

CR-134160

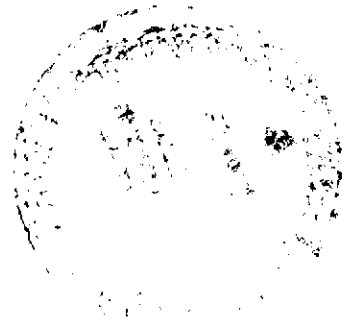
# OPERATIONS MANUAL FOR THE PATIENT ASSIST DEVICE

Prepared for  
NASA Lyndon B. Johnson Space Center  
Houston, Texas

**ORIGINAL CONTAINS  
COLOR ILLUSTRATIONS**

Contract No. NAS9-13582

31 October 1973

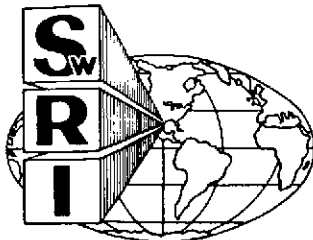


N74-12783

Unclas  
23709

G3/95

(NASA-CR-134160) OPERATIONS MANUAL FOR  
THE PATIENT ASSIST DEVICE (Southwest  
Research Inst.) 7# p HC \$5.75 CSCL 06L  
61



**SOUTHWEST RESEARCH INSTITUTE**  
SAN ANTONIO      CORPUS CHRISTI      HOUSTON

SOUTHWEST RESEARCH INSTITUTE  
Post Office Drawer 28510, 8500 Culebra Road  
San Antonio, Texas 78284

# OPERATIONS MANUAL FOR THE PATIENT ASSIST DEVICE

**ORIGINAL CONTAINS  
COLOR ILLUSTRATIONS**

Prepared for  
NASA Lyndon B. Johnson Space Center  
Houston, Texas

Contract No. NAS9-13582

**ORIGINAL CONTAINS  
COLOR ILLUSTRATIONS**

31 October 1973

Approved by:



C. William Hall  
Department of Bioengineering

Prepared by:  
Melvin A. Schrader

## FOREWORD

The purpose of this document is to describe the functions and operations of the Patient Assist Device. Instructions for the use and testing of this equipment are given. Electronic diagrams and a complete parts list are included to facilitate equipment maintenance.

## TABLE OF CONTENTS

	<u>Page</u>
FOREWORD	i
LIST OF ILLUSTRATIONS	iii
I. INTRODUCTION	1
II. DESCRIPTION OF THE PATIENT ASSIST DEVICE	2
A. Controls and Displays	2
B. Logic Function	7
III. INSTALLATION, TESTING AND MAINTENANCE OF THE PATIENT ASSIST DEVICE	9
A. Installation of the Patient Assist Device	9
B. Testing of the Patient Assist Device	9
C. Maintenance of the Patient Assist Device	9
APPENDIX A	
APPENDIX B	

## LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1	The Patient Assist Device	3
2	The Front Panel of the Patient Assist Device	4
3	The Rear Panel of the Patient Assist Device	6
4	The Logic Function Diagram of the Patient Assist Device	8
5	Testing the Patient Assist Device with the Load Test Board	10
6	Internal Wiring Diagram of the Patient Assist Device	11

## I. INTRODUCTION

Quadraplegic patients and multiple amputee patients are almost totally dependent on nursing personnel for any activities or interests in which they participate. The morale of these patients is greatly improved and the need for nursing personnel greatly reduced by any device or procedure which provides self-sufficiency to these patients.

With this motivation, the NASA Biomedical Applications Team at Southwest Research Institute designed and developed the Patient Assist Device which provides patient control over electrical devices in his environment.

The patient operates three switches to acquire control over a desired electrical appliance. The type switches employed are chosen to conform to patient capabilities, even when such capabilities are as limited as eye or head movements.

The switch operations are sensed and converted into command signals by the Patient Assist Device to control ten electrical appliances simultaneously and independently.

## II. DESCRIPTION OF THE PATIENT ASSIST DEVICE

### A. Controls and Displays

The Patient Assist Device, shown in Figure 1, provides an electrical appliance control system for amputee, paralyzed, or otherwise physically impaired persons. The control of power supplied to electrical appliances and in some instances, functional control of these appliances, may be accomplished by an invalid using eye-movements, head movements, directed breathing, or other slight movements of which the person is capable. This device eliminates the total dependence of physically impaired persons on others for control of their immediate environment. This control capability contributes to better patient morale in nursing homes and hospitals and lessens the severe time demands on patient attendants.

The Patient Assist Device monitors the operations of three switches and converts their activations into command signals which operate relays performing the desired control over appliances. Two of the three switches are used to address channels of power to selected appliances. The third switch is activated to switch the power in an addressed channel from "off" to "on" or from "on" to "off".

Power channels are sequentially addressed in ascending or descending numeric order by repeatedly activating the "ADDRESS" switch. The number of switch activations required to change from one channel address to another channel address is the number of channels in numeric sequence separating the channel addresses. This number is dependent on the direction of count, that is, whether the desired channel is acquired by counting up or counting down in a modulo-10 number system. For example, if channel "8" is presently addressed, only 3 channels must be counted in the "up" direction to address Channel "1", whereas 7 channels must be counted in the "down" direction to address Channel "1". The bi-directional counting capability of the Patient Assist Device can save considerable amounts of time and effort of the patient in addressing a desired channel.

The "DIRECTION" switch selects the "COUNT UP" or "COUNT DOWN" mode of sequential addressing. An indicator lamp on the front panel, shown in Figure 2, displays the present direction of count. If the patient desires to change the direction of count, he activates the "DIRECTION" switch and the indicator lamp will indicate the new count direction.

The "ADDRESS" switch must then be activated a number of times which is the number of channels in numeric sequence between

