

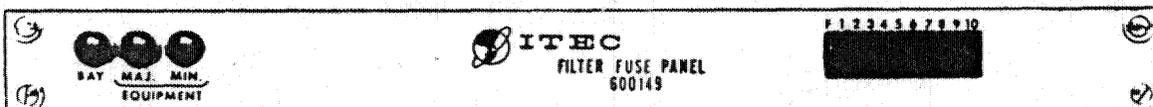
# TECHNICAL INFORMATION

## FILTERED FUSE

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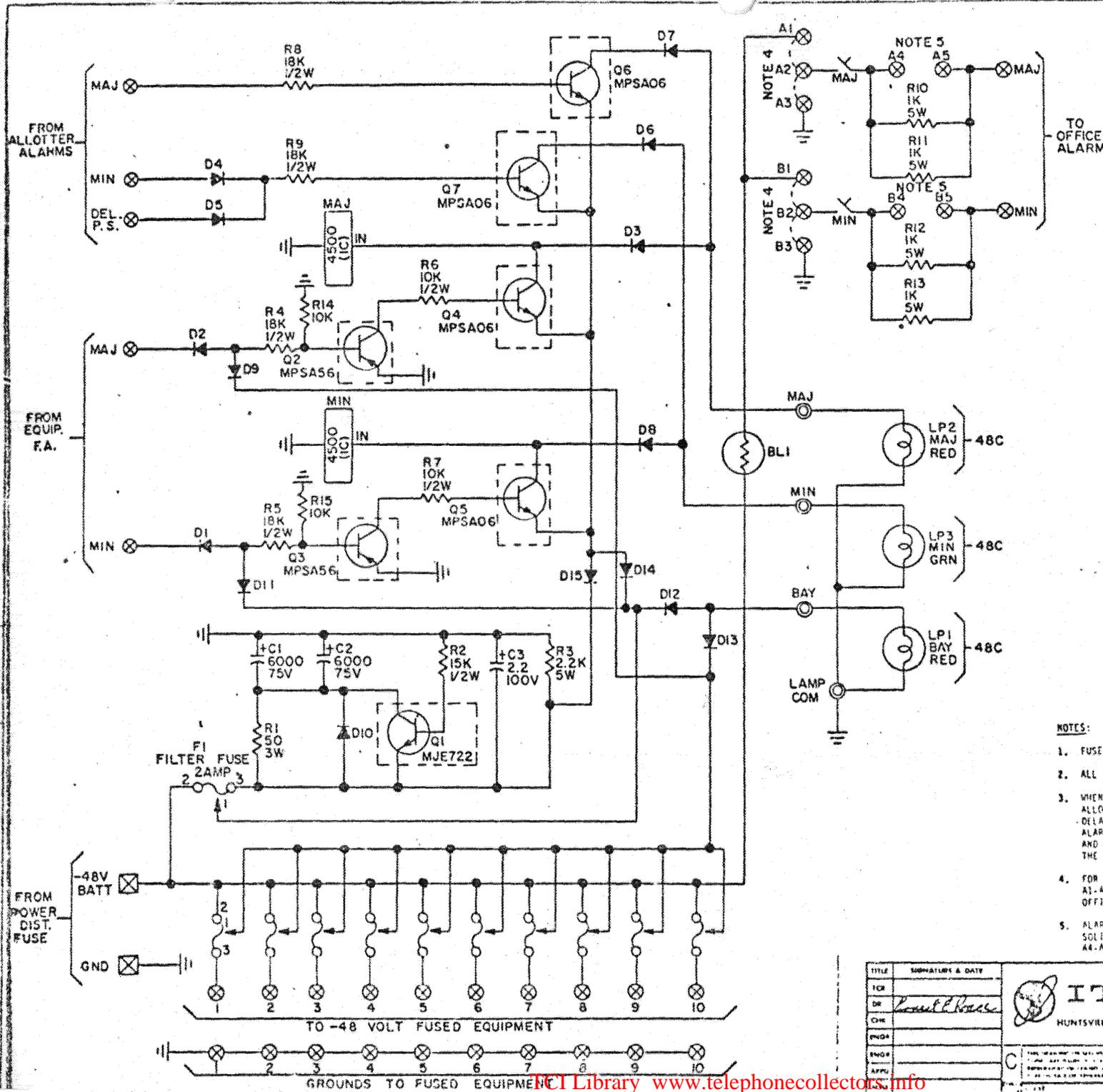
## ALARM PANEL

