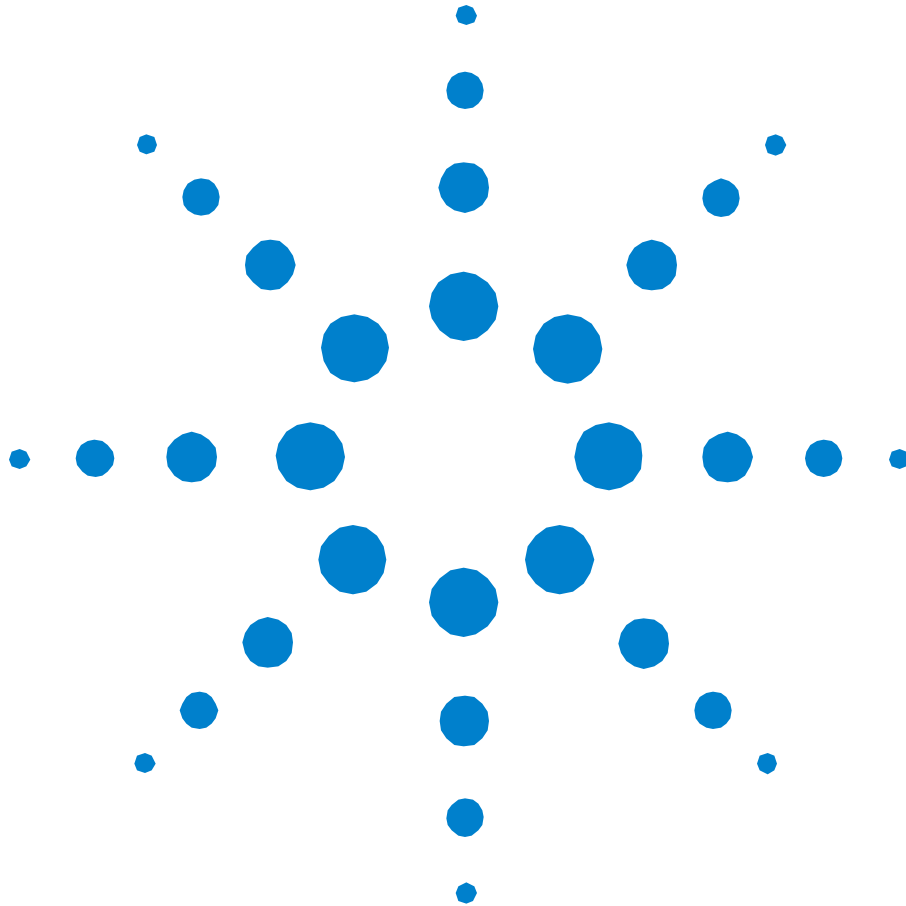


# Agilent 70612B K18 Switch Matrix

Hardware Reference Manual



**Agilent Technologies**



COPYRIGHT © 2000 AGILENT TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

NO PART OF THIS DOCUMENT MAY BE REPRODUCED IN ANY FORM OR BY ANY MEANS (INCLUDING ELECTRONIC STORAGE AND RETRIEVAL OR TRANSLATION INTO A FOREIGN LANGUAGE) WITHOUT PRIOR AGREEMENT AND WRITTEN CONSENT OF AGILENT TECHNOLOGIES, INC., AS GOVERNED BY UNITED STATES AND INTERNATIONAL COPYRIGHT LAWS.

PART NUMBER: 70612-92042  
PRINTED IN USA  
NOVEMBER 2000  
EDITION 2.0

## Notices

### Warranty

The material contained in this document is subject to change without notice. Agilent Technologies makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

### Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.

For assistance, call your nearest Agilent Technologies Sales and Service Office (see [Table 2](#) on page vii).

---

**WARNING:** A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

---

---

**CAUTION:** A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

---

## In this manual...

### Chapter 1 **General Information**

- Description
- Specifications
- Switch Drive Information

### Chapter 2 **Service**

- Service Information
- Replaceable Parts Information
- Accessory Information
- Schematics and Diagrams



## Safety summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies, Inc. assumes no liability for the customer's failure to comply with these requirements.

### General

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

All light emitting diodes (LEDs) used in this product are Class 1 LEDs as per IEC 60825-1.

---

**WARNING: DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE**  
Do not operate the instrument in the presence of flammable gases or flames.

---

---

**WARNING: DO NOT REMOVE THE INSTRUMENT COVER**  
Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified service personnel. Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

---

### Environmental conditions

Unless otherwise noted in the specifications, this instrument or system is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

### Before applying power

Verify that the product is set to match the available line voltage, the correct fuse is installed, and all safety precautions are taken. Note the instrument's external markings described in [“Safety symbols and instrument markings”](#) on page v.



## Ground the instrument

To minimize shock hazard, the instrument chassis and cover must be connected to an electrical protective earth ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

## Fuses










Use only fuses with the required rated current, voltage, and specified type (normal blow, time delay). Do not use repaired fuses or short-circuited fuse holders. To do so could cause a shock or fire hazard.