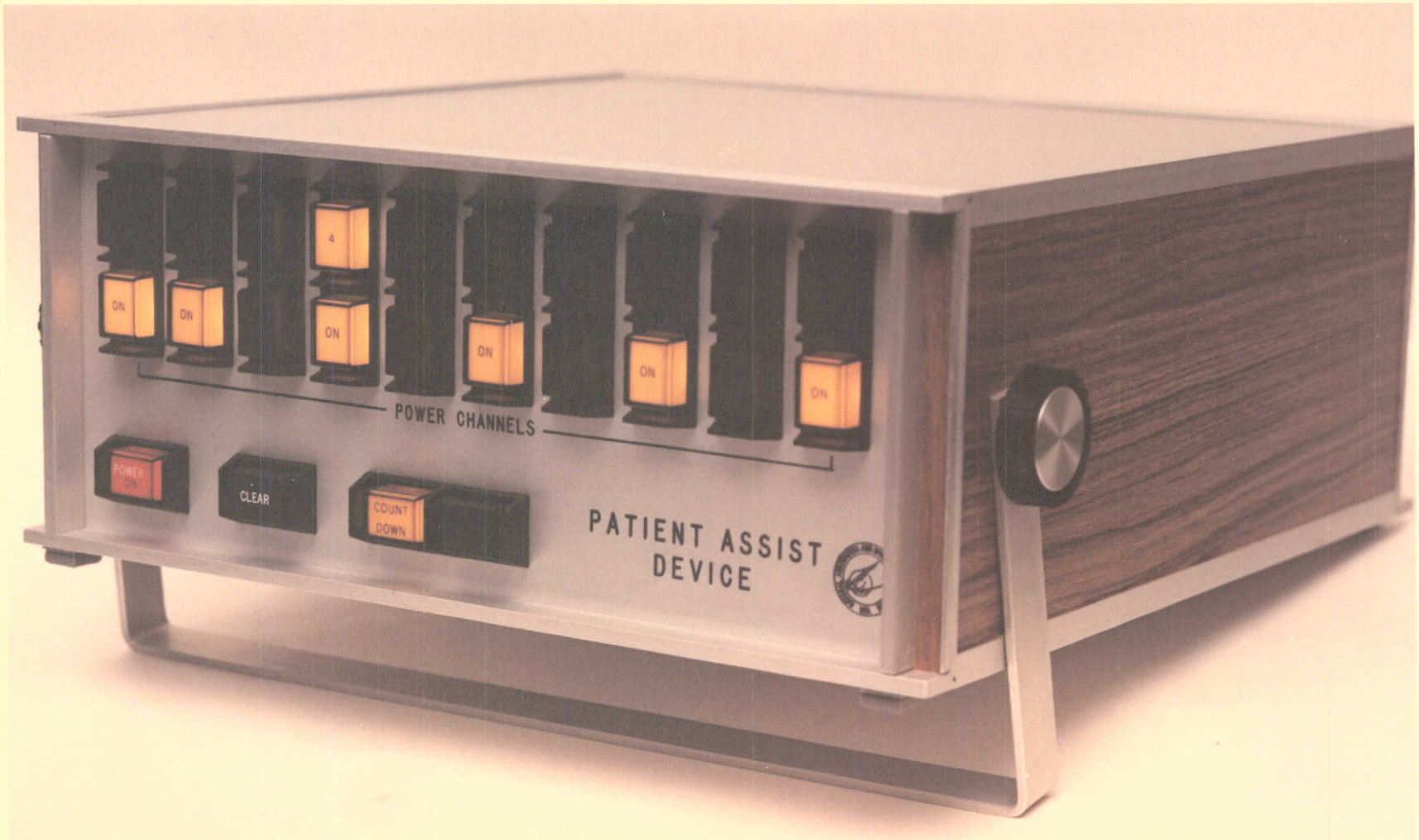


FIGURE 1. THE PATIENT ASSIST DEVICE



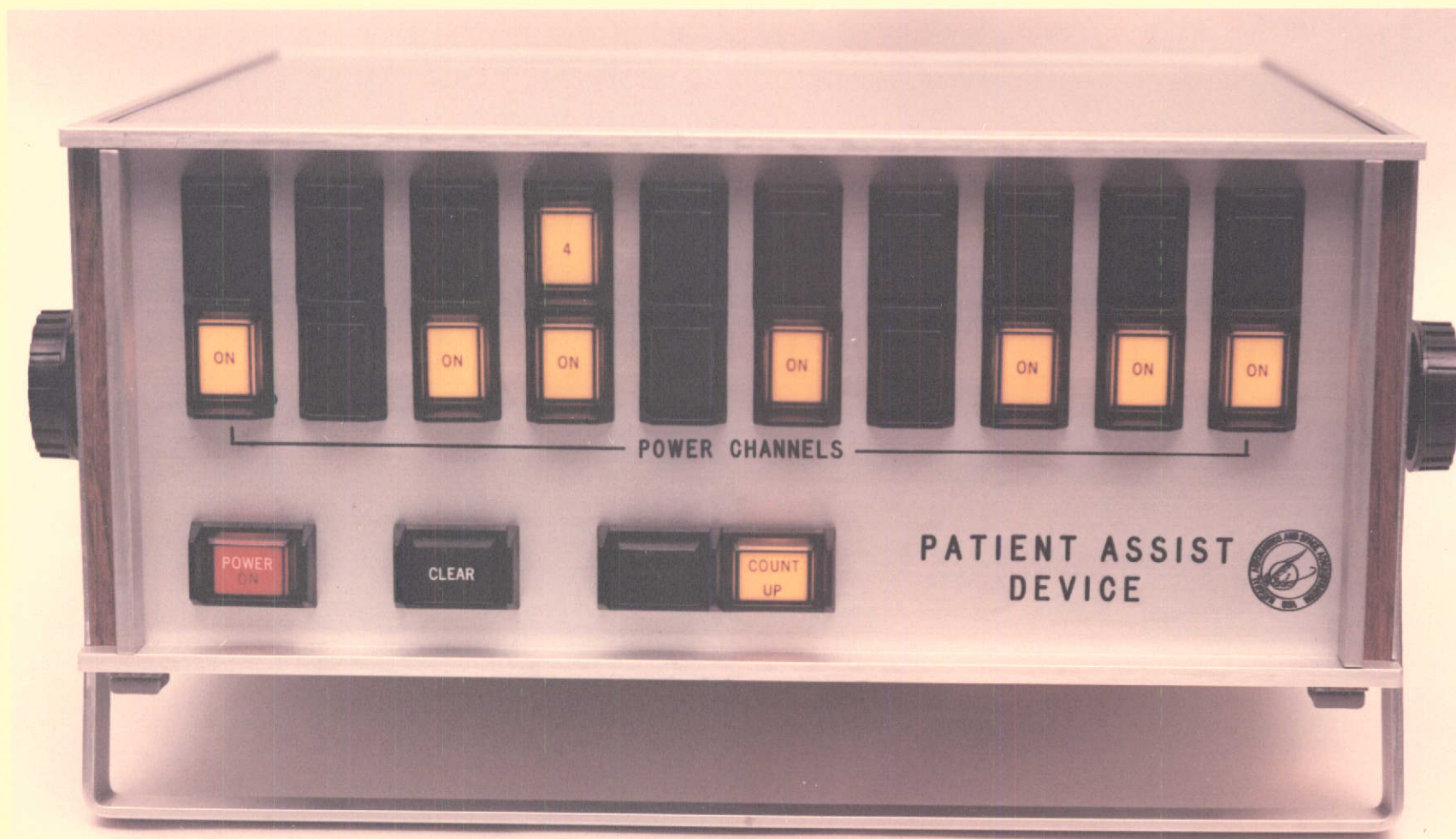


FIGURE 2. THE FRONT PANEL OF THE PATIENT ASSIST DEVICE

the presently addressed channel and the channel in which power is to be switched.

A string of indicator lamps on the front panel of the Patient Assist Device indicates which channel is addressed. The lamp corresponding to the addressed channel is lighted.

Immediately below each lamp in this string is another indicator lamp which displays the state of the power supplied to the channel. The power in any addressed channel may be switched by activating the patient "POWER" switch. The resulting change in the power status is displayed by the applicable indicator lamp.

The "CLEAR" pushbutton switch on the front control panel of the Patient Assist Device may be depressed by an attendant to switch power "off" in all power channels, reset the direction of count to "COUNT UP", and reset the address counter to Channel "1". The push button lens of this momentary action switch is lighted when depressed to indicate the reset.

The "CLEAR" feature permits a rapid shutdown of all appliance operations by an attendant when the patient falls asleep, or for some other reason, desires to turn off many appliances (lights, radio, etc.) with a single switch activation.

The "POWER" switch on the front panel is an alternate action push button switch. The push button lens is lighted when the power is "on". This switch is depressed by an attendant after the Patient Assist Device is installed and is left on thereafter unless the unit is physically moved to a remote location. When the "POWER" button is depressed to switch "on" power to the device, the power in all channels is reset to "off" condition, the direction of count is set to "COUNT UP", and the address counter is set to Channel "1". That is, the device is automatically cleared when the "POWER" is switched "on".

The rear panel of the Patient Assist Device, shown in Figure 3, provides ten AC power connections for electrical appliances to be controlled by the patient. Each AC power circuit contains an A/3AG/AGC-5 fuse and can supply 5 amperes at 140 VAC.

The remaining rear panel fuse is in the AC power circuit to DC power supplies for logic circuitry and indicator lamps.

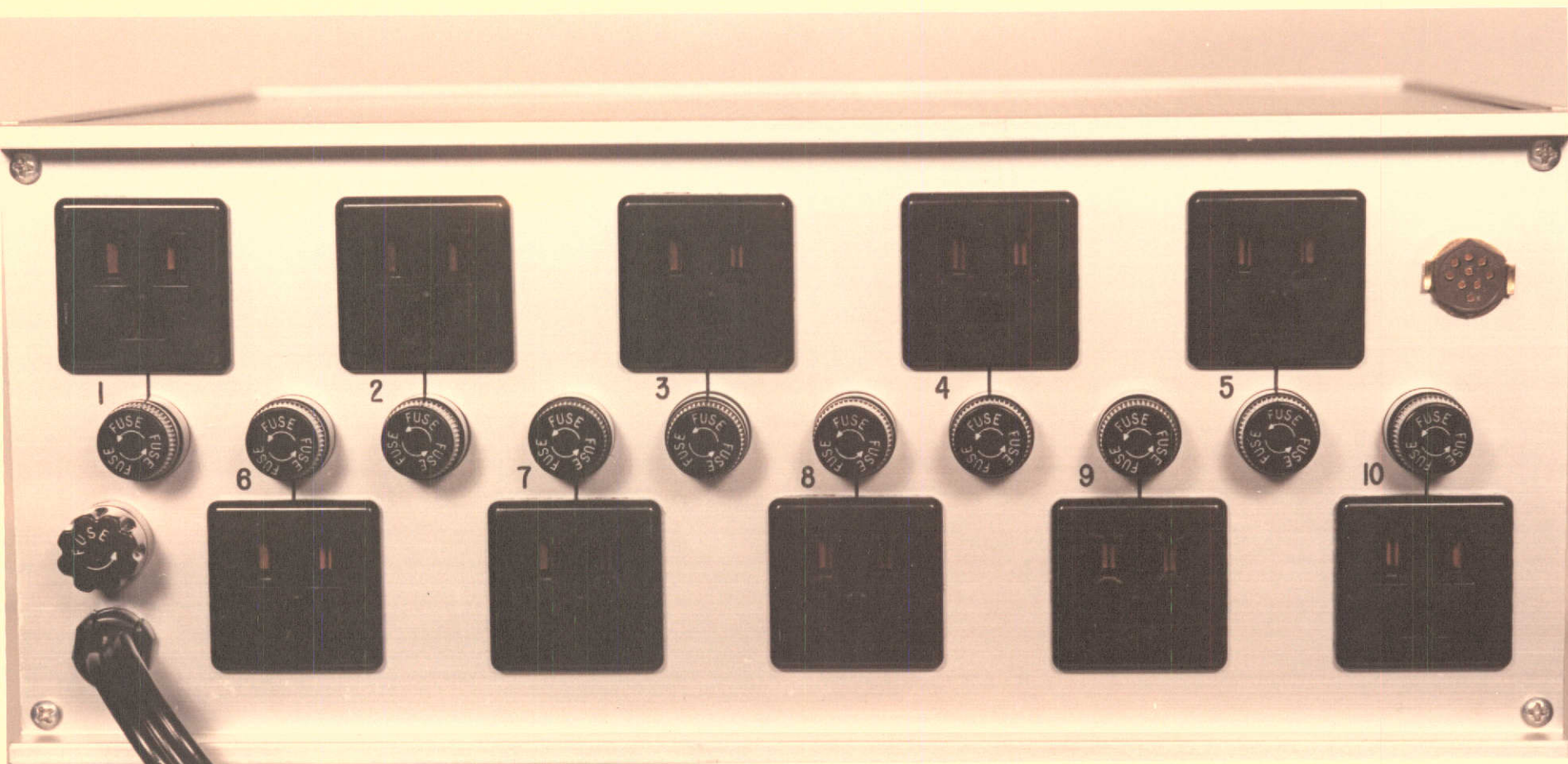


FIGURE 3. THE REAR PANEL OF THE PATIENT ASSIST DEVICE

An M9S receptacle on the rear panel connects the three patient-operated switches to the Patient Assist Device logic.

#### B. Logic Function

Logic circuitry diagrammed in Figure 4 is employed to monitor the "DIRECTION", "ADDRESS", and "POWER" patient switches and convert their operations into command signals which control power supplied to electrical appliances. SN 7400 N series integrated circuits implement the decision and control logic functions.

Patient switch activations trigger monostable multi-vibrators with output pulse widths of sufficient duration to include time for switch release by the patient. This time duration eliminates false circuit triggering due to switch chatter or bounce.

"DIRECTION" switch activations toggle a flip-flop, which determines the direction of counting addresses.

Addresses are counted in a synchronous four-bit decade counter. Channel addresses 1 to 10 are in one-to-one correspondence with counting numbers 0 to 9 in the counter.

The contents of the decade counter are decoded into decimal form by a BCD-to-decimal decoder. The decimal output designating the addressed power channel enables patient "POWER" switch signals to toggle a bistable multivibrator. The bistable multivibrator controls a relay in the power supply circuit to the appliance connected to the addressed channel. When the relay completes the power supply circuit, the circuit pilot lamp (labeled "ON") is lighted to indicate that power is supplied to that circuit.

The decoded channel address in decimal form is also indicated by lighting the corresponding lamp in a string of lamps.

Solid-state relays with zero voltage turn-on are employed to minimize radio frequency interference from switching heavy current loads. Each relay is capable of switching 5 amp at 140 VAC.

Separate power sources supply logic circuitry and indicating lamps to minimize effects of switching displays on the logic function.

Page intentionally left blank

### III. INSTALLATION, TESTING AND MAINTENANCE OF THE PATIENT ASSIST DEVICE

#### A. Installation of the Patient Assist Device

Installation of the Patient Assist Device merely requires a power connection to 110 VAC. The Patient Assist Device requires a maximum of 800 milliamperes current in operation. The current supplied to electrical appliances under control of the Patient Assist Device is an additional current requirement from the 110 VAC electrical power circuit supplying the Patient Assist Device. The current which may be simultaneously supplied to several controlled appliances is ultimately limited by the load capabilities of the AC power circuit. Current supplied to any one controlled appliance is limited to 5 amperes at 140 VAC.

#### B. Testing of the Patient Assist Device

Operational testing of the Patient Assist Device may be easily accomplished with the aid of a Load Test Board, shown in Figure 5.

Each lamp on the board is connected to a separate power channel. When a power channel is addressed through the Patient Assist Device, ("ADDRESS" switch) the corresponding lamp may be switched "on" or "off" by the patient activated "POWER" switch. Each lamp in turn may be switched "on" or "off" as the power channels are sequentially addressed in either direction. Various combinations of loads may be supplied power simultaneously to check for independent operation of each channel and to assure that different power channels do not interfere with each other when power is switched.

"Document ETP-1, Engineering Test Plan for the Patient Assist Device" provides procedures for completely testing the modes of operation of the Patient Assist Device. For convenience, this plan is also included in Appendix B of this report.