# 600149



Approved: *R. A. Weiritt*

Issue	1	12-01-81
Issue	2	3-25-83
Issue	3	8-1-83
Issue	4	9-22-84



CHANGES

ISSUE 1	RELEASED 10-1-73	
ECO-1522	REVISE FILTER CHANGING LIMIT CIRCUIT TO WORK WITH 12,000 WVD FILTER	11-13-79
ISSUE 2		
ECO-1578	ADD BLOCKING DIODES TO PREVENT TEARHOUS LAMP OPERATION. CHANGE CAR BRACKET MFG. SCREWS	11-17-79
ISSUE 3		
ECO-1613	ADD DIODE TO PROTECT Q1 FROM REVERSE SPIKE	2-21-80
ISSUE 4		
ECO-1634	ADD INPUT FROM FINDER ALLOTTER AND REMOVED F.A. MIN AND F.A. MAJ GND TERMINALS.	3-19-80
ISSUE 5		
ECO-1705	CONNECT FA FOR FILTER FUSE ADD OPTION FOR RECEIVING 500 OHM OR RAW BATTERY ALARMS EQUIPMENT. ADD SOCKET FOR Q1 TRANSISTOR.	6-24-80
ISSUE 6		
ECO-1769	CHANGE LAMPS TO LOWER VOLTAGE TO IMPROVE BRIGHTNESS	10-13-80
ISSUE 7		
ECO-1812	ALLOW STRAPABLE BATTERY AT GND AND OUTPUT	4-1-81
ISSUE 8		
ECO-2001	CORRECTS PIN NUMBERS ON DIP SOCKET FOR Q1	7-30-81
ISSUE 9		
ECO-2051	ELIMINATES FALSE ALARMS DUE TO LEAKAGE ON INPUT LEADS	8-19-81
ISSUE 10		
ECO-2466	ELIMINATES FALSE ALARMS DUE TO LEAKAGE ON INPUT LEADS	7-23-82
ISSUE 11		
ECO-2476	SEPARATES OFFICE ALARM BATTERY SUPPLY FROM FUSE PANEL ALARM SUPPLY. ADD INDEX FUSE STRIPS FOR BATTERY OUTPUT	9-25-82
ISSUE 12		
ECO-2611	ALL 500 OHM ALARMS IF FILTER FUSE IS AN EXAMPLE TO ALL 500 OHM ALARMS	
ISSUE 13		
ECO-2819	CHANGE DIP SOCKET FOR Q1 FROM 4 PINS TO 5 PINS	1-13-83
ISSUE 14		

**NOTES:**

1. FUSE PANEL RATED AT 45 AMPERES.
2. ALL DIODES ARE 1N4005 OR EQUIVALENT.
3. WHEN THIS CIRCUIT IS USED WITH THE FINDER ALLOTTER, CONNECT MAJ ALM, MIN ALM & DELAYED PS FROM FINDER ALLOTTER. THESE ALARMS WILL GIVE LAMP INDICATIONS ONLY, AND ARE NOT EXTENDED BY THIS CIRCUIT TO THE OFFICE ALARM CIRCUIT.
4. FOR BATTERY OUTPUT TO OFFICE ALARMS, STRAP A1-A2 AND B1-B2. FOR GROUND OUTPUT TO OFFICE ALARMS, STRAP A2-A3 AND B2-B3.
5. ALARMS ARE NORMALLY 500 OHM OUTPUT. FOR SOLID BATTERY OR GROUND OUTPUT, STRAP A4-A5 AND B4-B5.

