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TECHNICAL MANUAL

for

FILTER PANEL

MODEL SFP-2



THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N. Y.

OTTAWA, CANADA

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NOTICE

THE CONTENTS AND INFORMATION CONTAINED IN THIS INSTRUCTION MANUAL IS PROPRIETARY TO THE TECHNICAL MATERIEL CORPORATION TO BE USED AS A GUIDE TO THE OPERATION AND MAINTENANCE OF THE EQUIPMENT FOR WHICH THE MANUAL IS ISSUED AND MAY NOT BE DUPLICATED EITHER IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER WITHOUT THE WRITTEN CONSENT OF THE TECHNICAL MATERIEL CORPORATION.



THE TECHNICAL MATERIEL CORPORATION

C O M M U N I C A T I O N S E N G I N E E R S

700 FENIMORE ROAD

MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes* furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use the same either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

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SECTION I

GENERAL DESCRIPTION

1-1. PHYSICAL DESCRIPTION

The Model SFP-2, Filter Panel is shown in figure 1-1. The SFP-2 is designed to be mounted on a standard 19" relay rack. The physical dimensions are shown in paragraph 1-3, Technical Specifications of SFP-2 and in figure 2-2. All controls necessary for operation of the SFP-2 are readily accessible on the front panel.

1-2. FUNCTIONAL DESCRIPTION

The Model SFP-2, FILTER PANEL, is an audio type dual channel bandpass filter incorporating two MARK and two SPACE filters. The MARK filters are centered at 2975 cps and the SPACE filters at 2125 cps. Each channel has a front panel switch (S101 for channel 1, S102 for channel 2) which permits the operator to switch the panel to the IN position, putting the filter in series with the signal, the OUT position, which bypasses the filter and feeds directly to the converter, or to the PANEL OUT position, which disconnects the audio FSK signal from either receiver 1 or receiver 2, allowing a comparison of the quality of either signal individually.

Facilities are provided by front panel phone jacks for monitoring the audio tones in both channels.

1-3. TECHNICAL SPECIFICATIONS OF SFP-2

INPUT IMPEDANCE: 600 ohms
OUTPUT IMPEDANCE: 600 ohms

INSERTION LOSS: Less than 7 db

BANDWIDTH: SPACE Filters:
Centered at 2125 cps.
Flat within 3 db to ± 100 cps down not less than 40 db at 340 cps.

MARK Filters:
Centered at 2975 cps.
Flat within 3 db to ± 125 cps down not less than 45 db at 475 cps.

OPERATING CONTROLS:

CHANNEL 1 switch
1. Panel Out
2. Filter Out
3. Filter In

CHANNEL 2 switch
1. Panel Out
2. Filter Out
3. Filter In

MONITORING:

Front panel phone jacks in each channel.

DIMENSIONS:

3-1/2" high x 19" wide x 7" deep.

COMPONENTS AND CONSTRUCTION:

All equipment is manufactured in accordance with JAN/MIL specifications wherever practicable.

SECTION II INSTALLATION

2-1. INITIAL INSPECTION

Each SFP-2 unit has been calibrated and tested at the factory before shipment. Upon arrival at the operating site, inspect the packing case and its contents immediately for possible equipment damage. Unpack the equipment carefully. Inspect all packing material for parts which may have been shipped as "loose items".

2-2. MECHANICAL INSTALLATION

The Model SFP-2 is equipped with a standard 19" rack panel for mounting on any suitable equipment

rack. For outline dimensional measurements, refer to figure 2-2.

2-3. INITIAL ADJUSTMENTS

Before any SFP-2 unit is shipped, it is thoroughly checked against the manufacturers specifications. Therefore, no initial adjustments are necessary other than those listed in the operation chart, Table 3-2.