#### C. Maintenance of the Patient Assist Device

A schematic diagram of the electronic circuitry of the Patient Assist Device is given in Figure 4, Page 8. An internal wiring diagram of the Patient Assist Device is given in Figure 6.

Detailed descriptions of circuit components and Patient Assist Device hardware may be found in the complete parts list included in Appendix A.



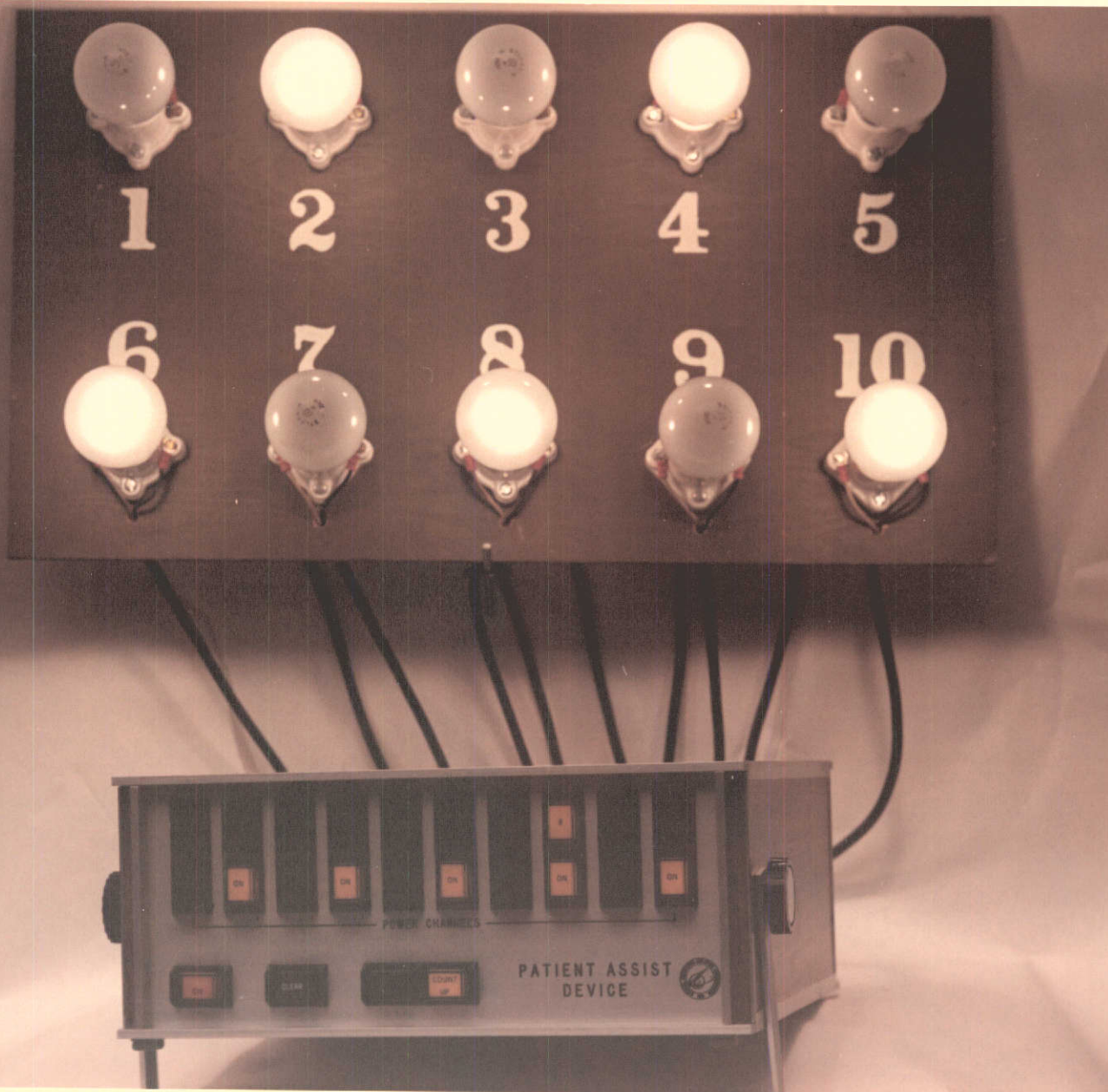


FIGURE 5 TESTING THE PATIENT ASSIST DEVICE WITH THE LOAD TEST BOARD

Page intentionally left blank



APPENDIX A

PATIENT ASSIST DEVICE PARTS LIST

## APPENDIX A

This appendix includes a complete parts list for the Patient Assist Device and SwRI drawings referenced in the parts list.

An explanation of the parts list columns is given below:

a. Reference No. - Column 1

The reference number applied to a component in the schematic diagram in Figure 4 appears in this column.

b. Description - Column 2

Reference name and qualifiers appear in this column.

c. Remarks - Column 3

Remarks of interest concerning reference items appear in this column. SwRI sketches referred to in this column are included immediately following the parts list.

Contractor Southwest Research Institute

Nomenclature PATIENT ASSIST DEVICE

Order No. Contract No. NAS 9-13582

Date Oct. 12, 1973

REF. NO.	DESCRIPTION	REMARKS
C <sub>1</sub>	Capacitor, Tantalum, 100 $\mu$ fd, 10%, 20 VDC	Kemet Series T110
C <sub>2</sub>	Capacitor, Tantalum, 100 $\mu$ fd, 10%, 20 VDC	Kemet Series T110
C <sub>3</sub>	Capacitor, Tantalum, 100 $\mu$ fd, 10%, 20 VDC	Kemet Series T110
C <sub>4</sub>	Capacitor, Tantalum, 100 $\mu$ fd, 10%, 20 VDC	Kemet Series T110
C <sub>5</sub>	Capacitor, Silver Mica, 560 pfd., 5%	Kemet Series T110
C <sub>6</sub>	Capacitor, Ceramic Disc, .01 $\mu$ fd., 20%, 50 VDC	Kemet Series T110
C <sub>7</sub>	Capacitor, Ceramic Disc, .01 $\mu$ fd., 20%, 50 VDC	Kemet Series T110
C <sub>8</sub>	Capacitor, Ceramic Disc, .01 $\mu$ fd, 20%, 50 VDC	Kemet Series T110
D <sub>1</sub>	Diode, Signal, Silicon, 1N4448	
D <sub>2</sub>	Diode, Signal, Silicon, 1N4448	
D <sub>3</sub>	Diode, Signal, Silicon, 1N4448	
D <sub>4</sub>	Diode, Signal, Silicon, 1N4448	

Contractor	Southwest Research Institute	Nomenclature	PATIENT ASSIST DEVICE
Order No.	Contract No. NAS 9-13582	Date	Oct. 12, 1973
REF. NO.	DESCRIPTION	REMARKS	
F1	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F2	Fuse, AGC-5 (installed in 3 AG fuse extractor post no. 342004)		
F3	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F4	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F5	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F6	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F7	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F8	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F9	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F10	Fuse, AGC-5 (installed in 3AG fuse extractor post no. 342004)		
F11	Fuse, slo-blo, 3AG 5A (installed in 3AG fuse extractor post no. 342004)		
IC <sub>1</sub>	Integrated Circuit, SN74123N	Texas Instruments	
IC <sub>2</sub>	Integrated Circuit, SN74123N	Texas Instruments	
IC <sub>3</sub>	Integrated Circuit, SN7474N	Texas Instruments	

Contractor Southwest Research Institute

Nomenclature PATIENT ASSIST DEVICE

Order No. Contract No. NAS 9-13582

Date Oct. 12, 1973

REF. NO.	DESCRIPTION	REMARKS
IC <sub>4</sub>	Integrated Circuit, SN7400N	Texas Instruments
IC <sub>5</sub>	Integrated Circuit, SN74192N	Texas Instruments
IC <sub>6</sub>	Integrated Circuit, SN75452	Texas Instruments
IC <sub>7</sub>	Integrated Circuit, SN7442N	Texas Instruments
IC <sub>8</sub>	Integrated Circuit, SN7402N	Texas Instruments
IC <sub>9</sub>	Integrated Circuit, SN7402N	Texas Instruments
IC <sub>10</sub>	Integrated Circuit, SN7402N	Texas Instruments
IC <sub>11</sub>	Integrated Circuit, SN75452	Texas Instruments
IC <sub>12</sub>	Integrated Circuit, SN75451	Texas Instruments
IC <sub>13</sub>	Integrated Circuit, SN75451	Texas Instruments
IC <sub>14</sub>	Integrated Circuit, SN75451	Texas Instruments
IC <sub>15</sub>	Integrated Circuit, SN75451	Texas Instruments
IC <sub>16</sub>	Integrated Circuit, SN75451	Texas Instruments
IC <sub>17</sub>	Integrated Circuit, SN7474N	Texas Instruments

Contractor	Southwest Research Institute	Nomenclature	PATIENT ASSIST DEVICE
Order No.	Contract No. NAS 9-13582	Date	Oct. 12, 1973
REF. NO.	DESCRIPTION	REMARKS	
IC <sub>18</sub>	Integrated Circuit, SN7474N	Texas Instruments	
IC <sub>19</sub>	Integrated Circuit, SN7474N	Texas Instruments	
IC <sub>20</sub>	Integrated Circuit, SN7474N	Texas Instruments	
IC <sub>21</sub>	Integrated Circuit, SN7474N	Texas Instruments	
IC <sub>22</sub>	Integrated Circuit, SN7404N	Texas Instruments	
IC <sub>23</sub>	Integrated Circuit, SN7404N	Texas Instruments	
IC <sub>24</sub>	Integrated Circuit, SN75452	Texas Instruments	
IC <sub>25</sub>	Integrated Circuit, SN75452	Texas Instruments	
IC <sub>26</sub>	Integrated Circuit, SN75452	Texas Instruments	
IC <sub>27</sub>	Integrated Circuit, SN75452	Texas Instruments	
IC <sub>28</sub>	Integrated Circuit, SN75452	Texas Instruments	
J1	Connector, Printed Circuit, 47 pin	ELCO No. 00-7015-047-217-002	
J2	Connector, 9 pin	Winchester M9S	

Contractor Southwest Research Institute

Nomenclature PATIENT ASSIST DEVICE

Order No. Contract No. NAS 9-13582

Date Oct. 12, 1973

REF. NO.	DESCRIPTION	REMARKS
J3	Socket, AC, 3-wire	Waber Electronics No. 3011
J4	Socket, AC, 3-wire	Waber Electronics No. 3011
J5	Socket, AC, 3-wire	Waber Electronics No. 3011
J6	Socket, AC, 3-wire	Waber Electronics No. 3011
J7	Socket, AC, 3-wire	Waber Electronics No. 3011
J8	Socket, AC, 3-wire	Waber Electronics No. 3011
J9	Socket, AC, 3-wire	Waber Electronics No. 3011
J10	Socket, AC, 3-wire	Waber Electronics No. 3011
J11	Socket, AC, 3-wire	Waber Electronics No. 3011
J12	Socket, AC, 3-wire	Waber Electronics No. 3011
K1	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103
K2	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103
K3	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103

