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**TECHNICAL  
MANUAL  
FOR  
STRIP RECEIVER SYSTEM**

**SYM-5212**

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**THE TECHNICAL MATERIEL CORPORATION**

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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.

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THE TECHNICAL MATERIEL CORPORATION

COMMUNICATIONS ENGINEERS

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.

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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 them 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

## PREFACE

This technical manual discusses the information you will require to install, operate and maintain the SYM-5212 Strip Receiver System. This manual is intended for operators and technicians who will be responsible for the proper functioning of the equipment.

This text is compiled in three parts:

SYM-5212	Strip Receiver System . . . . .	Part I
STR-5/U	Strip Receiver . . . . .	Appendix A
AMC-21C	Antenna Multicoupler . . . . .	Appendix B

You should read this manual in sequence, section by section, to become totally familiar with the system. After completing this manual, you should be able to install, operate, and depending on your level of technical training, perform maintenance to the component level.

Changes are periodically made to this manual through publication of TECHNICAL NEWSLETTERS that are distributed to users of the equipment. The REGISTRATION CARD located at the front of this manual should be completed and sent to:

THE TECHNICAL MATERIEL CORPORATION  
700 Fenimore Road  
Mamaroneck, New York 10543  
Attention: Thechnical Data Group

Your name and address will be entered on permanent TMC records and applicable publications automatically mailed to you. Requests for related publications should be made to your TMC representative, to a TMC field office in your area, or to TMC at the above address.

REQUEST FOR SPARE PARTS: Forms are available at the back of this manual.

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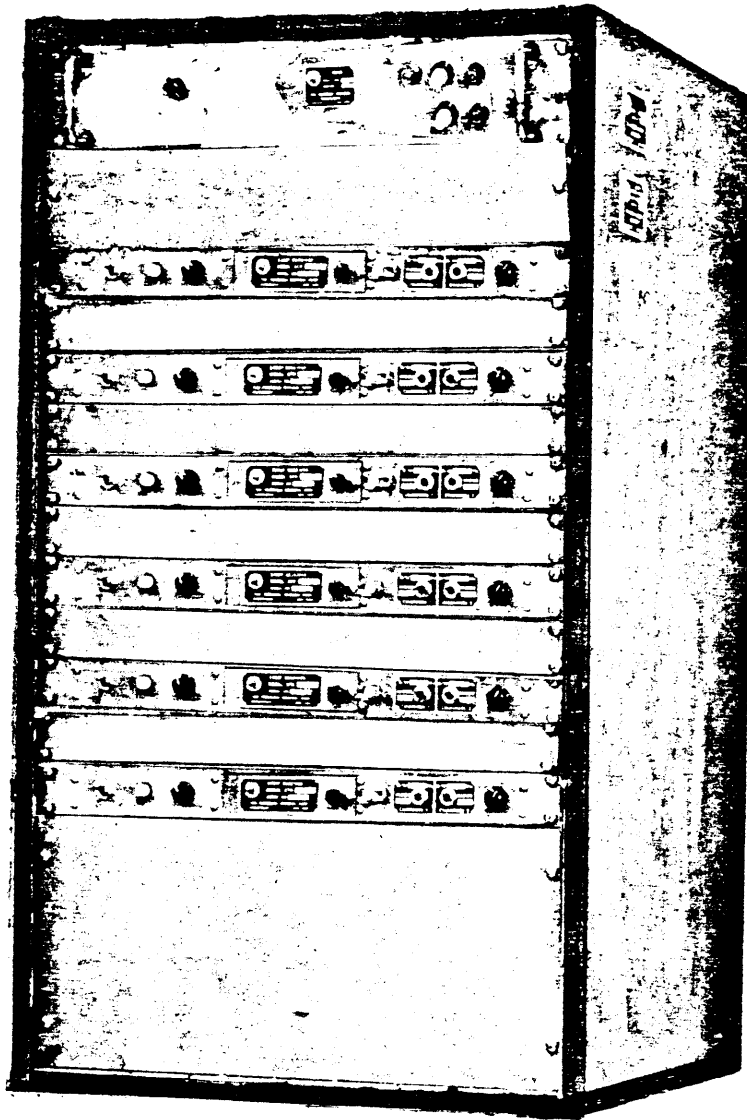
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SYM-5212

Figure 1-1

Strip Receiver System

SYM-5212

## SECTION I

### GENERAL INFORMATION

#### 1-1. GENERAL DESCRIPTION

The SYM-5212 Strip Receiver System, is comprised of (6) STR-5/U receivers and (1) AMC-21C Antenna Multicoupler. The SYM-5212 system is housed in (1) Rack.