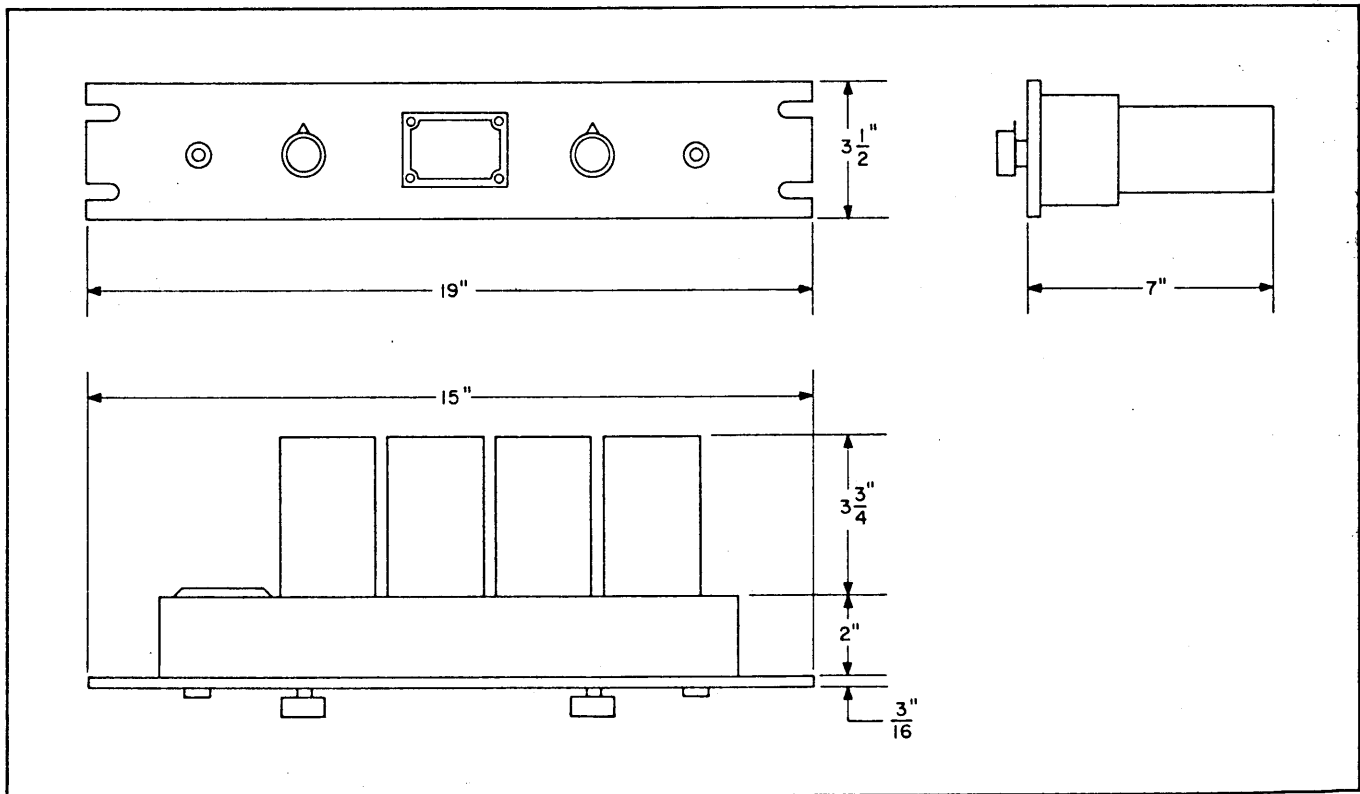


Figure 2-1. Outline Dimensional Drawing, Model SFP-2

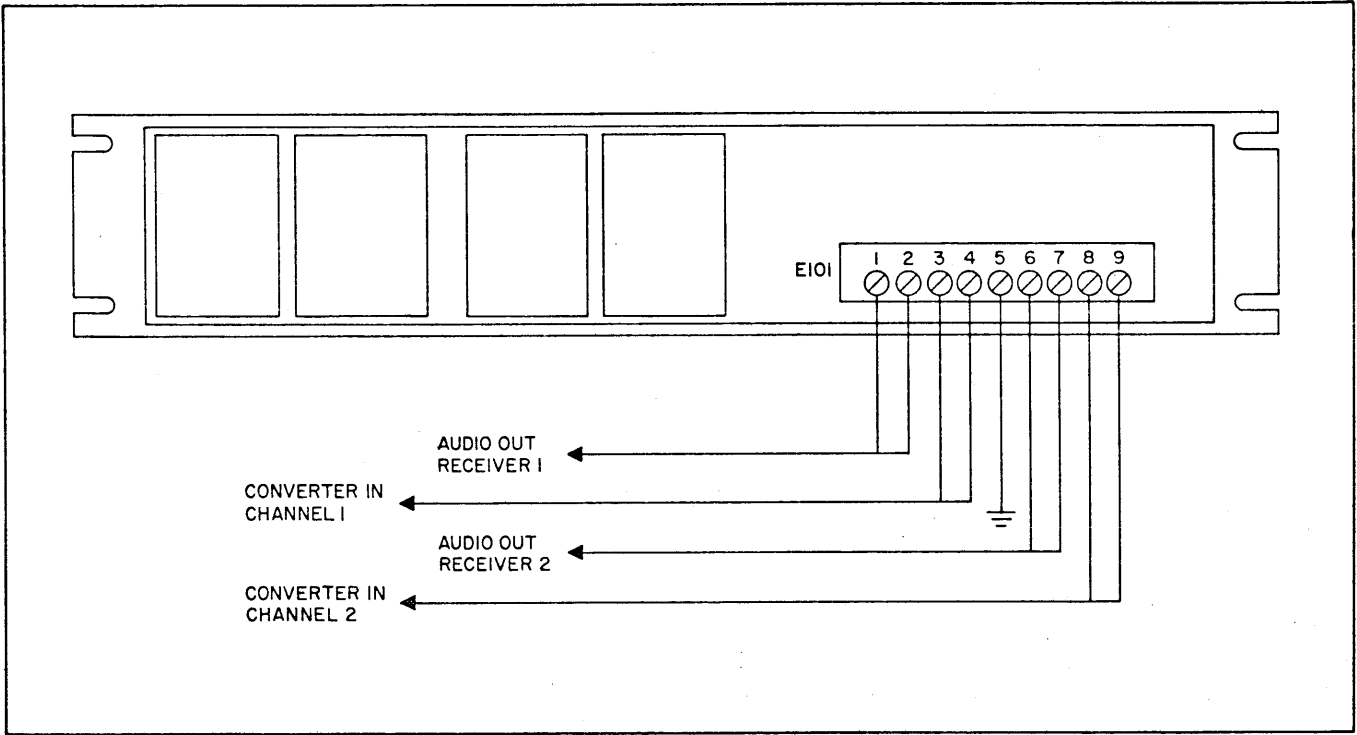


Figure 2-2. Interconnection Diagram, SFP-2

SECTION III OPERATOR'S SECTION

3-1. GENERAL

Although designed as an accessory to the TMC Model CFA, Frequency Shift Converter, the SFP-2 Filter Panel has widespread application to existing military converters such as the AN URA-8 and the AN URA-17 series. The use of the Model SFP-2 is recommended whenever teletype FSK converters are to be used on radio circuits where severe adjacent channel interference is encountered.

3-2. OPERATOR'S INSTRUCTIONS

The SFP-2 front panel controls are designed and situ-

ated for simplicity of operation. Table 3-1 provides equivalent control designations for the operating controls shown in figure 3-1. Table 3-2 is an operating chart to be used in conjunction with figure 3-1 and table 3-2.

3-3. OPERATOR'S MAINTENANCE

The operator should note the general settings of panel switches and proper connection of all interconnecting cables and plugs.