## Safety symbols and instrument markings




Symbols and markings in manuals and on instruments alert you to potential risks, provide information about conditions, and comply with international regulations.

[Table 1](#) defines the symbols and markings you may find in a manual or on an instrument.

**Table 1** Safety symbols and instrument markings

Safety symbols	
	Warning: risk of electric shock.
	Warning: hot surface
	Caution: refer to accompanying documents.
	Laser radiation symbol: marked on products that have a laser output.
	Alternating current.
	Both direct and alternating current.
	Three-phase alternating current.
	Earth (ground) terminal
	Protective earth (ground) terminal

**Table 1** Safety symbols and instrument markings (continued)

Safety symbols	
	Frame or chassis terminal
	Terminal is at earth potential. Used for measurement and control circuits designed to be operated with one terminal at earth potential.
	Terminal for neutral conductor on permanently installed equipment.
	Terminal for line conductor on permanently installed equipment.
	Standby (supply); units with this symbol are not completely disconnected from ac mains when this switch is off. To completely disconnect the unit from ac mains, either disconnect the power cord, or have a qualified electrician install an external switch.
Instrument markings	
	The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
	The CSA mark is a registered trademark of the Canadian Standards Association.
 N10149	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework regulations under the terms of the Radio Communications Act of 1992.
ISM1-A	This text indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPER 11, Clause 4).



# Service and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Agilent Technologies Service Center.

## Agilent on the Web

You can find information about technical and professional services, product support, and equipment repair and service on the Web:

<http://www.agilent.com/contacts/English/noscript.html>

Double-click the link to **Test & Measurement**. Select your country from the drop-down menus. The Web page that appears next has contact information specific for your country.

## Agilent by Phone

If you do not have access to the Internet, call one of the numbers in [Table 2](#).

**Table 2** Agilent Call Centers and Regional Headquarters

<b>United States and Canada:</b>	Test and Measurement Call Center (800) 452 4844 (toll-free in US)
<b>Europe:</b>	(41 22) 780 8111
<b>Japan:</b>	Measurement Assistance Center (81) 0426 56 7832
<b>Latin America:</b>	305 269 7548
<b>Asia-Pacific:</b>	(85 22) 599 7777





# Contents

## 1 General Information

Description 1-2

    This Manual 1-2

    Serialized Test Data 1-2

    Year 2000 Compliance 1-2

Specifications 1-3

    Table 1-1. 70612B K18 Electrical Specifications 1-3

    Table 1-2. 70612B K18 Mechanical and Environmental Specifications 1-3

Switch Drive Information 1-4

    Table 1-3. 70612B K18 Switch Drive Information 1-4

## 2 Service

Service Information 2-2

Replaceable Parts Information 2-3

    Table 2-1. 70612B K18 Replaceable Parts 2-3

Accessory Information 2-5

    Table 2-2. 70612B K18 Accessories 2-5

Schematics and Diagrams 2-6

    Figure 2-1. 70612B K18 DC Interconnect Assembly 2-7

    Figure 2-2. 70612B K18 RF Schematic 2-8

    Figure 2-3. 70612B K18 Front Panel Diagram 2-9

    Figure 2-4. 70612B K18 Rear Panel Diagram 2-10

    Figure 2-5. 70612B K18 Switch Drive Diagram (board A2) 2-11

    Figure 2-6. 70612B K18 Component Layout Diagram 2-13







# 1

## General Information

- [Description](#), page 1-2
- [This Manual](#), page 1-2
- [Serialized Test Data](#), page 1-2
- [Year 2000 Compliance](#), page 1-2
- [Specifications](#), page 1-3
- [Switch Drive Information](#), page 1-4

## Description

### This Manual

---

**NOTE:** This documentation supports a product that previously shipped under the Hewlett-Packard company brand name. The brand name has now been changed to Agilent Technologies. The two products are functionally identical, only our name has changed. The document still includes references to Hewlett-Packard products, some of which have been transitioned to Agilent Technologies.

---

The Agilent 70612B K18 microwave filter unit Type 2, is a microwave switch matrix which has one input (J1), and one output (J2). The input (1 to 20 GHz) is routed either to the AUX OUT port (J3), a through line (out J2), an internal 50  $\Omega$  load (AT1), or through one of three low frequency RF lowpass filters (F1 through F3), covering 17.6 to 49.8 MHz. An AUX INPUT (J4) can be routed to the output. The K18 has the switching capacity available for adding up to nine more filters.

This unit is housed in a 4/8 MMS module, with all connectors on the front. It consists of:

- Two SP4T switches
- Four SP6T switches
- Four 50  $\Omega$  loads
- Three filters

Switch drive is by means of GPIB commands to the MMS module which drives the internal controller (A1), and driver (A2) boards. A drive table showing how to select switch positions appears later in this manual. For detailed programming instructions, refer to the *Agilent 70611/12/13 Operating and Service Manual*.