#### 1-2. FUNCTIONAL DESCRIPTION

The SYM-5212 system (figure 1-1), is a transistorized, multi-channel, fixed tuned, 2-16 MHz (extended range to 32.0 MHz available on special order) receiving system designed for use in communications systems where received-signal quality is of prime importance. The SYM-5212 is a multi Receiver (6 STR) single Channel per receiver type system.

Each channel is independently operated and comprised of a receiver STR-5/U. The RF input to each receiver is directed via an Antenna Multicoupler AMC-21C. The AMC-21C is a broadband distribution system interposed between a single antenna and the antenna terminals of the receivers (STR).

#### 1-3. DESCRIPTION OF MODULAR UNITS

General - Paragraphs a and b give a brief description of the modular units which comprise the SYM-5212. For more detailed information pertaining to each of these units, refer to appendix A and B as listed in Table 1-1.

APPENDIX A	STRIP RECEIVER	STR-5/U
APPENDIX B	ANTENNA MULTICOUPLER	AMC-21C

TABLE 1-1

Appendix of Modular Units

a. Strip Receiver, Model STR-5/U - Strip Receiver (STR) is a transistorized, double-conversion, superheterodyne communications receiver that utilizes a fixed-tuned, plug-in module (Model TTRR) for its rf section. A crystal filter, when supplied, is employed in the antenna input to the rf modules and provides a 6 KHz bandpass at the customer-selected frequency. A change in operating frequency must be accompanied by a corresponding change in the crystal filter. A RECEIVER CLARIFIER control (located on front panel of TTRR) provides fine-tuning of the crystal controlled local oscillator. The STR produces two IF outputs and two separate audio outputs. The audio outputs are: one SSB and one AM/AME output each with up to +10 VU output at 600 ohms balanced or unbalanced. Additionally there are high impedance outputs (standard phone jacks) for monitoring the audio outputs. A front panel selector switch (MODE) selects the AGC to be used in the system. A squelch circuit is used with the SSB channel to eliminate reception of noise or of signals below a specific level, thus preventing operator fatigue. The squelch circuit is available, but is not normally supplied with the basic receiver.

b. Antenna Multicoupler, Model AMC-21C - The Antenna Multicoupler, Model AMC-21C, is a broadband antenna-to-receiver coupling device which permits the use of a common antenna by a number of communications receivers. It consists of a broadband transistorized preamplifier, optional filters, and a variable number of output modules. Input and output impedance is substantially constant over the specified frequency range within the limits of the voltage standing wave ratio (VSWR). Construction of the equipment is such that flexibility in the number of output channels is easily achieved.

## SECTION 2

### INSTALLATION

#### 2-1. UNPACKING AND HANDLING

The SYM-5212 system has been calibrated and tested at the factory before shipment. When the equipment is received at the operating site, inspect the packing cases and their contents immediately for possible damage; unpack the equipment carefully. Inspect all packing material for parts which may have been shipped as "loose items" (Technical Manuals, connectors, mounting hardware, etc.). With respect to damage to the equipment for which the carrier is liable, the Technical Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

#### 2-2. POWER REQUIREMENTS

The SYM-5212 is designed for 115 or 230 volt  $\pm 10\%$ , 50 to 60 Hz single phase AC power. On the rear of the RACK an AC input connector (J101) is located on the interface panel. (see figure 2-1) When AC power is connected to J101, AC power potential will be present for all of the modular units. Individual front panel AC power switches must be activated for unit operation.