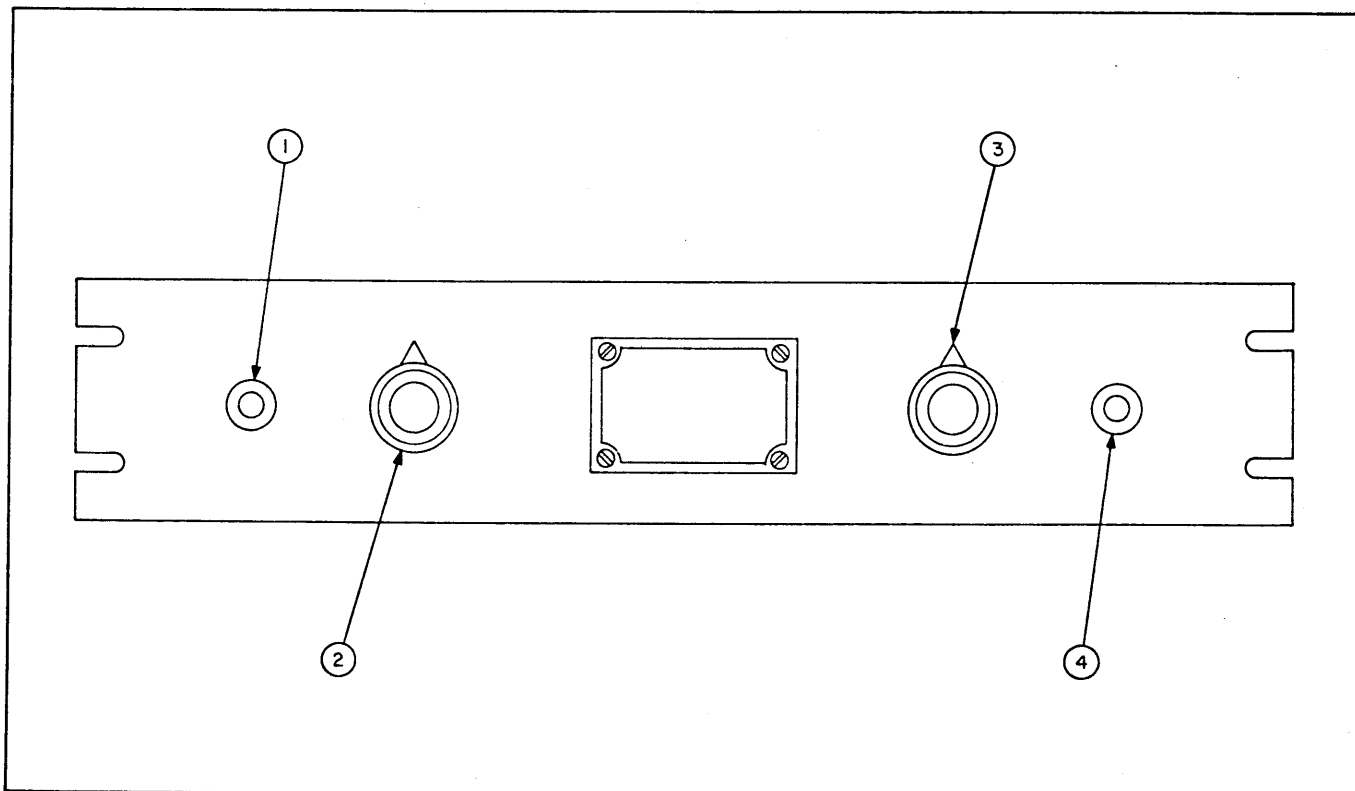


Figure 3-1. Panel View of SFP-2. Showing Operating Controls

TABLE 3-1. TABLE OF EQUIVALENT CONTROL DESIGNATIONS

DESIGNATION	PANEL DESIGNATION	COMPONENT REFERENCE DESIGNATION NO.
1	MONITOR, channel 1 phone jack.	J101
2	CHANNEL 1 - PANEL OUT, FILTER OUT, FILTER IN Selector knob control.	S101
3	MONITOR, channel 2 phone jack.	J102
4	CHANNEL 2 - PANEL OUT, FILTER OUT, FILTER IN selector knob control	S102

TABLE 3-2. SFP-2, OPERATING CHART

STEP	CONTROL	OPERATION	PURPOSE
1	CHANNEL 1 selector knob control (2)	PANEL OUT	Disconnects channel 1 intelligence from the SFP-2 unit.
		FILTER OUT	Permits channel 1 intelligence to bypass the SFP-2 filters.
		FILTER IN	Connects channel 1 intelligence to the SFP-2 filters.
2	CHANNEL 2	PANEL OUT	Disconnects channel 2 intelligence from the SFP-2 unit.
		FILTER OUT	Permits channel 2 intelligence to bypass the SFP-2 unit.
		FILTER IN	Connects channel 2 intelligence to the SFP-2 filters.
3	MONITOR phone jack (1)	Connect earphones	Monitor channel 1 audio output.
4	MONITOR phone jack (3)	Connect earphones	Monitor channel 2 audio output.

SECTION IV PRINCIPLES OF OPERATION

4-1. INTRODUCTION

The following text contains a brief description of the Model SFP-2. Filter Panel circuitry operation. The text is supported by a simplified block diagram, figure 4-1. The schematic diagram will be found in Section 8 of this manual.

4-2. SFP-2, FILTER PANEL

When the CHANNEL selector switch (S101 or S102) is set to the PANEL OUT position, the receiver intelligence is electrically disconnected from the SFP-2 unit, allowing the intelligence to be fed directly from the receiver (or receivers) to another terminal, or allowing comparison of the quality of each intelligence channel.

With the CHANNEL selector switch (S101 or S102) set to the FILTER OUT position, the receiver intelligence is fed, bypassing the unit filters, directly to the converter.

When the CHANNEL selector switch (S101 or S102) is set to the FILTER IN position, the receiver intelligence is fed directly to the input of the MARK and SPACE filters. Z101 and Z103 for channel 1 operation, Z102 and Z104 for channel 2 operation.

The SPACE filters used in the SFP-2 are centered at 2125 cps and are flat within 3 db to ± 100 cps down and not less than 40 db at 340 cps.

The MARK filters used in the SFP-2 are centered at 2975 cps and are flat within 3 db ± 125 cps down and not less than 45 db at 475 cps.

The filter output is also applied to the OUTPUT monitor jacks, J101 for channel 1 and J102 for channel 2. Figure 4-2 is a simplified schematic diagram showing one section (channel 1) of the SFP-2 Filter Panel.