### Serialized Test Data

Serialized test data is provided with each instrument, and is located behind the Serialized Test Data Tab.

### Year 2000 Compliance

This product does *no* date related processing. Date related standards *do not* apply to this type of product.



# Specifications

**Table 1-1** 70612B K18 Electrical Specifications

<b>Frequency range:</b>	<ul style="list-style-type: none"> <li>• 1.0 to 20.0 GHz through 17.6, 29.6</li> <li>• 49.8 MHz low pass filter paths</li> </ul>
<b>Insertion loss:</b>	<ul style="list-style-type: none"> <li>• 5.0 dB or less for passbands</li> <li>• Flatness less than 1.5 dB</li> </ul>
<b>VSWR:</b>	<ul style="list-style-type: none"> <li>• 1.6:1 or less for passbands</li> </ul>
<b>Rejection at 1.2 Fc to 2.0 Fc:</b>	<ul style="list-style-type: none"> <li>• -90 dB</li> </ul>
<b>Power Consumption:</b>	<ul style="list-style-type: none"> <li>• Zero at steady state</li> </ul>

**Table 1-2** 70612B K18 Mechanical and Environmental Specifications \*

<b>Altitude:</b>	Up to 4,572 meters (15,000 feet)
<b>Temperature:</b>	0 °C to 55 °C (unless otherwise specified)
<b>Max relative humidity:</b>	80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C.
<b>Height:</b>	146.3 mm (5.75 in)
<b>Width:</b>	190.2 mm (7.5 in)
<b>Depth:</b>	472.1 mm (18.6 in)
<b>Weight:</b>	≈9.98 kg (20 lbs)

\* For indoor use only (unless otherwise specified).



## Switch Drive Information

**Table 1-3** 70612B K18 Switch Drive Information

70612B K18 Device	Switch Position	Switch Driver Board			
		Board	Command	Channel	Function
S1 and S2 Switch	2 to C	A2	Close	100	AUX
	3 to C	A2	Close	101	Thru
	5 to Cc	A2	Close	102	FL1 to FL3, loads
	6 to C	A2	Close	103	Spares, loads
S3 and S5 Switch	1 to C	A2	Close	104	FL1 (49.8 MHz)
	2 to C	A2	Close	105	FL2 (29.6 MHz)
	3 to C	A2	Close	106	FL3 (17.6 MHz)
	4 to C	A2	Close	107	NC
	5 to C	A2	Close	108	NC
	6 to C	A2	Close	109	50 $\Omega$ loads
S4 and S6 Switch	1 to C	A2	Close	112	NC
	2 to C	A2	Close	113	NC
	3 to C	A2	Close	114	NC
	4 to C	A2	Close	115	NC
	5 to C	A2	Close	116	NC
	6 to C	A2	Close	117	50 $\Omega$ loads

**NOTE:** “J” numbers on driver boards are numerically larger by one than channel numbers.

**CAUTION:** Channels 110, 111, 118 and 119 must not be used (due to drive current limits).





# 2

## Service

- [Service Information](#), page 2-2
- [Replaceable Parts Information](#), page 2-3
- [Accessory Information](#), page 2-5
- [Schematics and Diagrams](#), page 2-6

## Service Information

- If your instrument requires service, or if you need to remove or replace a component, contact your local Agilent sales and service office.
- Fasteners in the instrument have both metric and inch threads, with a mix of TORX and pozidrive heads.





## Replaceable Parts Information

**Table 2-1** 70612B K18 Replaceable Parts

Reference Designation	Part Number	Qty	Description
A1	70611-60001	1	Controller board
A1 U1	70611-80015	1	EPROM
A1 U2	70611-80016	1	EPROM
A2	87130-62065	1	Driver board
A2J1-A2J31	1252-2153	16	Connector, 4-pin, solder to backside of A2
A3	70611-60003	1	Status board
AT1-AT4	0960-0053	4	50 ohm termination
J1-J4	5062-6618	4	Connector, bulkhead, APC 3.5 (f) / SMA (f)
FL1	70612-82062	1	Low-pass filter
FL2	70612-82063	1	Low-pass filter
FL3	70612-82064	1	Low-pass filter
J6	70700-60001	1	Connector, 50-pin / cable to MMA (m/f)
S1-S2	87104-60001	2	Switch, 1 x 4, 26.5 GHz, STD
S3-S6	87106-60009	4	Switch, 1 x 6, 26.5 GHz, STD
W1-W2	70612-22858	1	RF cable, semirigid
W3-W4	70612-22859	2	RF cable, semirigid
W5	70612-22860	2	RF cable, semirigid
W6	70612-22887	1	RF cable, semirigid
W7	70612-22888	1	RF cable, semirigid
W8	70612-22889	1	RF cable, semirigid
W9	70612-22890	1	RF cable, semirigid
W10	70612-22883	1	RF cable, semirigid
W11	70612-22884	1	RF cable, semirigid
W12, W15	70612-22885	2	RF cable, semirigid
W13, W14	70612-22886	2	RF cable, semirigid
W16	70611-60006	1	Cable, A1 to A3
W17	70612-60002	1	Cable, A1 to A2
	0510-1244	1	Clip
	0900-0012	1	O-ring
	1460-2095	4	Spring