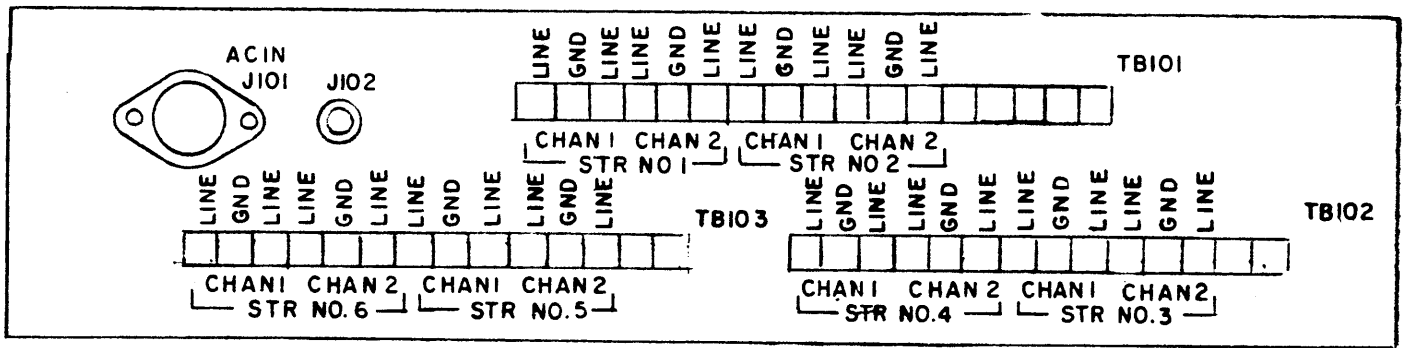


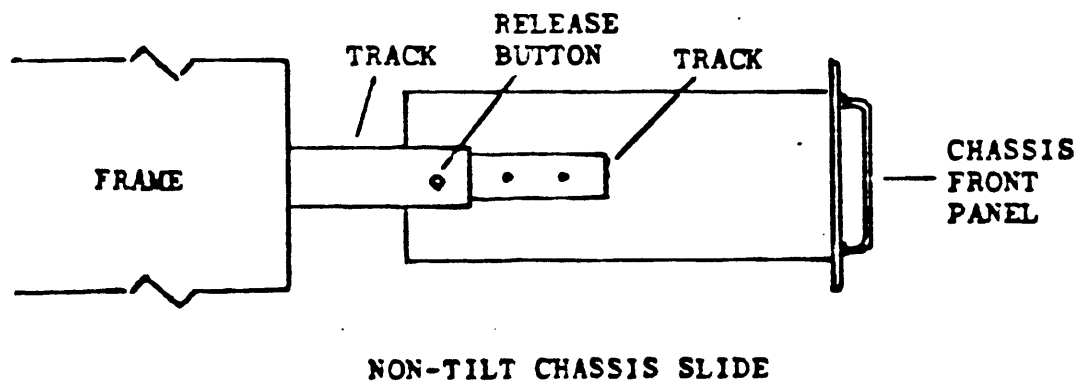
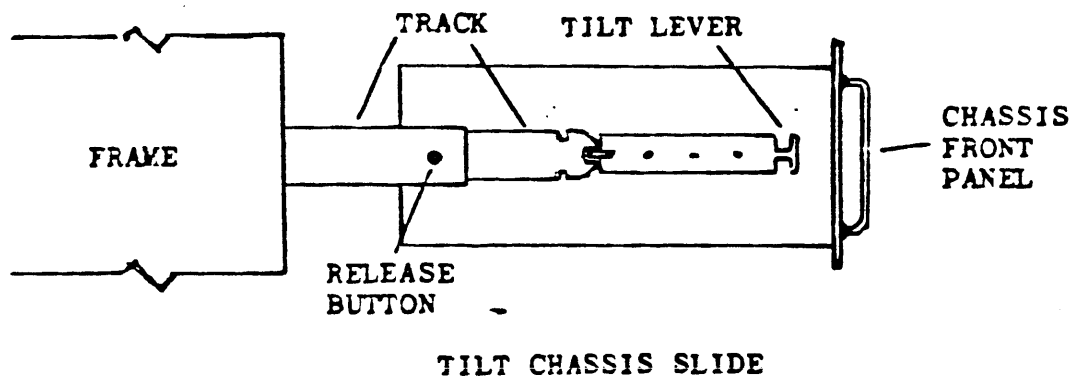
Figure 2-1

Interface Panel SYM-5212

2-3 INSTALLATION

The SYM-5212 is designed to house (6 STR-5/U) Receivers and (1 AMC-21C) Multicoupler, prime considerations when installing the SYM-5212 are: adequate ventilation, sufficient space to withdraw the units for servicing. The STR-5/U and AMC-21C are designed for rack mounting. The STR-5/U and AMC-21C are equipped with standard 19 inch front panels. The STR-5/U stands 1 3/4 inches high and 15 inches deep. The AMC-21C stands 3 1/2 inches high and 14 inches deep. Figure 7-1 describes all connections that exist in the system. The Interface Panel (figure 2-1) is positioned on the rear of the rack so as to receive all external interfacing that may be required when operating the SYM-5212.