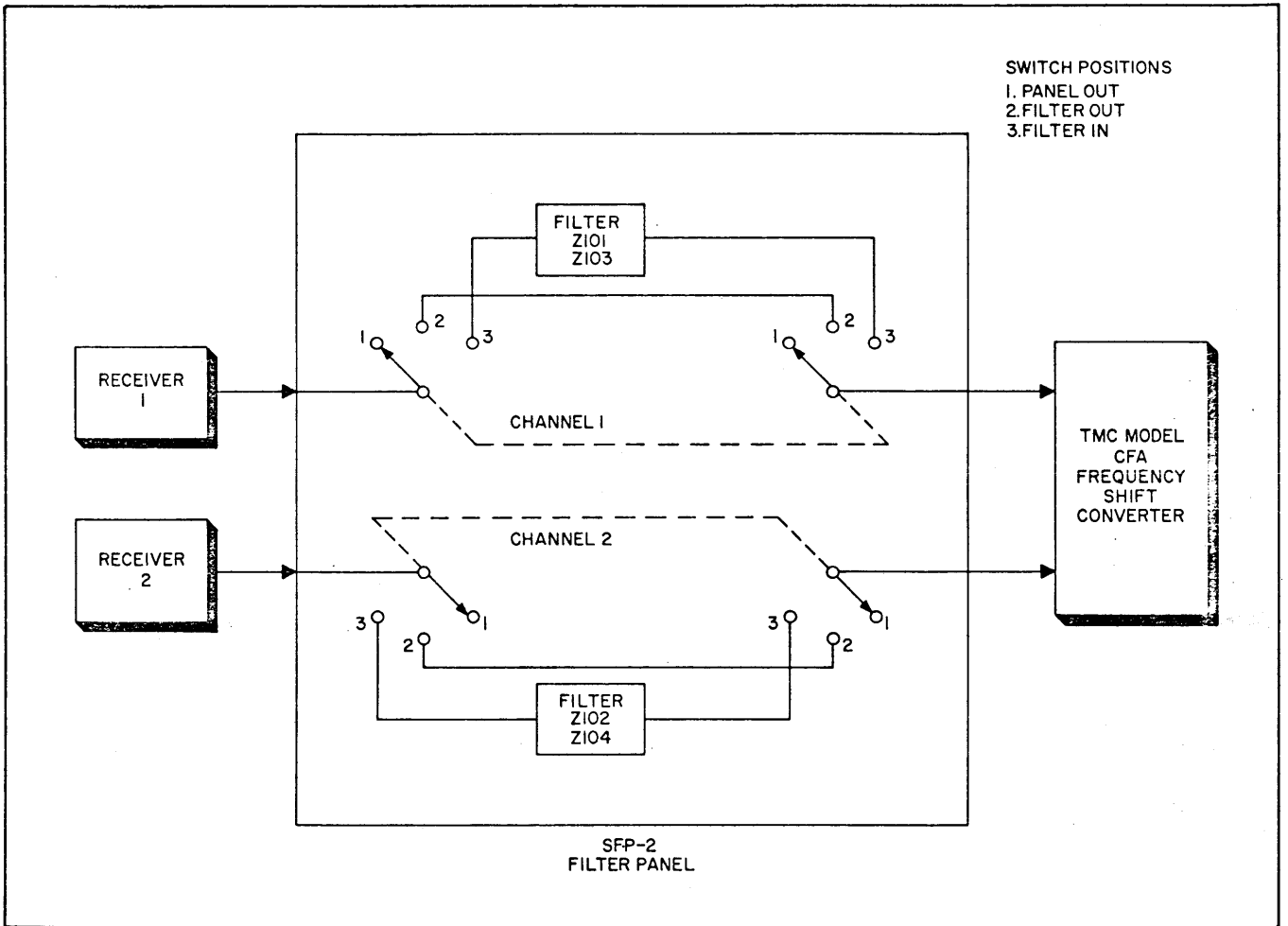


Figure 4-1. Simplified Block Diagram, Model SFP-2

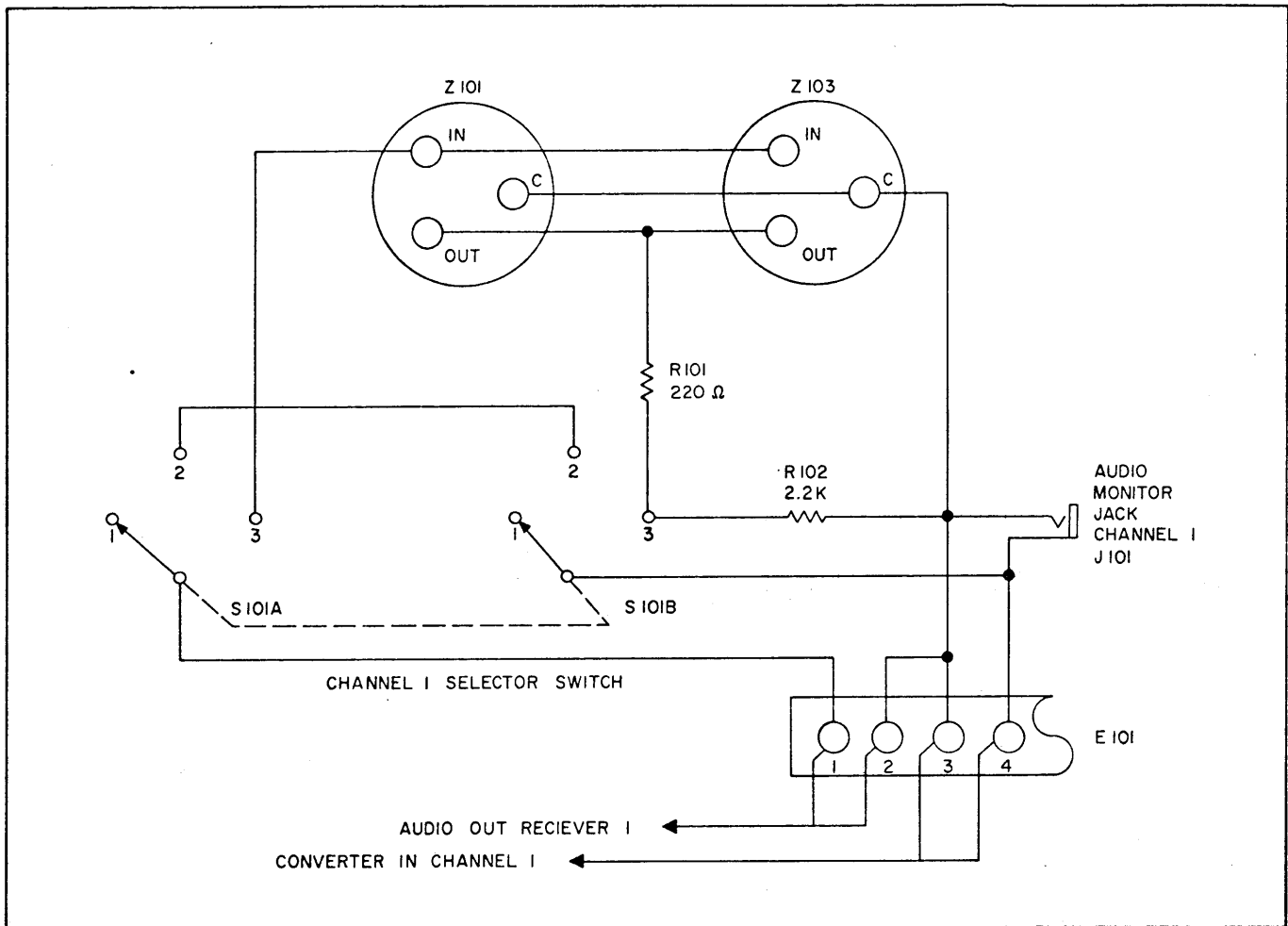


Figure 4-2. Simplified Schematic Diagram, SFP-2, Channel 1

SECTION V TROUBLESHOOTING

5-1. INTRODUCTION

This section contains instructions on how to analyze and locate various equipment malfunctions. The information necessary to remedy the malfunctions will be found in Section 6, Maintenance, of this manual.

The following aids to troubleshooting are provided:

- a. Schematic Diagram
- b. Resistance troubleshooting chart
- c. Simplified schematic diagram
- d. Troubleshooting techniques

5-2. TROUBLESHOOTING TECHNIQUES

When a piece of equipment has been working satisfactorily and suddenly fails, the cause of failure may be apparent either because of circumstances occurring at the time of failure or because of symptoms analogous to past failures.

a. **GENERAL CONSIDERATIONS.** The first step in troubleshooting is to ascertain that all interconnecting cables are properly terminated. Upon removal of the chassis cover, investigate for charring, corrosion, excessive heat, dirt, dampness, etc.

b. **RESISTANCE TROUBLESHOOTING CHART.** The resistance troubleshooting chart included in this section has been prepared to aid the technician in locating any equipment failure. Due to the simplicity of circuitry design, it can be noted that resistance troubleshooting is all that may be required to locate the cause of equipment failure.

The Resistance Troubleshooting Chart, Table 5-1, lists the normal resistance measurements taken at the pin connections shown. The REMEDY column lists the obvious circuit checks, and may be enhanced by the technician's individual troubleshooting technique.