**Table 2-1** 70612B K18 Replaceable Parts (continued)

<b>Reference Designation</b>	<b>Part Number</b>	<b>Qty</b>	<b>Description</b>
	5001-5835	2	Bar connector
	5001-5840	1	Ground clip
	5022-0051	1	Latch screw
	70594-00003	1	Panel rear
	70611-22401	1	Front frame
	70611-22402	1	Base
	70611-22403	1	Rear frame
	70612-00020	2	Bracket, left
	70612-00021	2	Bracket, right
	70612-02027	1	Cover
	70612-02220	1	Deck
	70612-02222	1	Filter bracket, right
	70700-0004	1	Ferrite bracket
	70700-40002	2	PC board guide



## Accessory Information

**Table 2-2** 70612B K18 Accessories

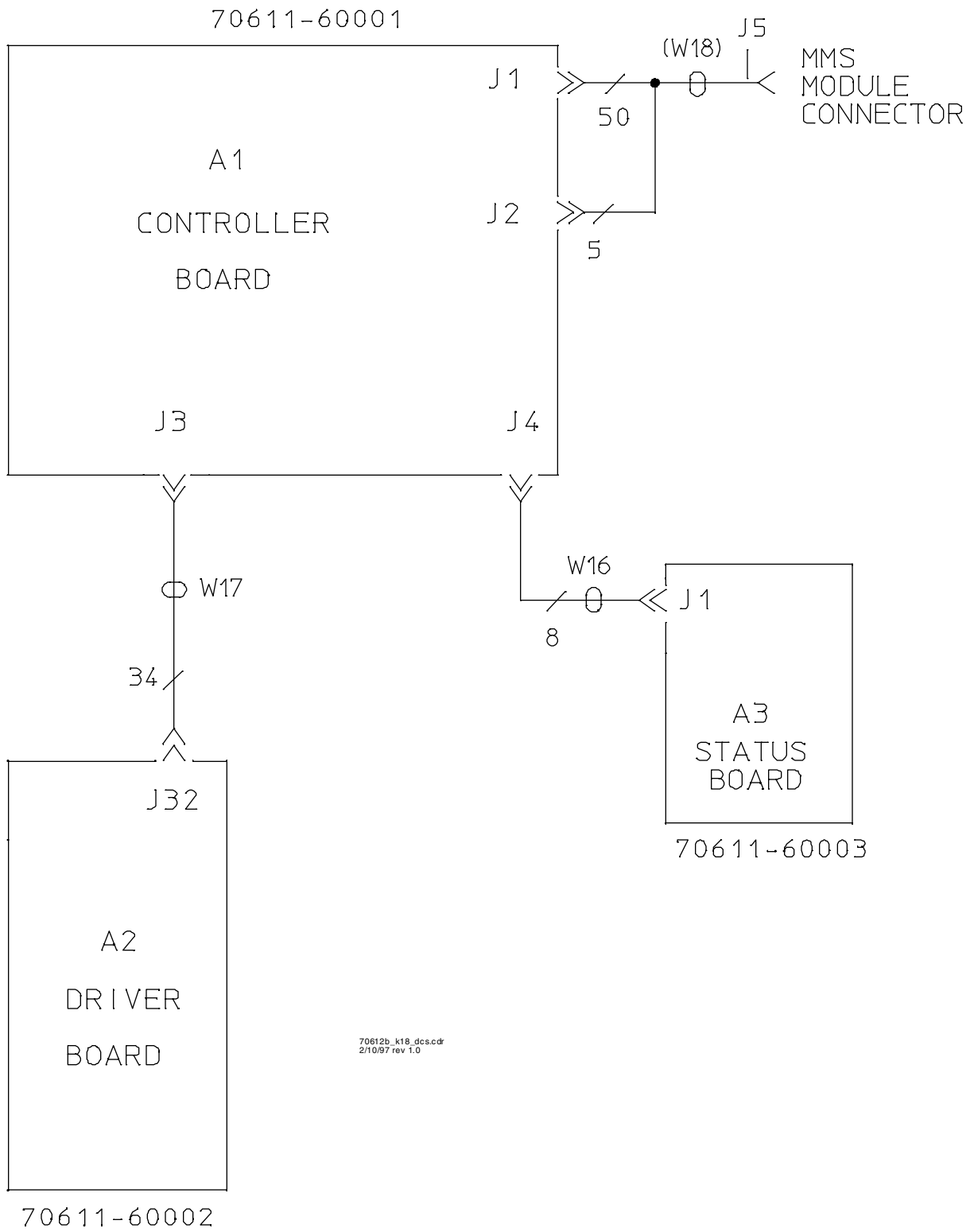
<b>Description</b>	<b>Part Number</b>
<i>70612 B K18 Hardware Reference Manual</i>	70612-92042
70612B K18 Hardware Reference CD-ROM	70612-90033
70611/12/13 Operating and Service Manual	70611-90015



