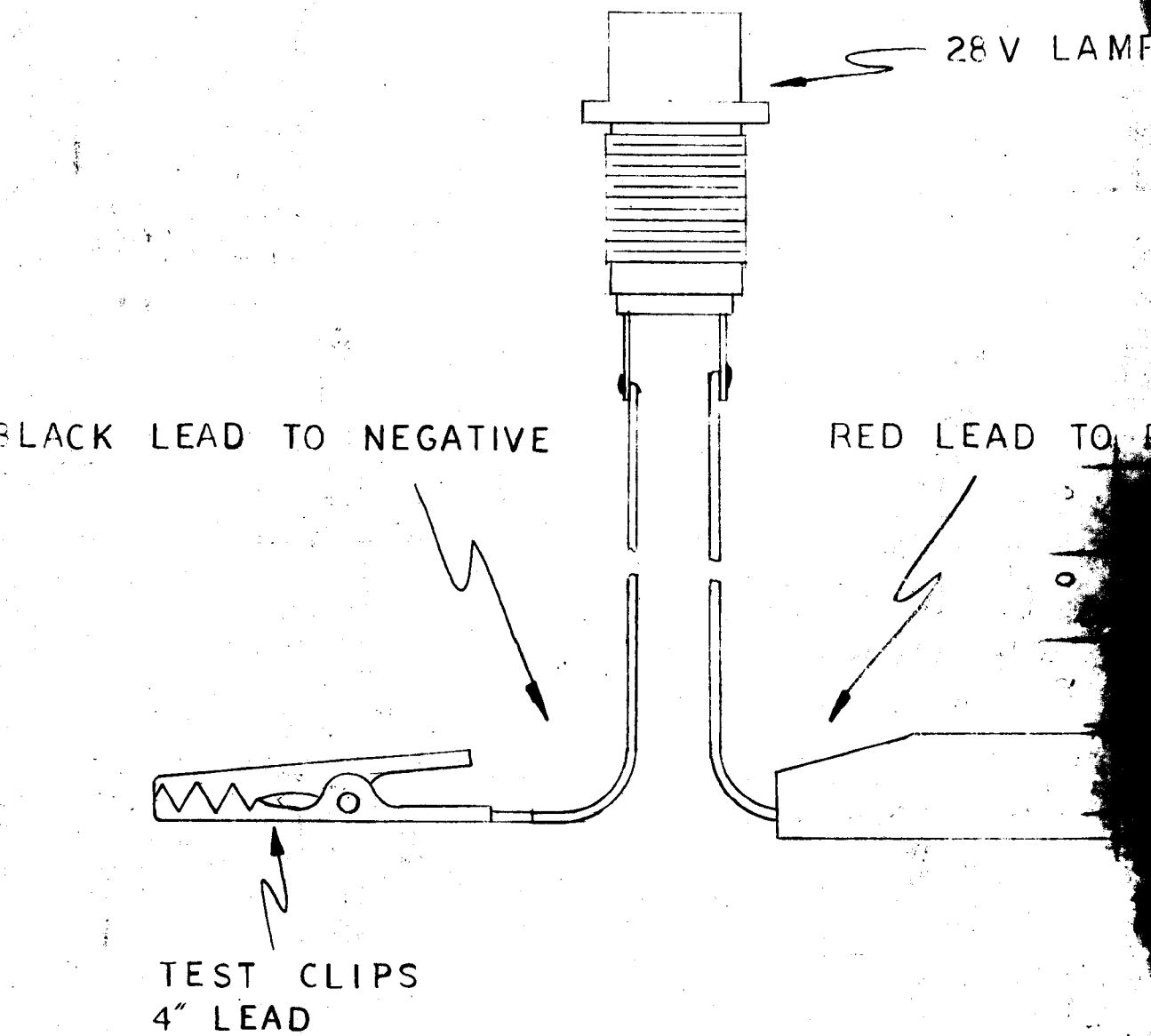
1. Under normal supervisory conditions, the pointer on the panel mounted meter should be at approximately mid-scale. In order to perform any tests on the module, it must be removed from the equipment rack, since all inputs are received from the mother board connector.
2. Unplug the module from the rack and insert the printed circuit card extender. Plug the module into the extender.
3. Set the VOM to the +50VDC scale. Connect the negative lead to pin 12 and the positive to the line on the PC board which connects to pin 4. The voltage should be 28VDC (nominal), and the meter should be at mid-range.
4. Connect a jumper from pin 4 to the common alarm input on the module (pin 6). The meter on the module should now read full scale.
5. Remove the jumper from pin 6 and connect it to pin 10 (trouble input). The meter on the module should now read zero.
6. Unplug the module from the extender and remove the extender card from the rack.
7. Before inserting the meter module into the rack, check the continuity between pins 1 and 2. Reading should be zero ohms.