TABLE 5-1. RESISTANCE TROUBLESHOOTING CHART

STEP	MEASURE RESISTANCE		CHANNEL SWITCH POSITIONS NORMAL READINGS			REMEDY
	FROM	TO	PANEL OUT	FILTER OUT	FILTER IN	
1	PIN 5	ground	0 ohms	0 ohms	0 ohms	Check for loose or broken ground connection on PIN 5 of E101.
2	PIN 1	PIN 4	infinity			Check for shorted arm contacts of selector switch S101.
				0 ohms		Check for loose or broken wire connection between PIN 2 of section A to PIN 2 of section B, selector switch S101. Check connection between arm of S101B to PIN 4 of E101.
					infinity	If a reading is obtained, check for defective filters Z101 and Z103.
3	PIN 2	PIN 3	0 ohms	0 ohms	0 ohms	If no indication is obtained, check for loose or broken wire connection between PIN 2 and PIN 3 of E101.

TABLE 5-1. RESISTANCE TROUBLESHOOTING CHART (Cont'd)

STEP	MEASURE RESISTANCE		CHANNEL SWITCH POSITIONS			REMEDY
			NORMAL READINGS			
	FROM	TO	PANEL OUT	FILTER OUT	FILTER IN	
4	PIN 2	PIN 4	infinity			Check for shorted J101 contacts.
				infinity		Check for shorted J101 contacts.
					2.2 K ohms	If normal indication is not obtained, check condition and connection of R102.
5	PIN 3	PIN 4	infinity			Perform step 4.
				infinity		Perform step 4.
					2.2 K ohms	Perform step 4.
6	PIN 6	PIN 9	infinity			Perform step 2.
				0 ohms		Check for loose or broken wire connection between PIN 2 of section A to PIN 2 of section B of selector switch S102. Check connection between arm of S102B to PIN 9 of E101.
					infinity	If a reading is obtained, check for defective filters Z102 and Z104.
7	PIN 7	PIN 8	0 ohms	0 ohms	0 ohms	If no indication is obtained, check for loose or broken wire connection between PIN 7 and PIN 8 of E101.
8	PIN 7	PIN 9	infinity			Check for shorted J102 contacts.
				infinity		Check for shorted J102 contacts.
					2.2 K ohms	If normal indication is not obtained, check condition and connection of R104.
9	PIN 8	PIN 9	infinity			Perform step 8.
				infinity		Perform step 8.
					2.2 K ohms	Perform step 8.

SECTION VI MAINTENANCE

6-1. INTRODUCTION

The maintenance data contained in this section falls into two categories; preventive maintenance and corrective maintenance.

The purpose of preventive maintenance is to prevent equipment breakdown by performing periodic checks and those procedures which maintain normal equipment operation.

Corrective maintenance may be considered as information useful in locating and diagnosing equipment troubles and maladjustments. The diagnostic type of information is presented under troubleshooting (Section 5); remedial type of information is presented in this section.

6-2. PREVENTIVE MAINTENANCE

In order to prevent actual failure of the SFP-2, it is suggested that a schedule of preventive maintenance be set up and adhered to. At periodic intervals (at least every six months) the SFP-2 should be removed from the equipment rack for cleaning and inspection.

The chassis wiring should be inspected for dirt, corrosion, charring, discoloring or grease. Dust may be removed with any soft brush or a vacuum cleaner, if one is available. Remove dirt or grease from electrical parts with trichlorethylene or ethylenedichloride. Remove dirt or grease from other parts with any good dry cleaning fluid.

WARNING

Carbon tetrachloride may be used only if great care is exercised because it is a toxic substance. Do not inhale its fumes. Avoid prolonged contact with skin.

6-3. CORRECTIVE MAINTENANCE

When performing corrective maintenance, the technician should have at hand all the tools and diagrams necessary to complete his task in the minimum of time. All components being replaced should be of the same type or value as that being removed. Refer to the parts list (Section 7) for exact replacement parts value and type.