TITLE	SIGNATURE & DATE	<b>ITEC</b> HUNTSVILLE, ALABAMA 35892	<b>FILTERED FUSE PANEL</b>
TCR	<i>Paul D. Bace</i>		
DR			<b>C600149</b>
CHK			
INVD			
ENGR			
APPR			

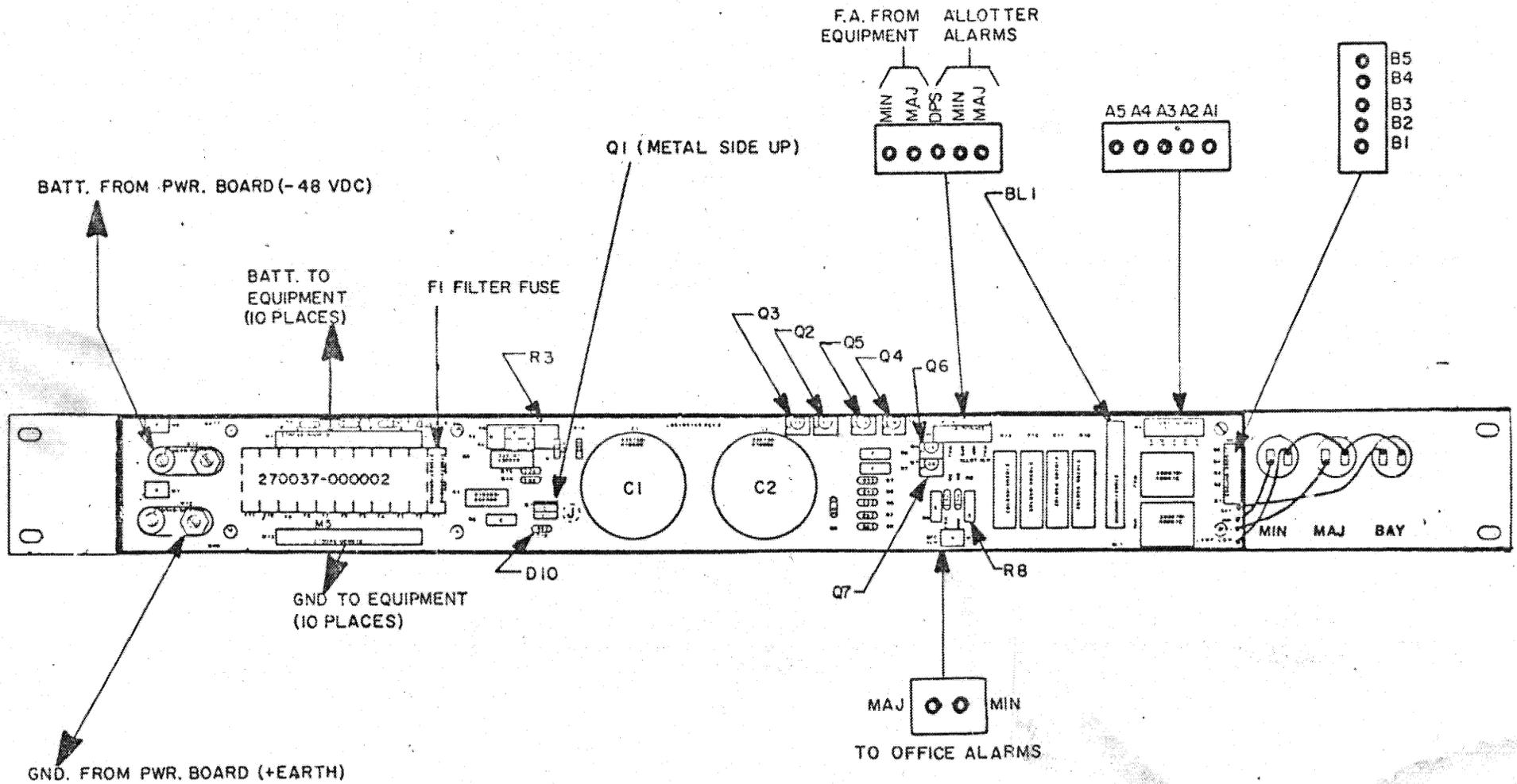
FILTERED FUSE & ALARM PANEL

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# FILTERED FUSE PANEL

## WIRING SIDE



FILTERED FUSE & ALARM PANEL

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## FILTERED FUSE & ALARM PANEL

### SECTION IV - CIRCUIT DESCRIPTION

1.01 The ITEC Filtered Fuse & Alarm Panel is comprised of one circuit card mounted to a Front Panel. The Front Panel contains the Alarm lamps and GMT Fuses. The circuit card contains all other components and wiring connections, power distribution BATT and GND are connected via screw terminal posts, all other connections are wire wrap. Refer to Figure 2 for a functional diagram, and Schematic C600149 during the circuit description.