## Schematics and Diagrams

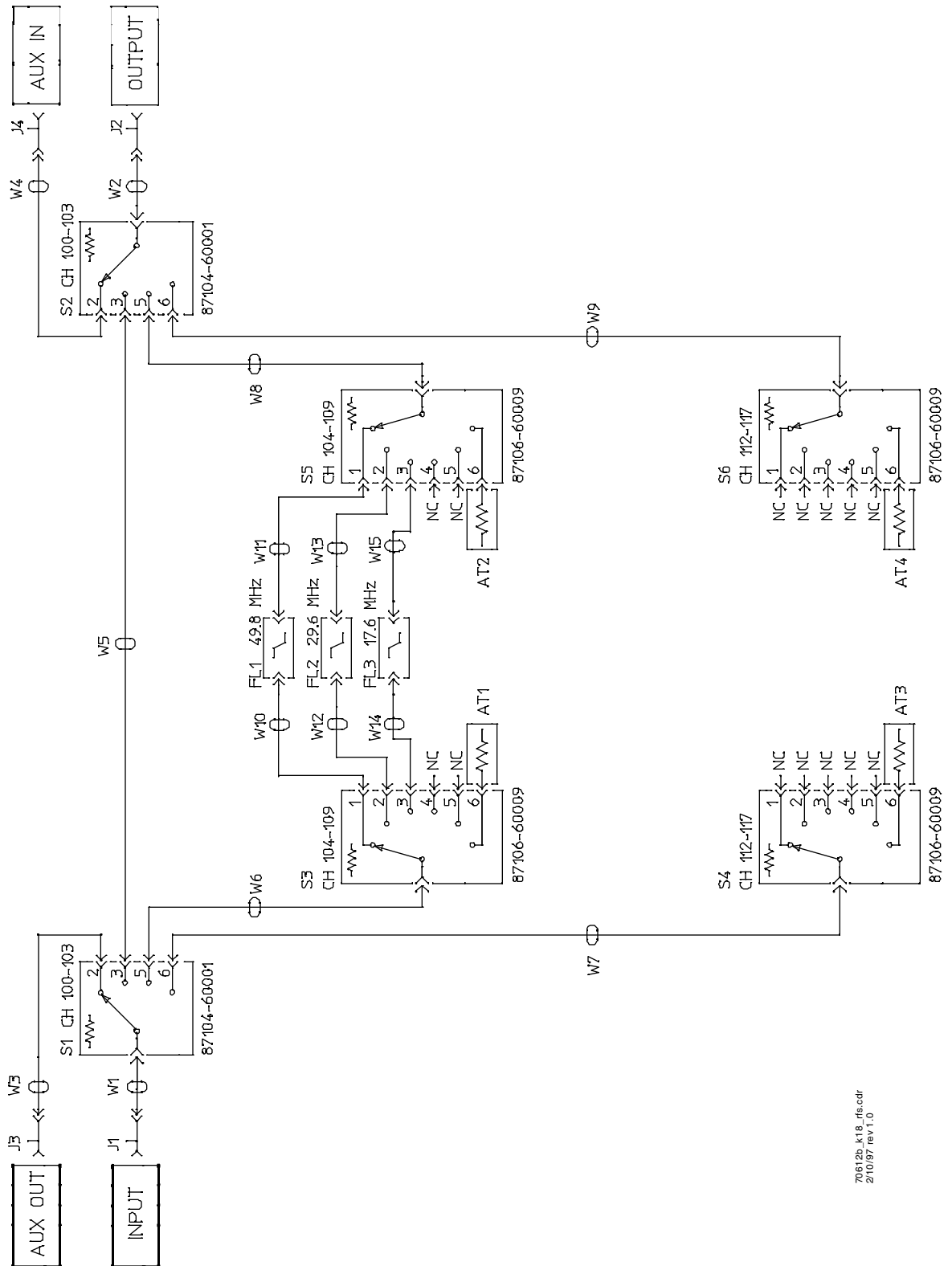
- [70612B K18 DC Interconnect Assembly](#)
- [70612B K18 RF Schematic](#)
- [70612B K18 Front Panel Diagram](#)
- [70612B K18 Rear Panel Diagram](#)
- [70612B K18 Switch Drive Diagram \(board A2\)](#)
- [70612B K18 Component Layout Diagram](#)