Contractor	Southwest Research Institute	Nomenclature	PATIENT ASSIST DEVICE
Order No.	Contract No. NAS 9-13582	Date	Oct. 12, 1973
REF. NO.	DESCRIPTION	REMARKS	
K4	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140VAC	Teledyne Relays No. 601-1103	
K5	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103	
K6	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103	
K7	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103	
K8	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103	
K9	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103	
K10	Relay, Solid State, Zero Voltage Turn on, Switches 5A, 140 VAC	Teledyne Relays No. 601-1103	
L1	Indicator, Pushbutton, Lighted(with legend "1" in 7/64" type size )	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L2	Indicator, Pushbutton, Lighted(with legend "2" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L3	Indicator, Pushbutton, Lighted(with legend "3" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	



Contractor	Southwest Research Institute	Nomenclature	PATIENT ASSIST DEVICE
Order No.	Contract No. NAS 9-13582	Date	Oct. 12, 1973
REF. NO.	DESCRIPTION	REMARKS	
L4	Indicator, Pushbutton, Lighted (with legend "4" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L5	Indicator, Pushbutton, Lighted (with legend "5" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L6	Indicator, Pushbutton, Lighted (with legend "6" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L7	Indicator, Pushbutton, Lighted (with legend "7" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L8	Indicator, Pushbutton, Lighted (with legend "8" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L9	Indicator, Pushbutton, Lighted (with legend "9" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	
L10	Indicator, Pushbutton, Lighted (with legend "10" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31-CYL with lamp ASA No. 656	

Contractor Southwest Research Institute

Nomenclature PATIENT ASSIST DEVICE

Order No. Contract No. NAS 9-13582

Date Oct. 12, 1973

REF. NO.	DESCRIPTION	REMARKS
L11	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L12	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L13	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L14	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L15	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L16	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L17	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656

Contractor Southwest Research Institute		Nomenclature PATIENT ASSIST DEVICE
Order No.	Contract No. NAS 9-13582	Date Oct. 12, 1973
REF. NO.	DESCRIPTION	REMARKS
L18	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L19	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L20	Indicator, Pushbutton, Lighted (with legend "ON" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L21	Indicator, Pushbutton, Lighted (with legend "COUNT UP" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C23B31 CYK with lamp ASA No. 656
L22	Indicator, Pushbutton, Lighted (with legend "COUNT DOWN" in 7/64" type size)	Microswitch Pushbutton Indicator No. 4C21B31 CYK with lamp ASA No. 656
P1	Connector, printed circuit, 47 pin	Elco No. 00-7021-047-000-001
P2	Connector, 9 pin	Winchester M9P

Contractor	Southwest Research Institute	Nomenclature	PATIENT ASSIST DEVICE
Order No.	Contract No. NAS 9-13582	Date	Oct. 12, 1973
REF. NO.	DESCRIPTION	REMARKS	
PS <sub>1</sub>	Power Supply, regulated, +5VDC, 2.2A	Acopian No. A5NT220	
PS <sub>2</sub>	Power Supply, regulated, +28VDC, 1.25A	Acopian No. A28NT125	
R1	Resistor, fixed, composition, 36K $\Omega$ , 5%, 1/4W		
R2	Resistor, fixed, composition, 20K $\Omega$ , 5%, 1/4W		
R3	Resistor, fixed, composition, 20K $\Omega$ , 5%, 1/4W		
R4	Resistor, fixed, composition, 20K $\Omega$ , 5%, 1/4W		
R5	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W		
R6	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W		
R7	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W		
R8	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W		
R9	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W		
R10	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W		
R11	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W		

Contractor Southwest Research Institute

Nomenclature PATIENT ASSIST DEVICE

Order No. Contract No. NAS 9-13582

Date Oct. 12, 1973

REF. NO.	DESCRIPTION	REMARKS
R12	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W	
R13	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W	
R14	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W	
R15	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W	
R16	Resistor, fixed, composition, 1K $\Omega$ , 5%, 1/4W	
S1, L24	Switch, Pushbutton, Lighted (with legends "POWER" and "ON" in 7/64" type size)	Microswitch Pushbutton Switch No. 4A21BFA31 CRJ with lamp no. ASA 656
S2, L23	Switch, Pushbutton, Lighted (with legend "CLEAR" in 7/64" type size)	Microswitch Pushbutton Switch No. 4A21BEA31 CGL with lamp no. ASA 656
S3*	Switch, Miniature, Light Force (with 2-3/8" lever as external actuator)	Cherry no. E22-85HX
S4*	Switch, Miniature, Light Force (with 2-3/8" lever as external actuator)	Cherry no. E22-85HX
S5*	Switch, Miniature, Light Force (with 2-3/8" lever as external actuator)	Cherry no. E22-85HN

\* These switches are patient activated and may be replaced by other SPST momentary action switches to suit patients.

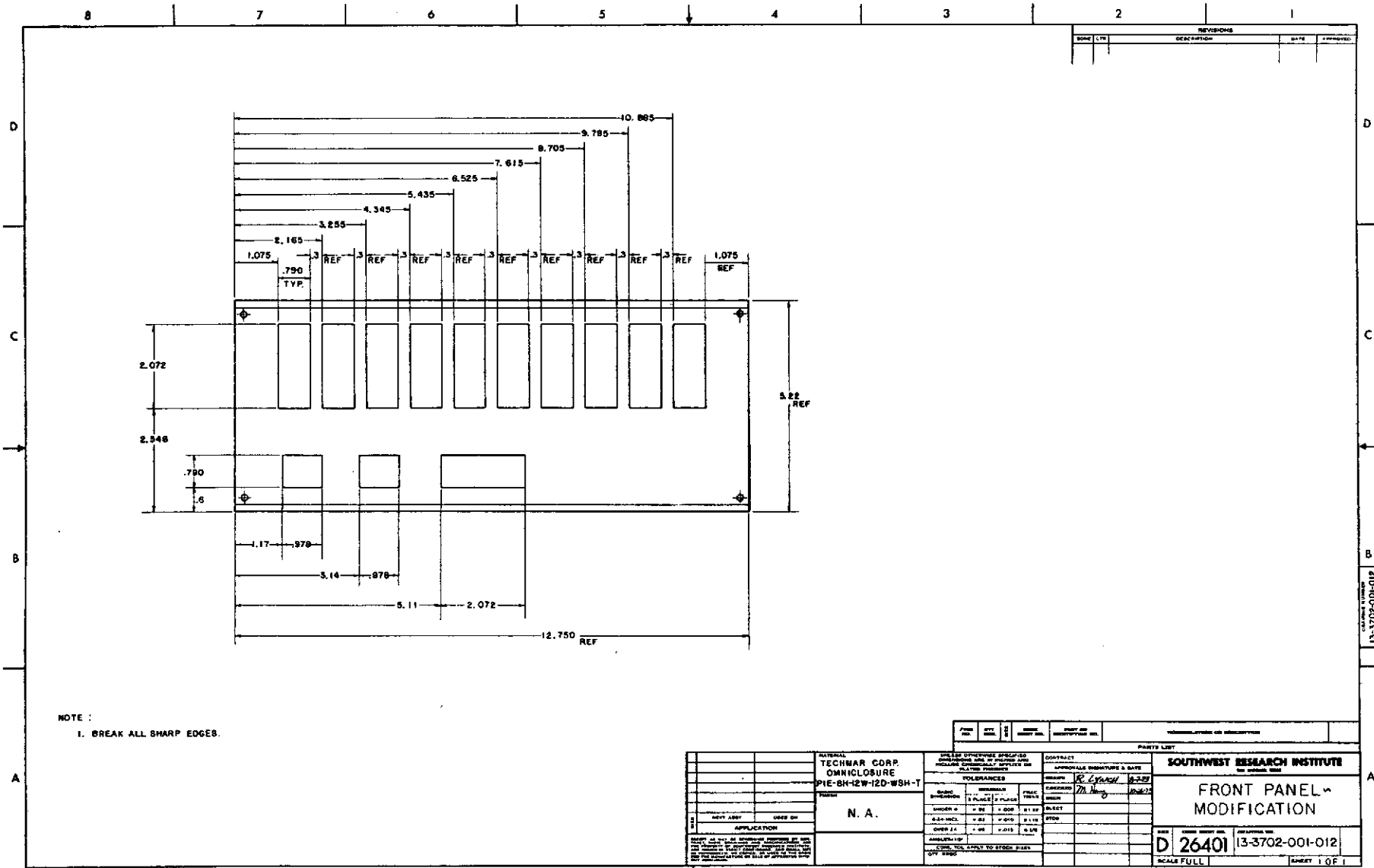
Contractor Southwest Research Institute

Nomenclature PATIENT ASSIST DEVICE

Order No. Contract No. NAS 9-13582

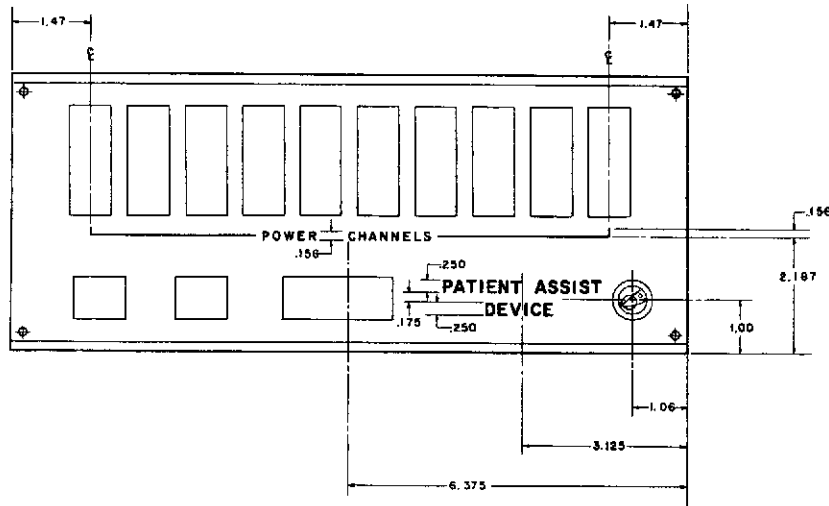
Date Oct. 12, 1973

REF. NO.	DESCRIPTION	REMARKS
	Cabinet, instrumentation, portable; with	Techmar No. PIC-5H-12W-120-WSH-T
	Panel, Front, modified by SwRI	SwRI Drawing Nos. 13-3702-001-011, -012, -013
	Panel, Rear, modified by SwRI	SwRI Drawing Nos. 13-3702-001-014, -015, -016