1.02 Inputs may be divided into three groups; (a) Allotter Alarms, (b) Equipment Fuse Alarms, and (c) Power Distribution. Outputs may also be divided into three groups; (a) Office Alarms, (b) Front Panel Display; and (c) Fused Equipment.

1.03 Filtering of -48v office battery is accomplished by two 6000 uf capacitors (C1 and C2) in parallel giving 12,000 uf filter capacity. Upon applying power, C1 and C2 are allowed to charge through R1 for approximately one second. Q1 will then turn on giving less than one ohm of impedance to the filtered supply line. D10 protects Q1 from positive transients. C3 allows for high frequency bypass to ground. R3 is a bleeder resistor to discharge the filter when power is removed. The filter fuse (F1) does not affect the 10 fused equipment outputs or the alarm sensing circuits. F1 blown causes the BAY lamp to lite through D12 and activate the alarm circuits through D14.

1.04 The Alarm circuits are powered from the filtering circuit through F1, the Fuse Panel System fuse. If F1 activates, the fuse indicator allows the alarm circuits to continue operation through D14 to activate the office alarms, and lite the BAY lamp through D12.

1.05 The Allotter alarm inputs, Major, Minor, and Delayed Permanent Signal, are normally transistor switched 120 ohms to ground, but may be hard ground if necessary. D4 and D5 isolate the Minor and Del P.S. alarms from each other. A 120 ohm or lower ground input will turn on Q6 or Q7 which in turn, supply -48v to either MAJ (Red) or MIN (green) front panel alarm lamps through D7 or D6. The Office Alarm outputs are not affected by Allotter Alarm inputs.

1.06 The Equipment Fuse Alarm inputs, Major and Minor, are normally transistor switched 500 ohms to Battery, but may be hard battery if necessary. D1 and D11 isolate the Equip. F.A. Min. Alarm input from the internal filter fuse alarm (F1). D2 and D9 isolate a Maj. Alarm input from the internal Fused Equipment fuse alarms. A 500 ohm or lower battery input will turn on Q2 or Q3 which will turn on Q4 or Q5. Q4 on will supply -48v to energize the MAJ Alarm relay, and also turn on the MAJ (red) front panel alarm lamp through D3. Q5 on will supply -48V to energize the MIN alarm relay, and then also turn on the MIN (green) front panel alarm lamp through D8.

1.07 The Office Alarm outputs, MAJOR and MINOR, are individually selectable for either ground or battery output by straps A1, A2, A3 and B1, B2, B3. 500 ohm (10 watt) resistance is normally in the Office Alarm outputs, but may be strapped out by A4 to A5, and B4 to B5. The ballast lamp BL1 protects the alarm circuitry from a foreign ground on the Office Alarm outputs when the outputs are strapped for battery.

1.08 The Fused Equipment outputs (10 ea.) are available as wire wrap posts directly behind each fuse position. Multiple ground posts parallel the fused output posts. The total capacity of the fused outputs must not exceed 45 amps. The fuse alarms are tied through D13 to light the BAY (red) front panel alarm lamp.

## FILTERED FUSE & ALARM PANEL

### SECTION I - INTRODUCTION

#### 1.0 GENERAL

1.01 The ITEC Filtered Fuse & Alarm Panel is a self-contained rack-mounted bay power filter, bay equipment fuse panel, and bay alarm status indicator. Its small size and versatility make it very popular to use with any combination of bay mounted telephone equipment.

#### 2.0 DESIGN FEATURES

2.01 The Fuse Panel can handle a maximum of 10 fused equipments up to 45 amps total. Front panel alarm lamps simplify tracing a problem in the bay. Indications are given for Bay Fuse Alarm, Bay Equipment Major and Minor Alarms, Bay Allotter Major and Minor, and Delayed Permanent Signal Alarms. Since the Fuse Panel is normally located at the top of a rack, the fuses are oriented so the fuse indicators may be seen from floor level.