**Figure 2-1 70612B K18 DC Interconnect Assembly**





70612b\_k18\_rf.scd  
2/10/87 rev 1.0

Figure 2-2 70612B K18 RF Schematic



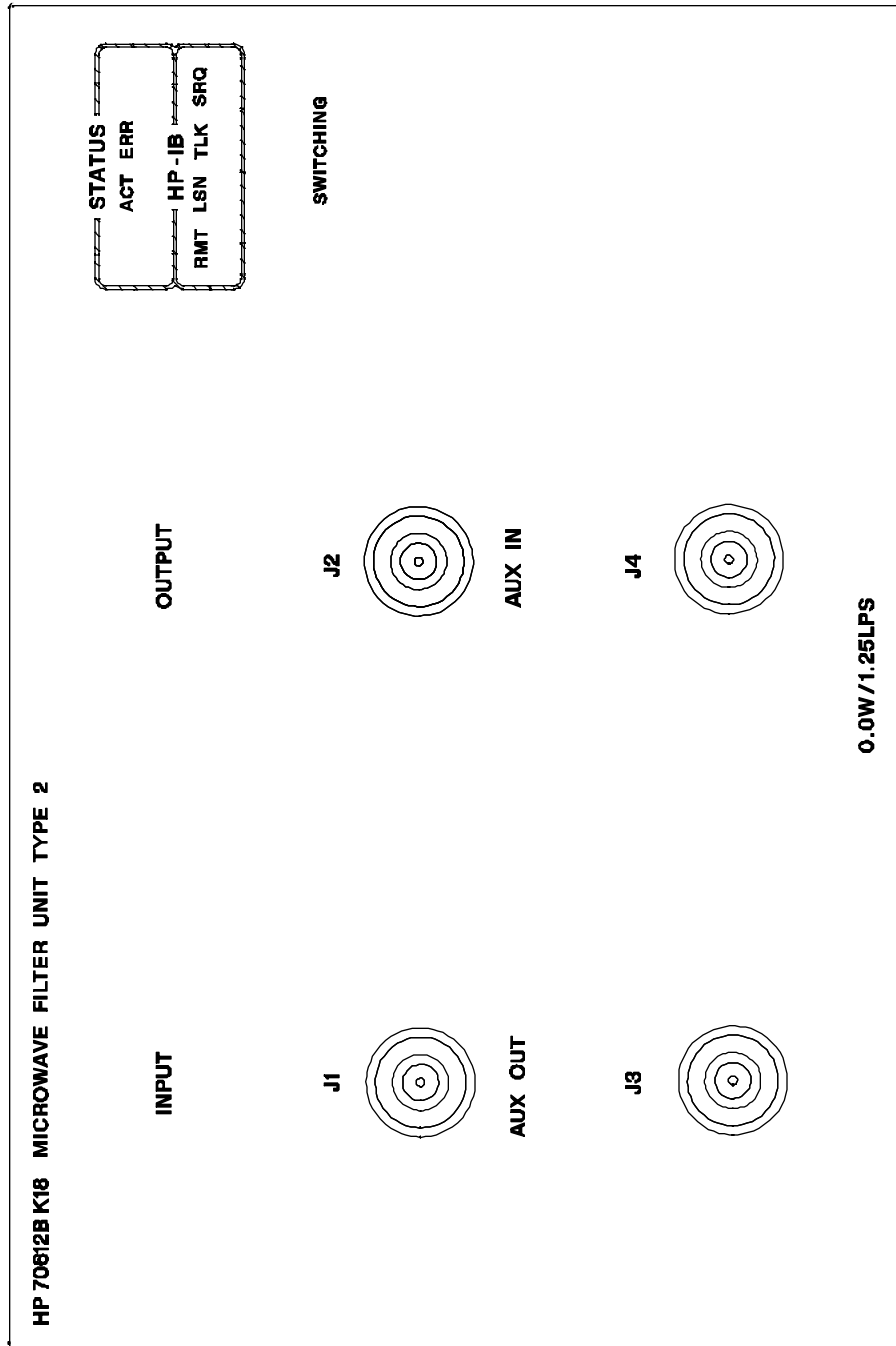
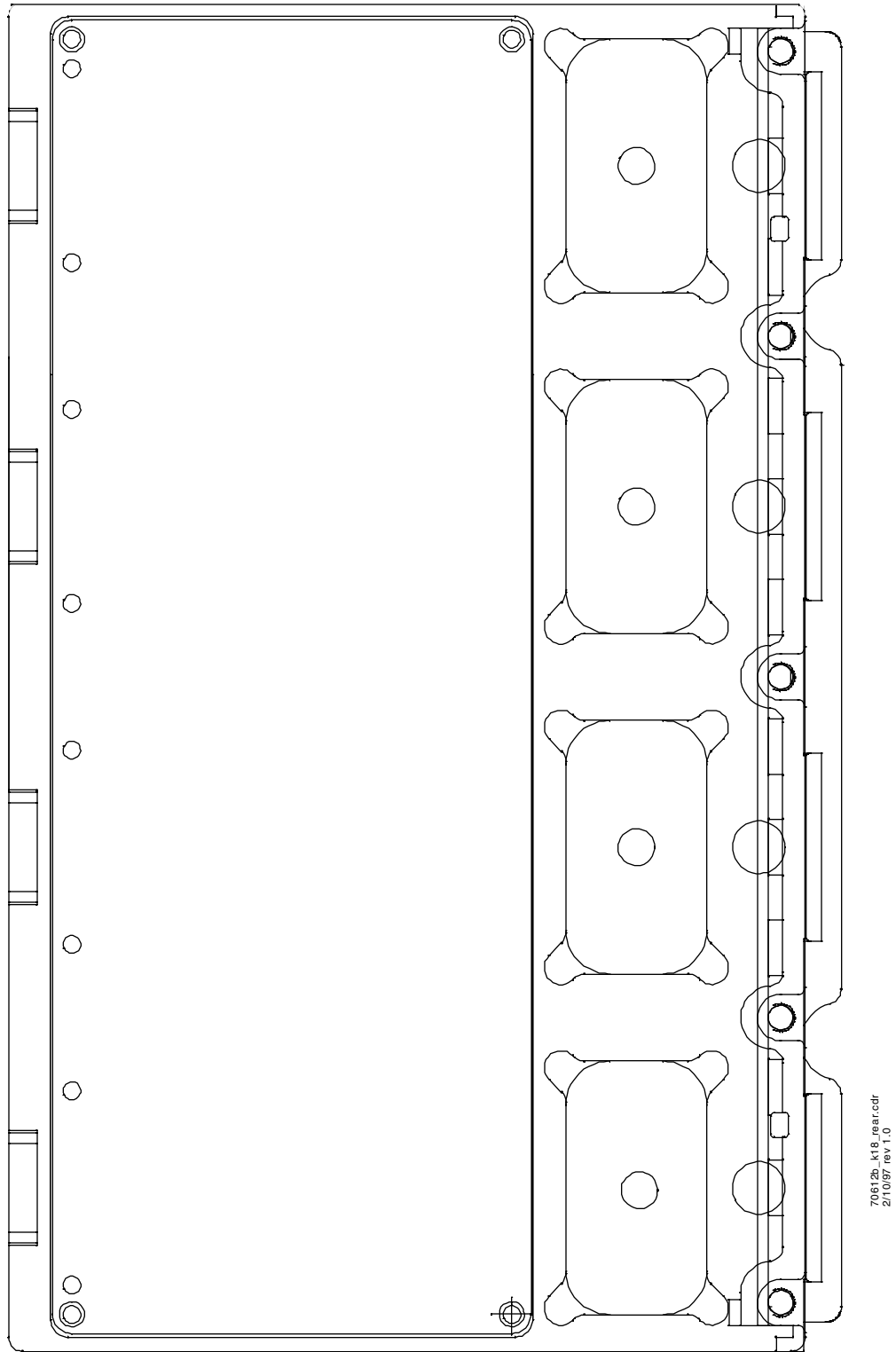