SECTION VII PARTS LIST

SYM.	DESCRIPTION	FUNCTION	TMC DWG OR PART NO.
E101	BOARD, terminal: general purpose barrier.	Input - Output Strip	TM-100-9
J101	JACK, telephone: tip and sleeve; bushing mounted; fits plug PJ-055.	Monitor	JJ-034
J102	Same as J101.	Monitor	
R101	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$; 1/2 watt.	Imp. Matching	RC20GF221K
R102	RESISTOR, fixed: composition; 2200 ohms; $\pm 10\%$; 1/2 watt.	Monitor Dropping	RC20GF222K
R103	Same as R101.		
R104	Same as R102.		
S101	SWITCH, rotary; one section, three position, two pole.	Channel 1	SW-121
S102	Same as S101.	Channel 2	
Z101	FILTER, bandpass: 2975 cps, center frequency.	Channel 1	FX-101
Z102	Same as Z101.	Channel 2	
Z103	FILTER, bandpass: 2125 cps, center frequency.	Channel 1	FX-132
Z104	Same as Z103.	Channel 2	

**SECTION VIII
SCHEMATIC DIAGRAMS**

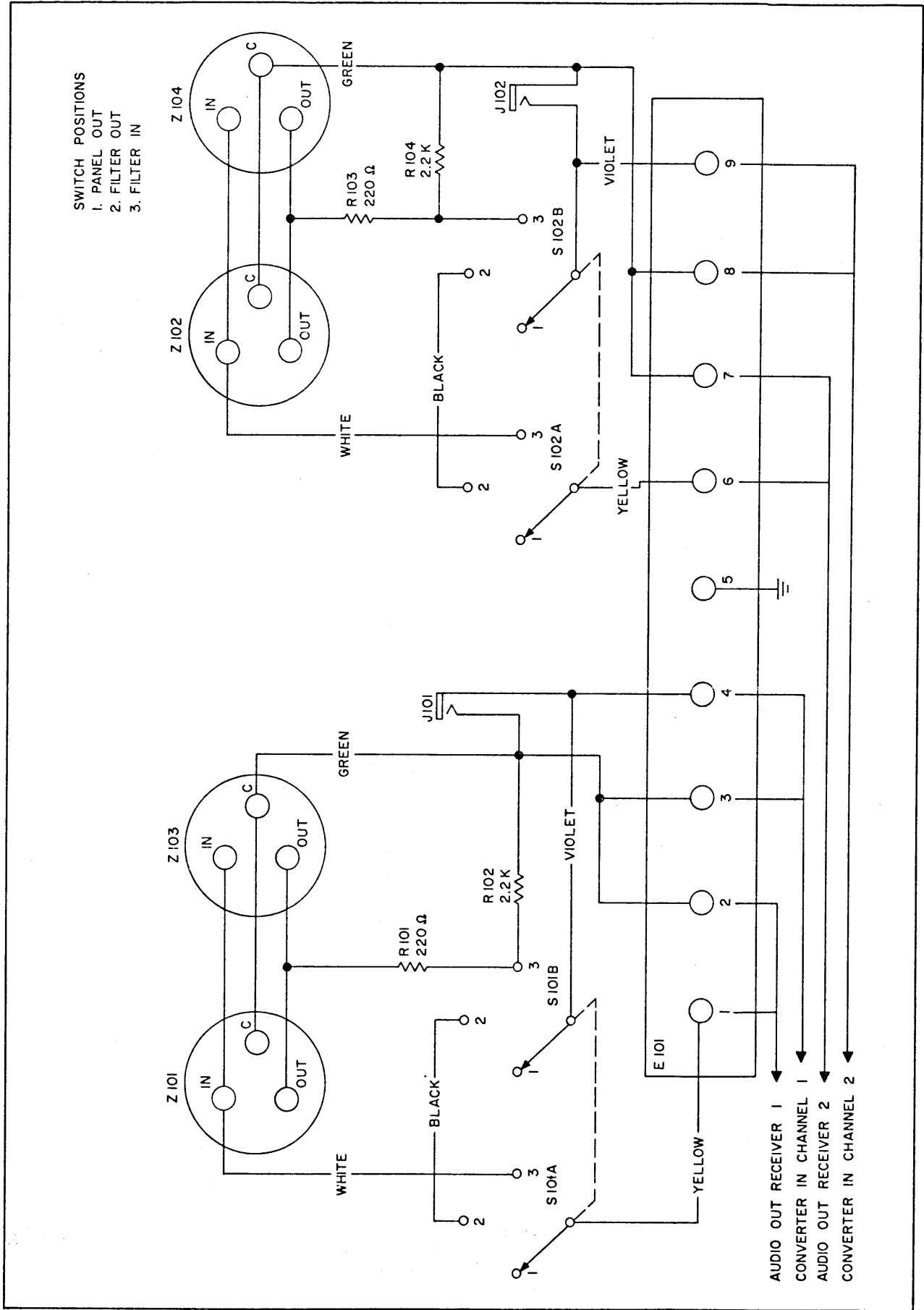


Figure 8-1. Wiring Diagram of Filter Panel SFP-2