2.02 Office Alarm outputs exist for Major and Minor and may be individually strap selectable for 500 ohm battery or ground, or if necessary, solid battery or ground. The alarm circuitry is protected from foreign potentials appearing on the Office Alarm outputs.

2.03 The Filtering circuit has automatic capacitor charging to prevent surges. Both positive and negative-going spikes are filtered as well as low and high frequency AC. The filtering circuit provides approximately 8db of noise improvement on a bay input. This filter is not meant to replace LC filters for audible noise filtering, but only to smooth and filter spikes from adjacent equipment to protect EMS or other sensitive equipment in a bay. Filtering is provided by 12,000 uf capacitance. The filtering

circuit is individually fused allowing complete independence from the alarm and display functions.

#### 3.0 WARRANTY

3.01 ITEC products are unconditionally warranted against defects in material or workmanship for eighteen months from date of shipment. Any units found defective during the warranty period will be repaired at no charge when returned prepaid to our Huntsville facility or other location as may be specified. Any abuse or improper installation will void this warranty.

3.02 A Return Material Authorization (RMA) must be obtained from the Customer Service Depart. (205 881-1613) prior to shipping. The following information should be included with the shipment:

1. RMA Number
2. Return shipping address
3. Contact name and phone no.
4. Specific failure or trouble

Ship via UPS or Parcel Post to:

ITEC, Inc.  
P.O. Box 4147  
520 Green Cove Road  
Huntsville, Al 35802

Adherence to this procedure will facilitate the prompt repair and return of your material.

3.03 The front panel slide base lamps may be replaced by unscrewing the colored lens cap and pulling forward on the lamp. DO NOT TURN the lamp while in the socket. A 55-C lamp may be substituted for the 48-C with a small loss of intensity, but greater life expectancy. Insert a lamp gently with the metal slides oriented up and down. Ensure the GREEN lens cap is on the MIN lamp. The BAY and MAJ lamps are both RED.

FILTERED FUSE & ALARM PANEL

SECTION II - ENGINEERING & INSTALLATION

1.0 GENERAL

1.01 This section contains detailed instructions for the installation of the ITEC Filtered Fuse & Alarm Panel.

2.0 SPECIFICATIONS

2.01 The ITEC Filtered Fuse & Alarm Panel Specifications are listed in TABLE 1.

TABLE 1. SPECIFICATIONS

SPECIFICATION	DESCRIPTION
FUNCTIONAL:	
Filter	12,000 uf capacitance
Filtering	8db approximately
Fuse Positions	F 2 amp (FILTER) 1-10 - Fused Equipment
Alarm Inputs	Equipment Fuse Alarms Allotter Alarms
Office Alarm Outputs	Selectable: 500 ohm Battery 500 ohm Ground Battery Ground
Temperature	10 to 120 F
Humidity	20% to 90%
ELECTRICAL:	
Voltage	-44 to -56Vdc
Current	
Idle	Less than 25 ma
Filter Inrush	1 amp
Maximum	45 amps
MECHANICAL:	
Height	1.75"
Width	19" (23" adapter)
Depth	6.5"
Weight	2 lbs.

## 2.0 OPERATION

2.01 After installation, there are no operator functions necessary unless a front panel lite indicates a problem. The BAY lamp indicates a GMT fuse has operated, and should be replaced with the same size fuse. The MAJ and MIN lamps will require further diagnosis of the equipment mounted in the bay.

## 3.0 FUNCTIONAL TESTS

3.01 The front panel lamps and Office Alarm outputs may be tested before or after installation by the tests described in TABLE 8. The Filter circuit may also be checked for proper functioning, but only in an operating environment with susceptible noise on the power distribution BATT input.

3.02 All transistors are mounted in sockets for ease of replacement. Ensure the transistors are oriented as shown in Figure 3. The transistor reference designations are shown in Assembly Drawing A600149. Q2 and Q3 (MPSA56) should have a white dot on the top. Q1 must be inserted with the metal-plated side up, and in the right-most three positions of the DIP socket.