8 7 6 5 4 3 2 1

REVISIONS			
BOX	DATE	DESCRIPTION	APPROVED



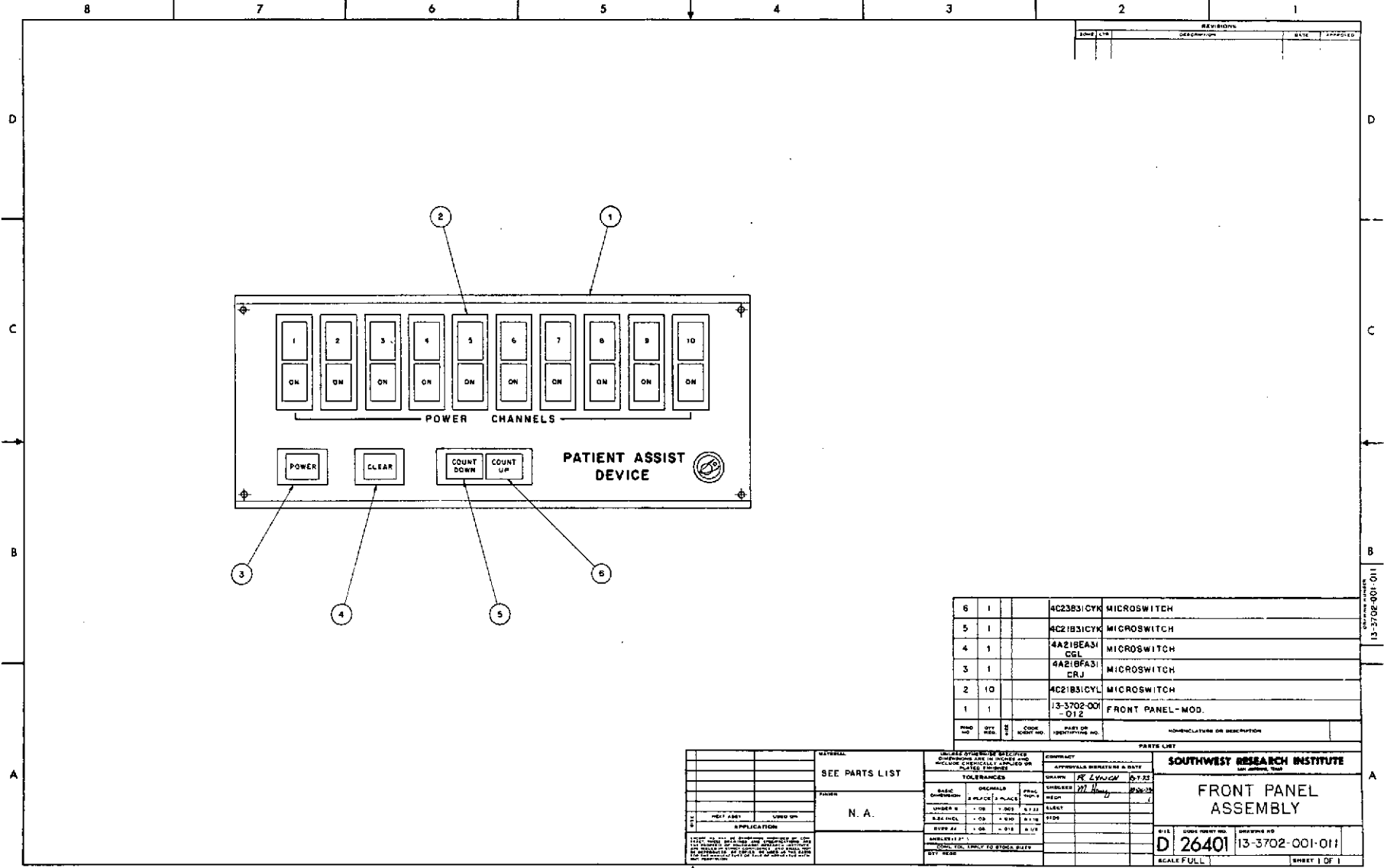
NOTES:

- 1 ENGRAVING TO BE CENTERED PER DIM'S SHOWN ON DWG. -
- LETTERS "POWER CHANNELS" TO BE .156 HEIGHT AND .020 WIDTH.
- GUIDE LINES TO BE .020 WIDTH.
- LETTERS "PATIENT ASSIST DEVICE" TO BE .250 HEIGHT AND .040 WIDTH.
- MASA SYMBOL TO BE .750 HEIGHT.
- ALL ENGRAVING TO BE FILLED WITH BLACK PAINT.

FIG. NO.	QTY. REQ.	U. S. CODE	PART OR IDENTIFYING NO.	DESCRIPTION OR IDENTIFYING

MATERIAL		SIZES TO BE SPECIFIED		PART LIST	
13-3702-001-012		SIZES TO BE SPECIFIED		PART LIST	
FRONT PANEL MDD.		SIZES TO BE SPECIFIED		PART LIST	
FINISH		TOLERANCES		SOUTHWEST RESEARCH INSTITUTE 1501 JEFFERSON ST. EL PASO, TEX. 75041	
SEE NOTE 1.		TOLERANCES		FRONT PANEL ENGRAVING	
APPLICATION		TOLERANCES		REV. CODE QTY. NO. DRAWING NO.	
APPLICATION		TOLERANCES		D 26401 13-3702-001-013	
APPLICATION		TOLERANCES		SCALE FULL	
APPLICATION		TOLERANCES		SHEET 1 OF 1	



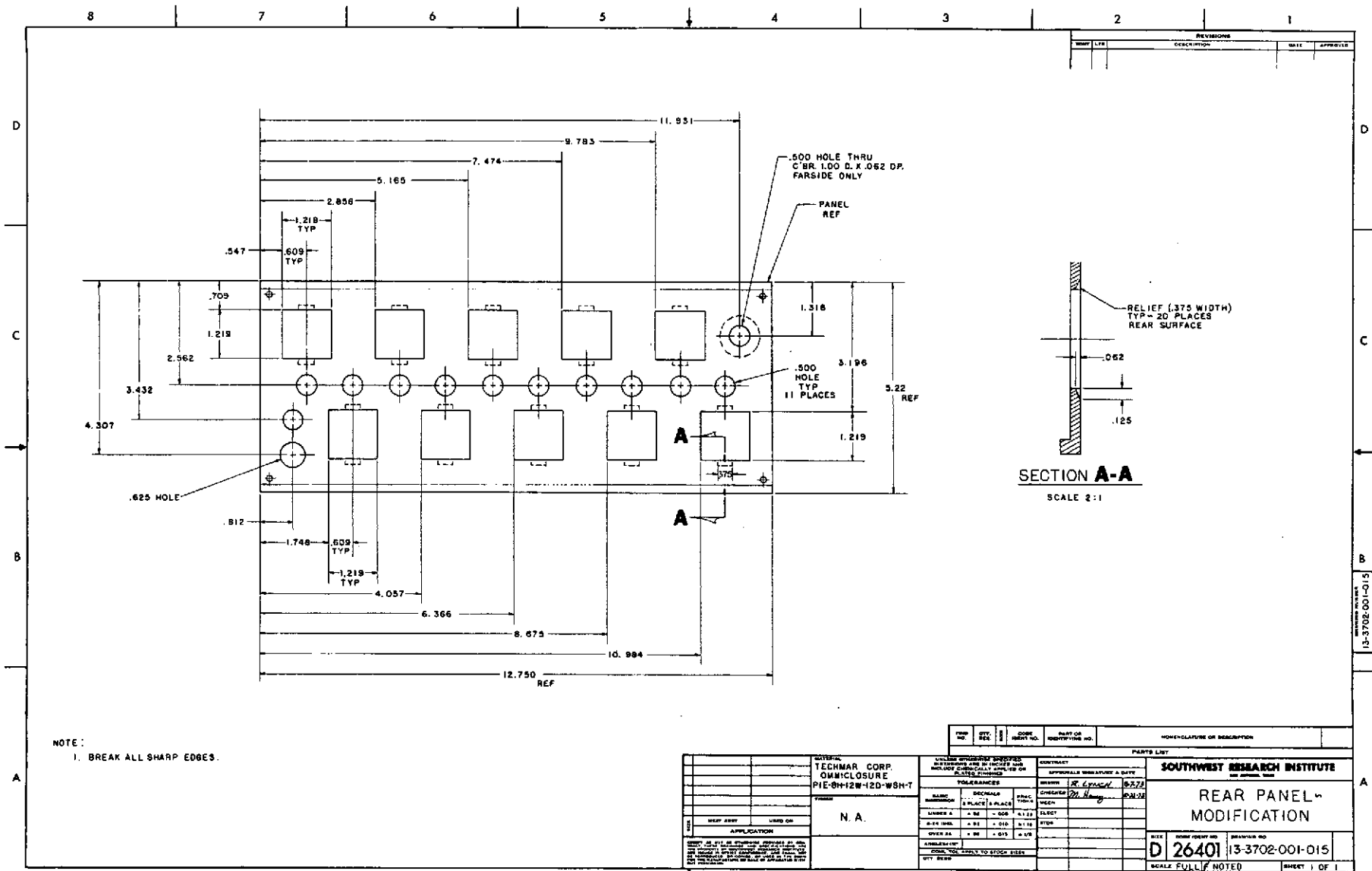


REVISIONS			
NO.	DATE	DESCRIPTION	APPROVED

QTY	REQ.	CODE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
6	1		4C23B31CYK	MICROSWITCH
5	1		4C21B31CYK	MICROSWITCH
4	1		4A21BEA31 CRL	MICROSWITCH
3	1		4A21BF431 CRL	MICROSWITCH
2	10		4C21B31CYL	MICROSWITCH
1	1		13-3702-001 -012	FRONT PANEL-MOD.