Figure 2-3 70612B K18 Front Panel Diagram



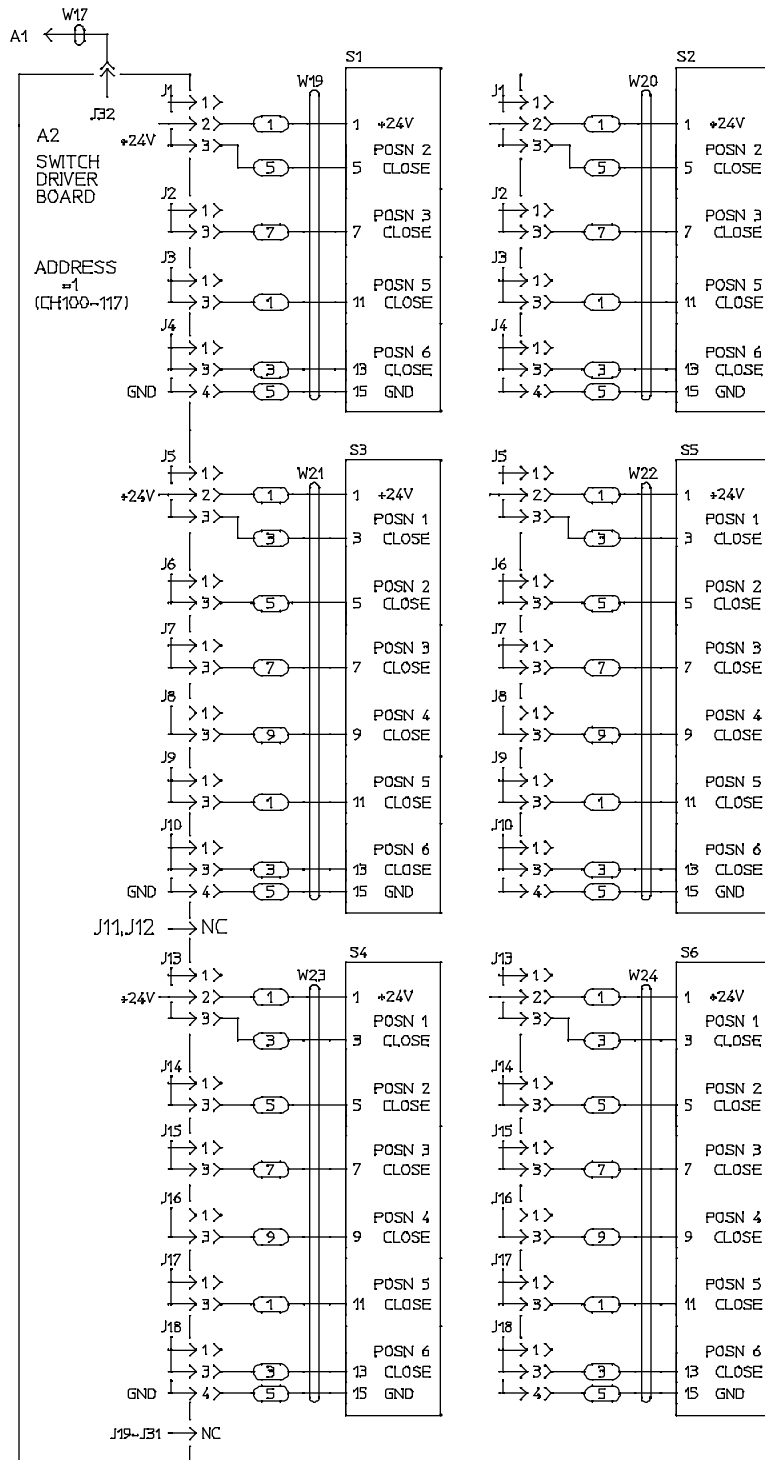


**Figure 2-4** 70612B K18 Rear Panel Diagram





Schematics and Diagrams



70612b\_k18\_sds.cdr  
4/2/97 rev 1.0

Figure 2-5 70612B K18 Switch Drive Diagram (board A2)





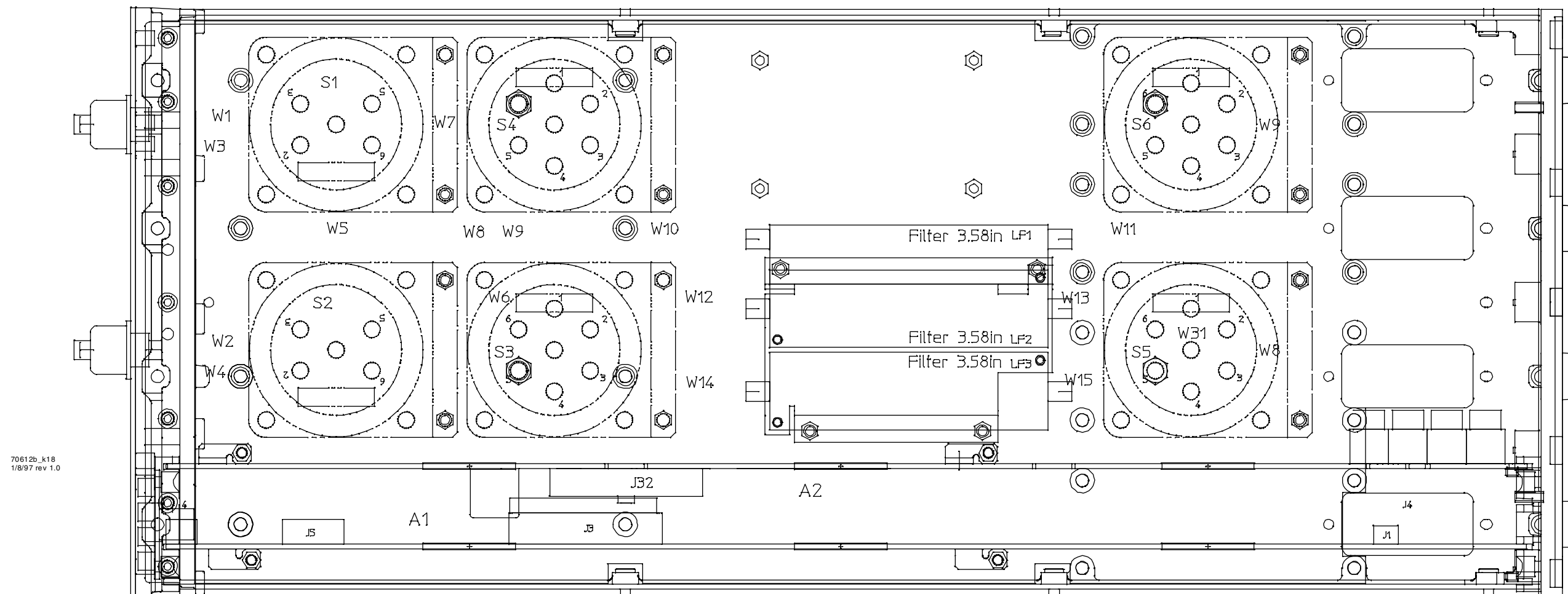


Figure 2-6 70612B K18 Component Layout Diagram