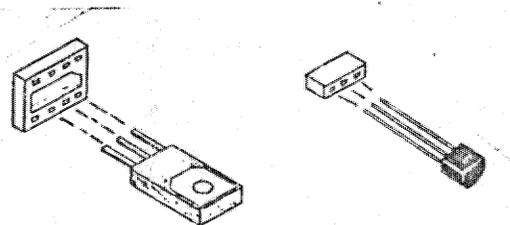


Figure 3. Transistor Mounting

TABLE 8. FUNCTIONAL TESTS

Allotter Alarms	Jumper a ground to each of the Allotter Alarm inputs. The Front Panel MAJ and MIN lamps should lite depending on which input is grounded. (Del P.S. lites the MIN lamp)
EQUIP FA	Jumper BATT to the EQUIP FA MAJ and MIN inputs. The Front Panel MAJ and MIN lamps should lite. The Office Alarm MAJ and MIN outputs should have either -48v, ground, or 500 ohms to ground as measured with a multimeter to GND, depending on the straps installed.
BAY Alarm	Using a GMT fuse that has been activated, insert into each fuse slot in the Front Panel and ensure the BAY lamp lites.
Filter	Use an oscilloscope on the BATT terminal. Set vertical input to AC, 1 v/div. MEASURE noise level. Remove Fl. Noise level should increase noticeably (if there is susceptible noise on the -48v input).

### 3.0 ORDERING INFORMATION

3.01 The Filtered Fuse & Alarm Panel model #600149 comes complete and ready for installation. A 2 amp fuse (#100032-8) is supplied in the F fuse position for the filtering circuits. Adapters are supplied for 23" or 19" rack mounting. GMT fuses for the Bay Equipment are not supplied and must be ordered separately (refer to TABLE 2). Order 600149-00 for 19 or 23 inch racks. Order 600149-47 for 27 inch racks.

TABLE 2. GMT FUSES

AMPERES	PART NUMBER
1/4	100032-2
1/2	100032-3
3/8	100032-4
3/4	100032-5
1	100032-6
1 1/3	100032-7
2	100032-8
3	100032-9
5	100032-10
7 1/2	100032-11
10	100032-12

3.02 Replacement Items are listed in TABLE 3.

TABLE 3. REPLACEMENT ITEMS

PART #	COMPONENT DESIGNATOR	DESCRIPTION
MJE 722	Q1	NPN silicon power
MPSA06	Q4, Q5, Q6, Q7	NPN silicon
MPSA56	Q2, Q3	PNP silicon
48-C	LP1, LP2, LP3	slide base lamp

### 4.0 MECHANICAL MOUNTING

4.01 The Filtered Fuse & Alarm Panel is designed to fit a 19" rack (1 mounting space of 1.75"), or a 23" rack with mounting brackets supplied. The recommended mounting position is at the top of the rack with all cabling entering from the right side facing the front of the bay.

### 5.0 ELECTRICAL CONNECTIONS

5.01 Wire wrap pins are used for all connections except BATT and GND which are screw terminals. The Fuse Equipment Outputs (10 ea.) are available directly behind each fuse position. Multiple ground posts parallel the fused output posts. The internal strappings are explained in Section 6.0. Refer to the Assembly Drawing A600149 for the wire wrap pin positions.

All cable and wiring must enter from one end of the Panel. This allows the Panel to be swung out for access to the circuit card and connections. Access from the rear of the bay is very limited due to the size and mounting position of the Panel.

# FILTERED FUSE & ALARM PANEL

## SECTION III - OPERATING PROCEDURES

### 1.0 FUNCTIONAL DESCRIPTION

1.01 The ITEC Filtered Fuse & Alarm Panel consists of one circuit card attached to a 19" rack mountable panel of one mounting space (1.75" height). Mounting hardware is supplied to accommodate 23" rack mounting. All fuses are located on the Front Panel allowing easy viewing and replacement. Three incandescent Front Panel lamps give alarm status and are viewable from all forward angles and lighting conditions.