MATERIAL		TOLERANCES		CONTRACT		SOUTHWEST RESEARCH INSTITUTE	
SEE PARTS LIST		N. A.		APPROVALS: DRAWN BY <i>R. L. HUGHES</i> DATE <i>07-23</i>		FRONT PANEL ASSEMBLY	
FINISH		DIMENSIONS		CHECKED BY <i>W. H. HUGHES</i> DATE <i>07-23</i>		D 26401	
APPLICATION		DIMENSIONS		DATE		13-3702-001-011	
BY: <i> </i>		BY: <i> </i>		SCALE: FULL		SHEET 1 OF 1	

13-3702-001-011



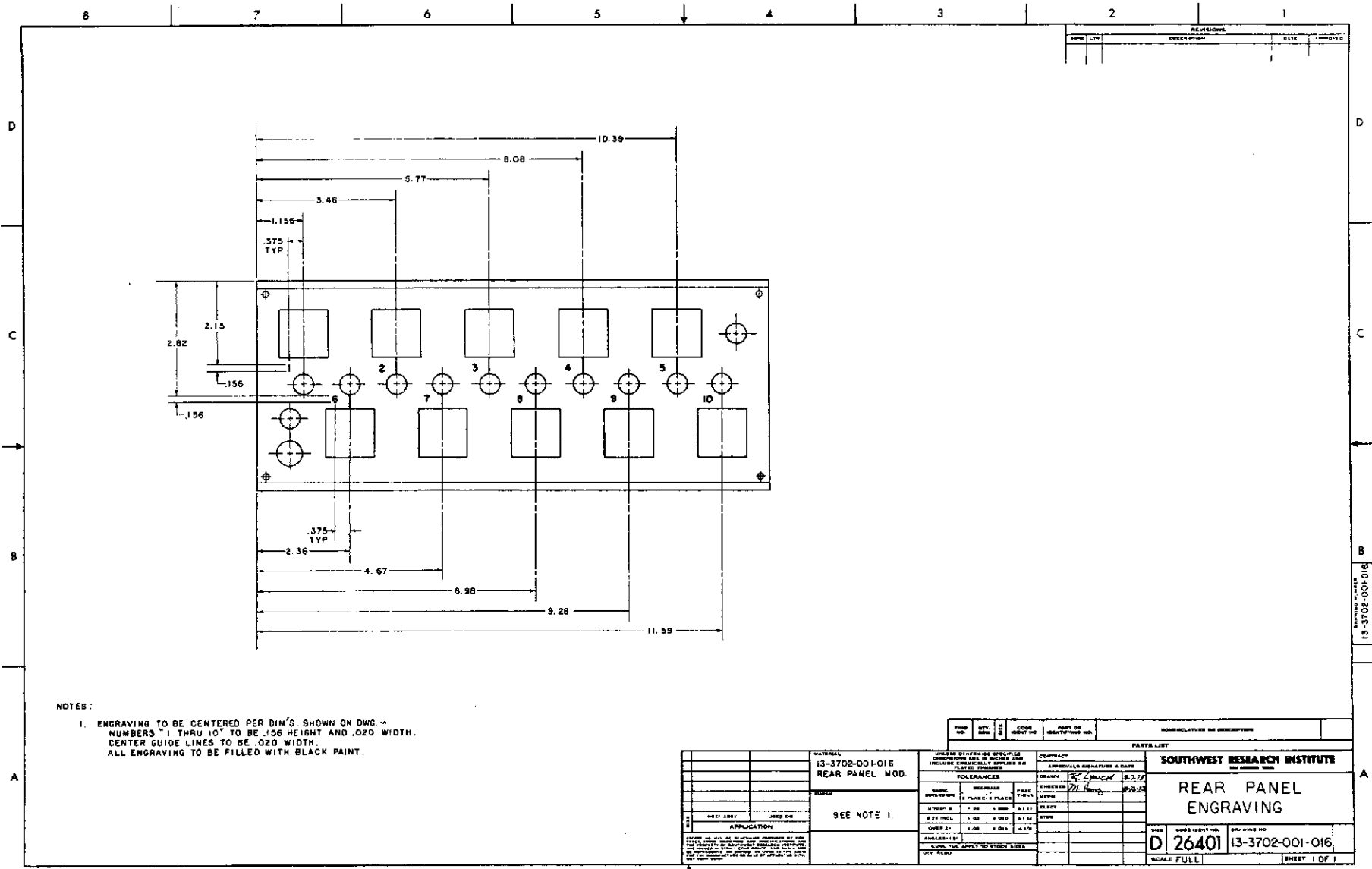
NOTE:  
1. BREAK ALL SHARP EDGES.

REV.	DATE	DESCRIPTION	BY	APPROVED

TECHMAR CORP. ENCLOSURE PIE-0H-12W-120-WSH-7	QUANTITY 1	DESCRIPTION REAR PANEL MODIFICATION	DATE 8-27-72
--	---------------	--	-----------------

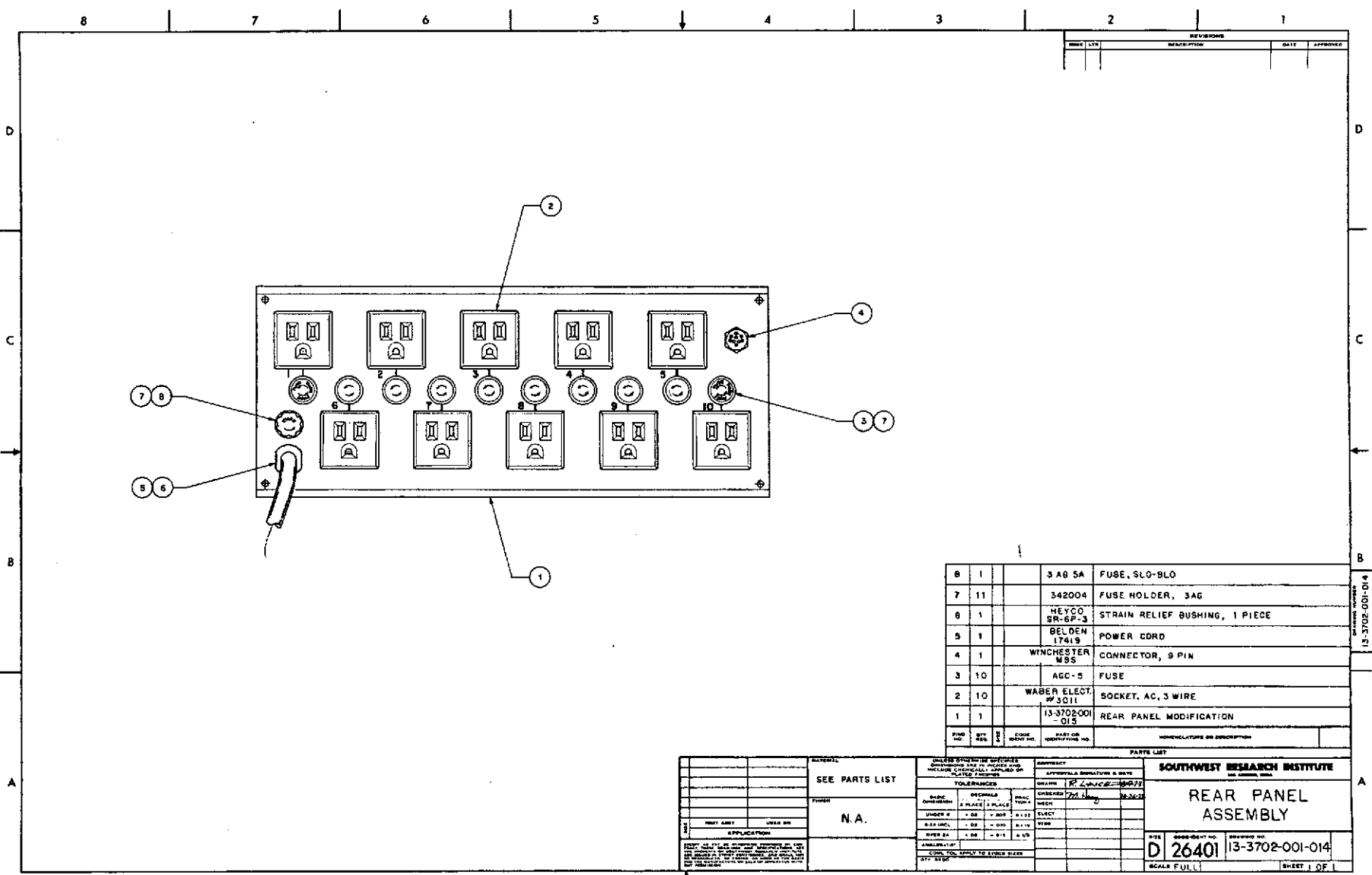
TECHMAR CORP. ENCLOSURE PIE-0H-12W-120-WSH-7	QUANTITY 1	DESCRIPTION REAR PANEL MODIFICATION	DATE 8-27-72
--	---------------	--	-----------------

TECHMAR CORP. ENCLOSURE PIE-0H-12W-120-WSH-7	QUANTITY 1	DESCRIPTION REAR PANEL MODIFICATION	DATE 8-27-72
--	---------------	--	-----------------



NOTES:  
 1. ENGRAVING TO BE CENTERED PER DIM'S. SHOWN ON DWG. ~  
 NUMBERS 1 THRU 10 TO BE .156 HEIGHT AND .020 WIDTH.  
 CENTER GUIDE LINES TO BE .020 WIDTH.  
 ALL ENGRAVING TO BE FILLED WITH BLACK PAINT.

TYPE	REV.	DATE	CODE	FORM OR	MANUFACTURE OR DESCRIPTION
				IDENTIFYING NO.	
PARTS LIST					
MATERIAL 13-3702-001-016 REAR PANEL MOD.			CONTRACT APPROVAL SIGNATURE & DATE ORDERED BY: <i>[Signature]</i> 8-27-59 CHECKED BY: <i>[Signature]</i> 8-28-59		SOUTHWEST RESEARCH INSTITUTE SAN ANTONIO, TEXAS
TOLERANCES FINISH UNLESS SHOWN OTHERWISE DIMENSIONS FINISH UNLESS SHOWN OTHERWISE DIMENSIONS FINISH UNLESS SHOWN OTHERWISE DIMENSIONS			REAR PANEL ENGRAVING		
APPLICATION SEE NOTE 1.			SIZE CODE IDENT. NO. DRAWING NO. D 26401 13-3702-001-016		
OTHER INFO DIMENSIONS TO CENTER UNLESS OTHERWISE SPECIFIED DIMENSIONS TO SURFACE UNLESS OTHERWISE SPECIFIED DIMENSIONS TO CENTER UNLESS OTHERWISE SPECIFIED DIMENSIONS TO SURFACE UNLESS OTHERWISE SPECIFIED			SCALE FULL SHEET 1 OF 1		



REVISIONS			
NO.	DATE	DESCRIPTION	APPROVED

QTY	DESCRIPTION	REVISIONS
3	AG 5A	FUSE, SLO-BLO
7	11	342004 FUSE HOLDER, 3AG
6	1	HEYCO SR-SP-3 STRAIN RELIEF BUSHING, 1 PIECE
5	1	BELDEN 17419 POWER CORD
4	1	WINCHESTER WSS CONNECTOR, 9 PIN
3	10	AGC-5 FUSE
2	10	WAGER ELECT. #3011 SODKET, AC, 3 WIRE
1	1	13-3702-001-015 REAR PANEL MODIFICATION

<b>REVISIONS</b> UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE DECIMALS APPLIED ON BASIC DIMENSIONS.		<b>APPROVED</b> APPROVED SIGNATURE & DATE DRAWN BY: [Signature] 10/23/53 CHECKED BY: [Signature] 10/26/53	
<b>GENERAL</b> SEE PARTS LIST		<b>SOUTHWEST RESEARCH INSTITUTE</b> 13-3702-001-014	
<b>PARTS LIST</b> PART NO. QTY. CODE PART OR IDENTIFYING NO. NOMENCLATURE OR DESCRIPTION		<b>REAR PANEL ASSEMBLY</b>	
<b>APPROVALS</b> DRAWN BY: [Signature] CHECKED BY: [Signature]		FILE NO. <b>D 26401</b> PROJECT NO. <b>13-3702-001-014</b> SCALE: FULL SIZE SHEET 1 OF 1	

APPENDIX B

PATIENT ASSIST DEVICE TEST PROCEDURES

## PATIENT ASSIST DEVICE TEST PROCEDURES

### INTRODUCTION

The Patient Assist Device will be tested with the aid of a Load Test Board which contains ten 100-watt lamps, each of which is in a separate circuit. Each lamp is labeled according to the number of the power channel to which it is connected.