	12	6	1	6	0	0	BUZZER
NORMAL CONDITION	12	6	1	6	0	0	Off
OPEN CKT. [1] - [2]	22	1	1	1	28	0	On
OPEN CKT. [3] - [4]	22	22	1	22	28	0	On
OPEN CKT. [5] - [6]	12	6	1	6	28	0	On
SHORT CKT. [5] - [6]*	0	22	22	0	28	2	On
Connect Jumper from Pin 4 to Pin 10	12	6	1	6	28	0	On

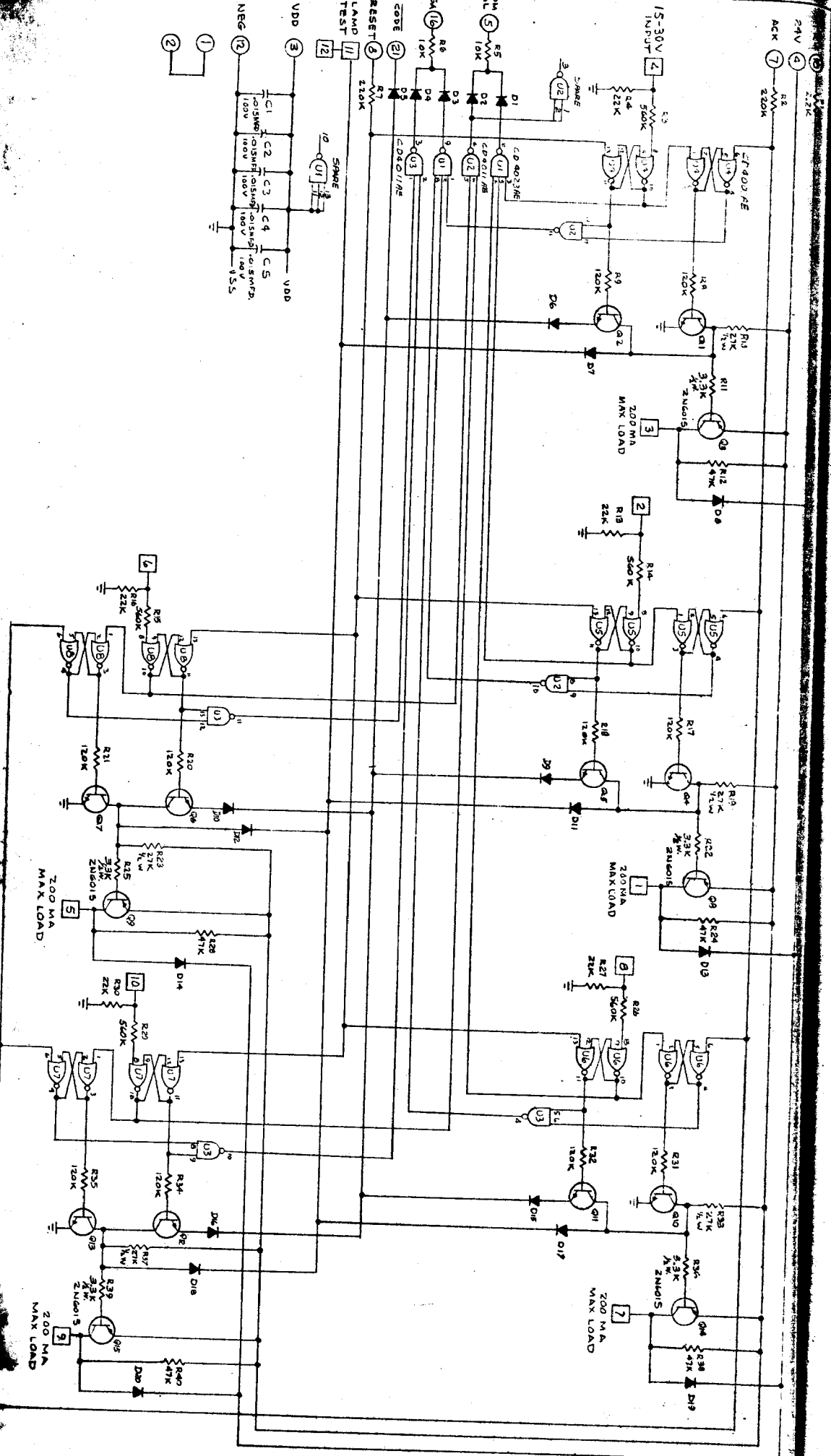
④ POSITIVE

⑫ Negative Reference

* Connect the voltmeter directly across the output terminals.



TEST LAMP ASSEMBLY



PC ASSEMBLY COMPONENTS SEE FIGURE 4

74184

74148

7414

7414

7414

7414