1.02 Figure 2 is a functional diagram of the Panel showing the logic of the alarm inputs to alarm outputs and displays. As shown, the Allotter Alarm inputs will only light the MAJ and MIN Front Panel lamps and do not affect the Office Alarm outputs. The Equipment FA inputs will affect both the Office Alarm outputs and front panel lamps. The BAY lamp is only turned on by a fuse failure, either the Filter or one or more of the bay fused equipments.

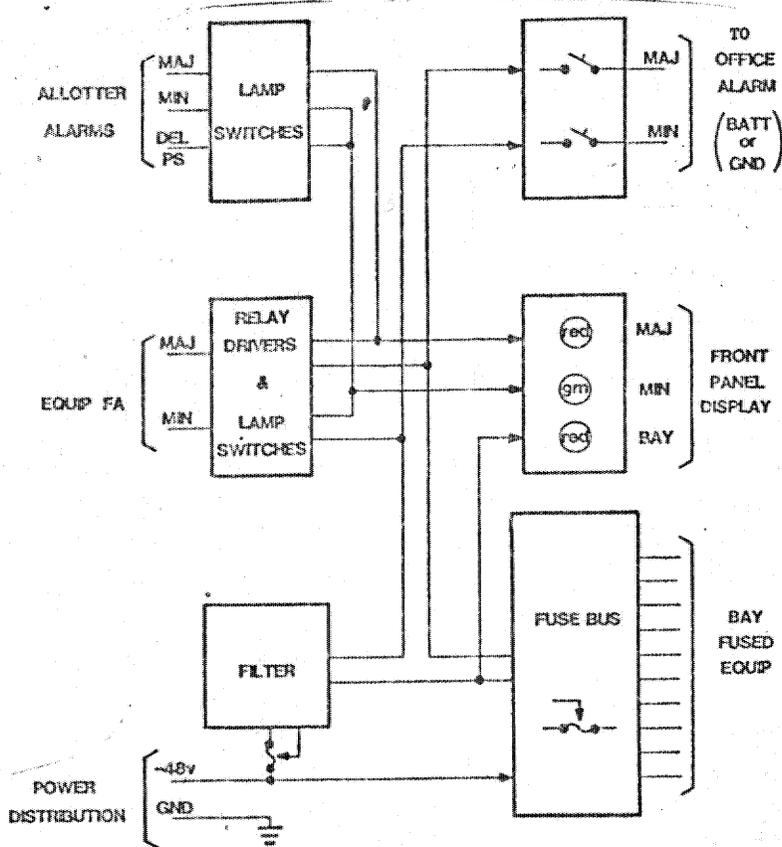


Figure 2. Filtered Fuse Panel Functional Diagram

### WIRE SIZE SELECTION

5.02 When installing a Fuse Panel, wire sizes to the Panel and to the fused circuits must be carefully selected to prevent overloading. The wire size should be large enough to limit the voltage drop to a maximum of 0.1 volts between the row feeder and Fuse Panel and 0.25 volts between the Fuse Panel and the unit being fused. The formula for determining wire size is: (CM = Circular Mills)

$$\frac{10.6 \times \text{loop length} \times \text{current}}{\text{voltage drop}} = \text{CM}$$

When determining wire size, the calculation should be based on the actual current to be carried, not the fuse size. The wire size for example, of a shelf with ten electronic trunks that require 200 ma each in the busy condition would be calculated based on the combined load of 2 amps. However, the fuse rating would be 3 amps (150% of max. load). The following tables can be used as a guide for selecting wire size. Loop length refers to both the Battery and the Ground wire, thus a 3 ft. loop length is 6 ft. wire length. It is good practice to use no smaller than 20 ga. wire.

TABLE 4. MAXIMUM CURRENT CAPACITY OF FUSE DISTRIBUTION WIRE  
(Max. 0.2 Volt Drop)

LOOP LENGTH FROM FUSE TO LOAD				
Wire Size	3 ft.	6 ft.	9 ft.	12 ft.
22 Gauge	4.0A	2.0 A	1.4A	1.0 A
20 Gauge	6.5A	3.2 A	2.1A	1.5 A
18 Gauge	10.0A	5.1 A	3.4A	2.5 A

NOTE: Fuse rating should be 150% to 200% of the maximum steady state load.