Single-pole, single-throw momentary action toggle switches will be used for patient actuation during testing. Three such switches are required for Patient Assist Device control. One is labeled "ADDRESS" and is activated to sequentially select power channels in ascending or descending numeric order. The "count up" or "count down" mode of successive channel selection is determined by the "DIRECTION" switch. This patient switch is activated to reverse the direction of count.

The third patient switch is activated to switch the power "on" or "off" in an addressed channel. The switch is labeled "POWER".

During testing, each lamp on the Load Test Board will be plugged into the correspondingly labeled AC socket on the rear panel of the Patient Assist Device.

The "POWER" push button switch on the front panel of the Patient Assist Device is depressed to turn "ON" power to the device. The push button lens includes hidden legend "ON" which is visible when "POWER" is supplied to the unit. Depressing this "POWER" switch resets the logic circuitry in the device such that no connected load (in this case, on the Load Test Board) is supplied power, channel "1" is addressed and "COUNT UP" is the selected numeric sequence.

Each power channel controlled by the Patient Assist Device is denoted by a separate button indicator on the front panel of the Patient Assist Device. Indicator lenses are labeled with the applicable channel number. When a channel is addressed, its indicator lens is lighted. Below each channel indicator is another button indicator with a hidden legend "ON". The legend is visible and the lens of this indicator is lighted when power is supplied to an electrical load in the applicable power channel.

Thus when the "POWER" push button is depressed, the channel "1" indicator is lighted since the unit logic is reset to address channel "1". All other channel indicators are not lighted and power is not supplied to any of the ten possible lamp loads.

No "ON" legends are visible beneath the channel designations on the front panel.

The "COUNT UP" legend is visible and the "COUNT DOWN" legend is hidden to indicate the initial numeric address sequence.

The remaining front panel indicator is a push button indicator with a visible legend "CLEAR". The lens of this indicator is momentarily lighted when the Patient Assist Device logic is reset either by depressing the "POWER" button to switch "ON" power to the device or by depressing the "CLEAR" button.

The test procedures presented here permit a complete functional testing of the Patient Assist Device by activation of patient switches and observation of front panel indicators on the device and load lamps on the Load Test Board.

## TEST PROCEDURES

1. Connect power to the Patient Assist Device.
2. Depress "POWER" push button to switch "ON" DC power to the logic section and indicator lamps of the Patient Assist Device.

The "ON" legend located under the "POWER" legend is visible when the power is supplied to the Patient Assist Device. \_\_\_\_\_

The "CLEAR" lens is momentarily lighted when the "POWER" switch is depressed. \_\_\_\_\_

The "COUNT UP" legend is visible. \_\_\_\_\_

The "1" channel is addressed as denoted by the lighted lens with legend "1". \_\_\_\_\_

No other lenses are lighted on the front panel of the unit. \_\_\_\_\_

NOTE: The following tests are performed by operating appropriate patient switches. When operating these switches, care must be taken to release a switch within a second of time following the initial contact with the switch. This time period may be adjusted differently to suit patient requirements. However, the one second period is normally preferred.

If the switch is not released during the one second time period, undesired results may occur upon release since switch chatter may retrigger the switch logic. The purpose of the one second time period is to permit switch release without retriggering the switch logic.

Also, no switch should be reactivated within a one-second period from a previous switch activation.

These criteria do not reflect a design deficiency of the Patient Assist Device. On the contrary, they are designed to meet the capabilities of a patient.

3. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "1".

The "ON" legend of a lens directly under the lens labeled "1" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "1" on the Load Test Board is lighted. \_\_\_\_\_

4. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "1".

The "ON" legend under the lens labeled "1" is hidden and that lens is not lighted. \_\_\_\_\_



The load lamp labeled "1" on the Load Test Board is not lighted. \_\_\_\_\_

5. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "2" .

The "2" channel is addressed as denoted by the lighted lens labeled "2" . \_\_\_\_\_

6. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "2" .

The "ON" legend of a lens directly under the lens labeled "2" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "2" on the Load Test Board is lighted. \_\_\_\_\_

7. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "2" .

The "ON" legend under the lens labeled "2" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "2" on the Load Test Board is not lighted. \_\_\_\_\_

8. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "3" .

The "3" channel is addressed as denoted by the lighted lens labeled "3" . \_\_\_\_\_

9. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "3" .

The "ON" legend of a lens directly under the lens labeled "3" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "3" on the Load Test Board is lighted. \_\_\_\_\_

10. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "3" .

The "ON" legend under the lens labeled "3" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "3" on the Load Test Board is not lighted. \_\_\_\_\_

11. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "4" .

The "4" channel is addressed as denoted by the lighted lens labeled "4" . \_\_\_\_\_

12. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "4" .

The "ON" legend of a lens directly under the lens labeled "4" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "4" on the Load Test Board is lighted. \_\_\_\_\_

13. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "4" .

The "ON" legend under the lens labeled "4" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "4" on the Load Test Board is not lighted. \_\_\_\_\_

14. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "5" .

The "5" channel is addressed as denoted by the lighted lens labeled "5" . \_\_\_\_\_

15. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "5" .

The "ON" legend of a lens directly under the lens labeled "5" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "5" on the Load Test Board is lighted. \_\_\_\_\_

16. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "5" .

The "ON" legend under the lens labeled "5" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "5" on the Load Test Board is not lighted. \_\_\_\_\_

17. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "6" .

The "6" channel is addressed as denoted by the lighted lens labeled "6" . \_\_\_\_\_

18. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "6" .

The "ON" legend of a lens directly under the lens labeled "6" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "6" on the Load Test Board is lighted. \_\_\_\_\_

19. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "6" .

The "ON" legend under the lens labeled "6" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "6" on the Load Test Board is not lighted. \_\_\_\_\_

20. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "7" .

The "7" channel is addressed as denoted by the lighted lens labeled "7" . \_\_\_\_\_

21. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "7" .

The "ON" legend of a lens directly under the lens labeled "7" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "7" on the Load Test Board is lighted. \_\_\_\_\_

22. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "7" .

The "ON" legend under the lens labeled "7" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "7" on the Load Test Board is not lighted. \_\_\_\_\_

23. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "8" .

The "8" channel is addressed as denoted by the lighted lens labeled "8" . \_\_\_\_\_

24. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "8" .

The "ON" legend of a lens directly under the lens labeled "8" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "8" on the Load Test Board is lighted. \_\_\_\_\_

25. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "8" .

The "ON" legend under the lens labeled "8" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "8" on the Load Test Board is not lighted. \_\_\_\_\_

26. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "9" .

The "9" channel is addressed as denoted by the lighted lens labeled "9" . \_\_\_\_\_

27. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "9" .

The "ON" legend of a lens directly under the lens labeled "9" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "9" on the Load Test Board is lighted. \_\_\_\_\_

28. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "9" .

The "ON" legend under the lens labeled "9" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "9" on the Load Test Board is not lighted. \_\_\_\_\_

29. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "10".

The "10" channel is addressed as denoted by the lighted lens labeled "10". \_\_\_\_\_

30. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "10".

The "ON" legend of a lens directly under the lens labeled "10" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "10" on the Load Test Board is lighted. \_\_\_\_\_

31. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "10".

The "ON" legend under the lens labeled "10" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "10" on the Load Test Board is not lighted. \_\_\_\_\_

32. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "1".

The "1" channel is addressed as denoted by the lighted lens labeled "1". \_\_\_\_\_

33. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "1".

The "ON" legend of a lens directly under the lens labeled "1" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "1" on the Load Test Board is lighted. \_\_\_\_\_

34. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "1".

The "ON" legend under the lens labeled "1" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "1" on the Load Test Board is not lighted. \_\_\_\_\_

35. Activate the patient "DIRECTION" switch to switch the sequence of addresses to a "COUNT DOWN" mode.

The "COUNT DOWN" legend is visible. \_\_\_\_\_

The "1" channel remains addressed as denoted by the lighted lens with legend "1". \_\_\_\_\_

36. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "10".

The "10" channel is addressed as denoted by the lighted lens labeled "10". \_\_\_\_\_

37. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "10". \_\_\_\_\_

The "ON" legend of a lens directly under the lens labeled "10" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "10" on the Load Test Board is lighted. \_\_\_\_\_

38. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "10".

The "ON" legend under the lens labeled "10" is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "10" on the Load Test Board is not lighted. \_\_\_\_\_

39. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in channel "9".

The "9" channel is addressed as denoted by the lighted lens labeled "9". \_\_\_\_\_

40. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "9".

The "ON" legend of a lens directly under the lens labeled "9" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "9" on the Load Test Board is lighted. \_\_\_\_\_

41. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "9".

The "ON" legend under the lens labeled "9 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "9 " on the Load Test Board is not lighted.  
\_\_\_\_\_

42. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "8 ".

The "8" channel is addressed as denoted by the lighted lens labeled "8 ". \_\_\_\_\_

43. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "8 ".

The "ON" legend of a lens directly under the lens labeled "8 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "8 " on the Load Test Board is lighted. \_\_\_\_\_

44. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "8 ".

The "ON" legend under the lens labeled "8 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled "8 " on the Load Test Board is not lighted. \_\_\_\_\_

45. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "7 ".

The "7 " channel is addressed as denoted by the lighted lens labeled "7 ". \_\_\_\_\_

46. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "7 ".

The "ON" legend of a lens directly under the lens labeled "7 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "7 " on the Load Test Board is lighted. \_\_\_\_\_

47. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "7 ".

The "ON" legend under the lens labeled " 7 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled " 7 " on the Load Test Board is not lighted.  
\_\_\_\_\_

48. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel " 6 ".

The " 6 " channel is addressed as denoted by the lighted lens labeled " 6 ". \_\_\_\_\_

49. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel " 6 ".

The "ON" legend of a lens directly under the lens labeled " 6 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled " 6 " on the Load Test Board is lighted. \_\_\_\_\_

50. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel " 6 ".

The "ON" legend under the lens labeled " 6 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled " 6 " on the Load Test Board is not lighted. \_\_\_\_\_

51. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel " 5 ".

The " 5 " channel is addressed as denoted by the lighted lens labeled " 5 ". \_\_\_\_\_

52. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel " 5 ".

The "ON" legend of a lens directly under the lens labeled " 5 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled " 5 " on the Load Test Board is lighted. \_\_\_\_\_

53. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel " 5 ".



The "ON" legend under the lens labeled " 5 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled " 5 " on the Load Test Board is not lighted.  
\_\_\_\_\_

54. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel " 4 ".

The " 4 " channel is addressed as denoted by the lighted lens labeled " 4 ". \_\_\_\_\_

55. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel " 4 ".

The "ON" legend of a lens directly under the lens labeled " 4 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled " 4 " on the Load Test Board is lighted. \_\_\_\_\_

56. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel " 4 ".

The "ON" legend under the lens labeled " 4 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled " 4 " on the Load Test Board is not lighted. \_\_\_\_\_

57. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel " 3 ".