TABLE 5. MAXIMUM CURRENT CAPACITY OF FUSE PANEL FEEDER CABLES  
(Max. 0.1 Volt Drop)

LOOP LENGTH FROM ROW FEEDERS TO FUSE PANEL					
Wire Size	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.
12 Gauge	20A	17A	12A	10A	8A
10 Gauge	30A	26A	19A	15A	13A
8 Gauge	40A	40A	30A	25A	20A
6 Gauge	*45A	45A	45A	40A	32A
4 Gauge	—	—	—	45A	45A

Maximum capacity of 600149 fuse panel is 45A

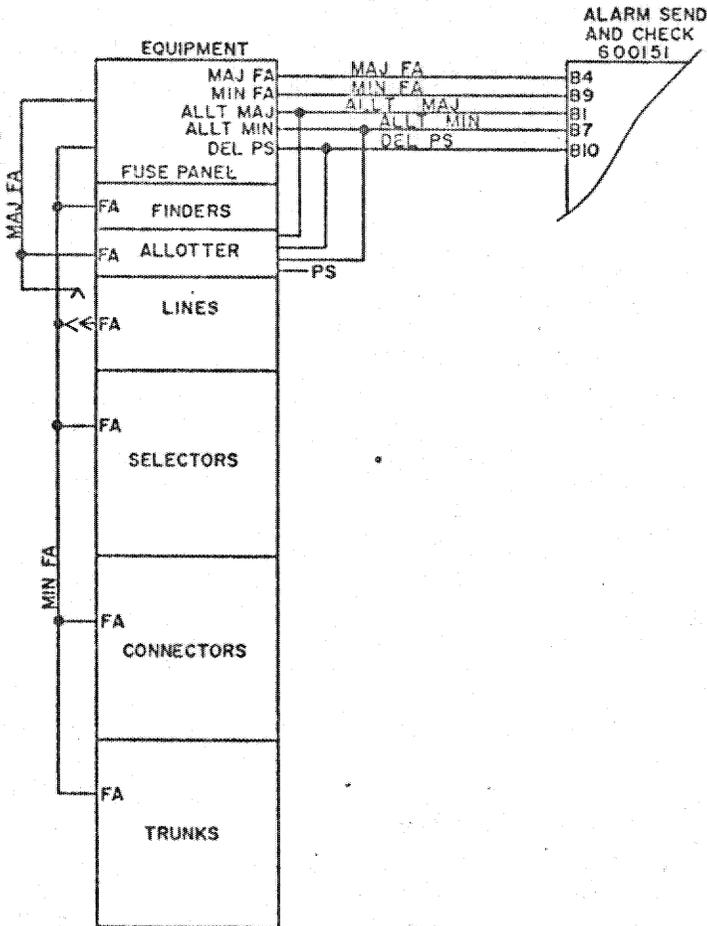
**TABLE 6. WIRE SIZE CONVERSION**

Wire Size (AWG)	Circular Mills	Millimeters
26	253	0.4
24	404	0.5
22	640	0.65
20	1020	0.8
18	1620	1.0
16	2580	1.5
14	4110	2.0
10	10,380	2.5
8	16,510	3.0
6	26,240	4.0
4	41,740	5.0

5.03 The Fuse Panel may be interconnected in many different configurations to satisfy engineering requirements. Figure 1 shows the Fuse Panel circuit connections as suggested with ITEC EMS-1 equipment. Consult the factory Customer Service for special applications not covered in this manual.

**6.0 INTERNAL STRAPPING**

6.01 The Filtered Fuse & Alarm Panel has a total of four strapping options, all related to the Office Alarm outputs. The Office Alarm outputs may be strappable for Battery, Ground, 500 ohm battery, or 500 ohm ground. Refer to TABLE 7 for the strapping list and Assembly Drawing A600149 for the strapping locations.



**TABLE 7. OFFICE ALARM STRAPPING**

ALARM OUTPUT	STRAP
Battery	A1 - A2
	A4 - A5
	B1 - B2
	B4 - B5
Ground	A2 - A3
	A4 - A5
	B2 - B3
	B4 - B5
500 ohm Battery	A1 - A2
	B1 - B2
500 ohm Ground	A2 - A3
	B2 - B3

**Figure 1. EMS Interconnections**