The " 3 " channel is addressed as denoted by the lighted lens labeled " 3 ". \_\_\_\_\_

58. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel " 3 ".

The "ON" legend of a lens directly under the lens labeled " 3 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled " 3 " on the Load Test Board is lighted. \_\_\_\_\_

59. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel " 3 ".

The "ON" legend under the lens labeled " 3 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled " 3 " on the Load Test Board is not lighted.  
\_\_\_\_\_

60. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel " 2 ".

The " 2 " channel is addressed as denoted by the lighted lens labeled " 2 ". \_\_\_\_\_

61. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel " 2 ".

The "ON" legend of a lens directly under the lens labeled " 2 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled " 2 " on the Load Test Board is lighted. \_\_\_\_\_

62. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel " 2 ".

The "ON" legend under the lens labeled " 2 " is hidden and that lens is not lighted. \_\_\_\_\_

The load lamp labeled " 2 " on the Load Test Board is not lighted. \_\_\_\_\_

63. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel " 1 ".

The " 1 " channel is addressed as denoted by the lighted lens labeled " 1 ". \_\_\_\_\_

64. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel " 1 ".

The "ON" legend of a lens directly under the lens labeled " 1 " is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled " 1 " on the Load Test Board is lighted. \_\_\_\_\_

65. Activate the patient "DIRECTION" switch to switch the sequence of addresses to a "COUNT UP" mode.

The "COUNT UP" legend is visible. \_\_\_\_\_

The "1" channel remains addressed as denoted by the lighted lens with legend "1". \_\_\_\_\_

The "ON" legend of a lens directly under the lens labeled "1" is visible and that lens is lighted. \_\_\_\_\_

The load lamp labeled "1" on the Load Test Board is lighted. \_\_\_\_\_

66. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "2".

The "2" channel is addressed as denoted by the lighted lens labeled "2". \_\_\_\_\_

67. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "3".

The "3" channel is addressed as denoted by the lighted lens labeled "3". \_\_\_\_\_

68. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "3"

The "ON" legends of lenses associated with Channels "1" and "3" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1" and "3" on the Load Test Board are lighted. \_\_\_\_\_

69. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "4".

The "4" channel is addressed as denoted by the lighted lens labeled "4". \_\_\_\_\_

70. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "5".

The "5" channel is addressed as denoted by the lighted lens labeled "5". \_\_\_\_\_

71. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "5".

The "ON" legends of lenses associated with Channels "1", "3", and "5" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", and "5" on the Load Test Board are lighted. \_\_\_\_\_

72. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "6".

The "6" channel is addressed as denoted by the lighted lens labeled "6". \_\_\_\_\_

73. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "7".

The "7" channel is addressed as denoted by the lighted lens labeled "7". \_\_\_\_\_

74. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "7".

The "ON" legends of lenses associated with Channels "1", "3", "5", and "7" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "5" and "7" on the Load Test Board are lighted. \_\_\_\_\_

75. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "8".

The "8" channel is addressed as denoted by the lighted lens labeled "8". \_\_\_\_\_

76. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "9".

The "9" channel is addressed as denoted by the lighted lens labeled "9". \_\_\_\_\_

77. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "9".

The "ON" legends of lenses associated with Channels "1", "3", "5", "7", and "9" are visible and those lenses are lighted.

The load lamps labeled "1", "3", "5", "7", and "9" on the Load Test Board are lighted. \_\_\_\_\_

78. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "10".

The "10" channel is addressed as denoted by the lighted lens labeled "10". \_\_\_\_\_

79. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "1".

The "1" channel is addressed as denoted by the lighted lens labeled "1". \_\_\_\_\_

80. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "1".

The "ON" legends of lenses associated with Channels "3", "5", "7", and "9" are lighted. \_\_\_\_\_

The load lamps labeled "3", "5", "7", and "9" on the Load Test Board are lighted.

81. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "2".

The "2" channel is addressed as denoted by the lighted lens labeled "2". \_\_\_\_\_

82. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "2".

The "ON" legends of lenses associated with Channels "2", "3", "5", "7", and "9" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "2", "3", "5", "7" and "9" on the Load Test Board are lighted. \_\_\_\_\_

83. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "3".

The "3" channel is addressed as denoted by the lighted lens labeled "3". \_\_\_\_\_

84. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "3".

The "ON" legends of lenses associated with Channels "2", "5", "7", and "9" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "2", "5", "7", and "9" on the Load Test Board are lighted. \_\_\_\_\_

85. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "4".

The "4" channel is addressed as denoted by the lighted lens labeled "4". \_\_\_\_\_

86. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "4".

The "ON" legends of lenses associated with Channels "2", "4", "5", "7", and "9" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "2", "4", "5", "7" and "9" on the Load Test Board are lighted. \_\_\_\_\_

87. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "5".

The "5" channel is addressed as denoted by the lighted lens labeled "5". \_\_\_\_\_

88. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "5".

The "ON" legends of lenses associated with Channels "2", "4", "7" and "9" are visible and those lenses are lighted.

The load lamps labeled "2", "4", "7" and "9" on the Load Test Board are lighted. \_\_\_\_\_

89. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "6". \_\_\_\_\_

The "6" channel is addressed as denoted by the lighted lens labeled "6". \_\_\_\_\_

90. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "6".

The "ON" legends of lenses associated with Channels "2", "4", "6", "7", and "9" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "2", "4", "6", "7", and "9" on the Load Test Board are lighted. \_\_\_\_\_

91. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "7".

The "7" channel is addressed as denoted by the lighted lens labeled "7". \_\_\_\_\_

92. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "7".

The "ON" legends of lenses associated with Channels "2", "4", "6" and "9" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "2", "4", "6" and "9" on the Load Test Board are lighted.

93. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "8".

The "8" channel is addressed as denoted by the lighted lens labeled "8". \_\_\_\_\_

94. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "8".

The "ON" legends of lenses associated with Channels "2", "4", "6", "8" and "9" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "2", "4", "6", "8" and "9" on the Load Test Board are lighted. \_\_\_\_\_

95. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "9".

The "9" channel is addressed as denoted by the lighted lens labeled "9". \_\_\_\_\_

96. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "9".

The "ON" legends of lenses associated with Channels "2", "4", "6", and "8" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "2", "4", "6", and "8" on the Load Test Board are lighted. \_\_\_\_\_

97. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "10".
- The "10" channel is addressed as denoted by the lighted lens labeled "10". \_\_\_\_\_
98. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "10".
- The "ON" legends of lenses associated with Channels "2", "4", "6", "8", and "10" are visible and those lenses are lighted. \_\_\_\_\_
- The load lamps labeled "2", "4", "6", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_
99. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "1".
- The "1" channel is addressed as denoted by the lighted lens labeled "1". \_\_\_\_\_
100. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "1".
- The "ON" legends of lenses associated with Channels "1", "2", "4", "6", "8" and "10" are visible and those lenses are lighted. \_\_\_\_\_
- The load lamps labeled "1", "2", "4", "6", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_
101. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "2".
- The "2" channel is addressed as denoted by the lighted lens labeled "2". \_\_\_\_\_
102. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "2".
- The "ON" legends of lenses associated with Channels "1", "4", "6", "8", and "10" are visible and those lenses are lighted. \_\_\_\_\_
- The load lamps labeled "1", "4", "6", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_



103. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "3".

The "3" channel is addressed as denoted by the lighted lens labeled "3". \_\_\_\_\_

104. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "3".

The "ON" legends of lenses associated with Channels "1", "3", "4", "6", "8", and "10" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "4", "6", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_

105. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "4".

The "4" channel is addressed as denoted by the lighted lens labeled "4". \_\_\_\_\_

106. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "4".

The "ON" legends of lenses associated with Channels "1", "3", "6", "8", and "10" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "6", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_

107. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "5".

The "5" channel is addressed as denoted by the lighted lens labeled "5". \_\_\_\_\_

108. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "5".

The "ON" legends of lenses associated with Channels "1", "3", "5", "6", "8" and "10" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "5", "6", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_

109. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "6".

The "6" channel is addressed as denoted by the lighted lens labeled "6". \_\_\_\_\_

110. Activate the patient "POWER" switch to switch power "off" to the electrical load in channel "6".

The "ON" legends of lenses associated with Channels "1", "3", "5", "8", and "10" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "5", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_

111. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "7".

The "7" channel is addressed as denoted by the lighted lens labeled "7". \_\_\_\_\_

112. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "7".

The "ON" legends of lenses associated with Channels "1", "3", "5", "7", "8" and "10" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "5", "7", "8", and "10" on the Load Test Board are lighted. \_\_\_\_\_

113. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "8".

The "8" channel is addressed as denoted by the lighted lens labeled "8". \_\_\_\_\_

114. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "8".

The "ON" legends of lenses associated with Channels "1", "3", "5", "7", and "10" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "5", "7", and "10" on the Load Test Board are lighted. \_\_\_\_\_

115. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "9".

The "9" channel is addressed as denoted by the lighted lens labeled "9". \_\_\_\_\_

116. Activate the patient "POWER" switch to switch power "ON" to the electrical load in Channel "9".

The "ON" legends of lenses associated with Channels "1", "3", "5", "7", "9", and "10" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "5", "7", "9", and "10" on the Load Test Board are lighted. \_\_\_\_\_

117. Activate the patient "ADDRESS" switch to acquire control of power supplied to the electrical load in Channel "10".

The "10" channel is addressed as denoted by the lighted lens labeled "10". \_\_\_\_\_

118. Activate the patient "POWER" switch to switch power "off" to the electrical load in Channel "10".

The "ON" legends of lenses associated with Channels "1", "3", "5", "7", and "9" are visible and those lenses are lighted. \_\_\_\_\_

The load lamps labeled "1", "3", "5", "7", and "9" on the Load Test Board are lighted. \_\_\_\_\_

119. Activate the patient "DIRECTION" switch to change the addressing sequence to a "COUNT DOWN" mode.

The "COUNT DOWN" legend is visible. \_\_\_\_\_

120. Depress the "CLEAR" push button on the front panel of the Patient Assist Device.

The "CLEAR" lens is momentarily lighted when the push button is initially depressed. \_\_\_\_\_

The "COUNT UP" legend is visible. \_\_\_\_\_

The "1" channel is addressed as denoted by the lighted lens with legend "1". \_\_\_\_\_

All "ON" legends directly under numerically labeled lenses are hidden. \_\_\_\_\_

No load lamps on the Load Test Board are lighted. \_\_\_\_\_

121. Depress "POWER" push button to switch "off" DC power to the logic section and indicator lamps of the Patient Assist Device.

The "ON" legend located under the "POWER" legend is hidden. \_\_\_\_\_

No indicator lenses are lighted on the front panel of the unit. \_\_\_\_\_

No load lamps on the Load Test Board are lighted. \_\_\_\_\_

## SUMMARY

The test procedure presented in this document completely tests the functioning of the Patient Assist Device. All modes of operation are included in the test.

Patient activated switches may be chosen for use with this device as desired. These switches, however, must be single-pole, single-throw, momentarily-on switches.