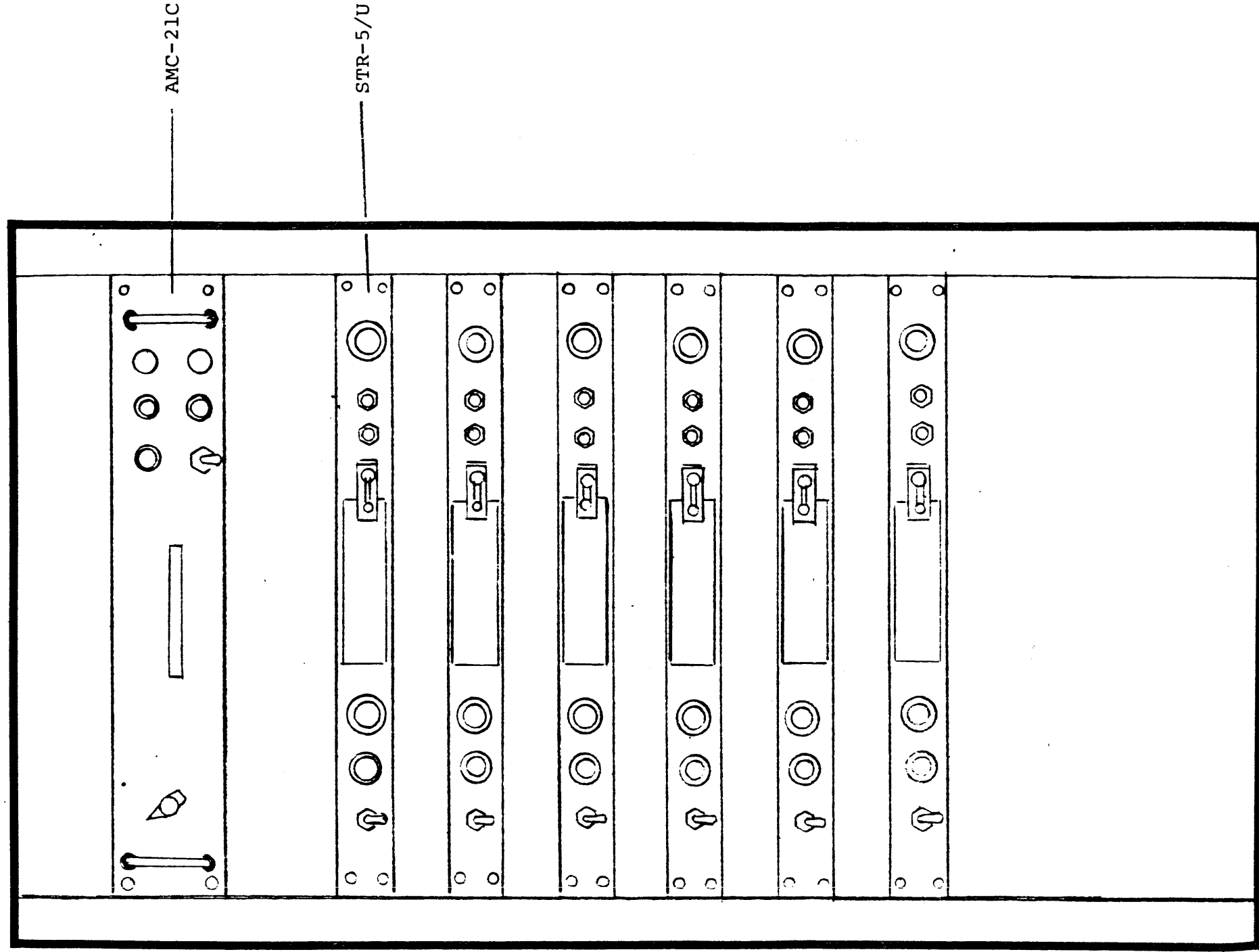
NOTE:  
UTILIZATION OF CHASSIS  
SLIDES DEPENDS UPON  
TYPE OF CABINET IN USE.



## 2-3    INSTALLATION

The SYM-5212 is designed to house (6 STR-5/U) Receivers and (1 AMC-21C) Multicoupler, prime considerations when installing the SYM-5212 are: adequate ventilation, sufficient space to withdraw the units for servicing. The STR-5/U and AMC-21C are designed for rack mounting. The STR-5/U and AMC-21C are equipped with standard 19 inch front panels. The STR-5/U stands 1 3/4 inches high and 15 inches deep. The AMC-21C stands 3 1/2 inches high and 14 inches deep. Figure 7-1 describes all connections that exist in the system. The Interface Panel (figure 2-1) is positioned on the rear of the rack so as to receive all external interfacing that may be required when operating the SYM-5212.





SYM-5212

Figure 2-2

NOTE:  
 CONFIGURATION MAY  
 VARY SLIGHTLY DE-  
 PENDING UPON TYPE  
 OF CABINETS USED

SECTION 3

OPERATOR'S SECTION

3-1. Operating Controls

The operating controls and indicators for the SYM-5212 are listed in table 3-1 and are referenced to the callouts on figure 3-1.

NOTE

Because the controls and indicators of each channel are the same, only channel 1 callouts are described on Table 3-1.

Table 3-1. Operating Controls And Indicators

Item No. Figure 3-1	Panel Designation	Function
STR 1	POWER ON/OFF Switch	Applies power to STR when ON.
2	POWER Indicator	When lit, indicates application of ac power
3	CLARIFIER	Permits fine tuning of the TTRR module
4	Receiver Converter	RF Section (see TTRR-( ) section

Table 3-1. Operating Controls and Indicators (continued)

Item No. Figure 3-1	Panel Designation	Function
STR 5	Channel 1 and channel 2 phone jacks	Standard phone jacks for earphone connection. The line output is not affected.
6	MODE Switch	Permits selection of channel 1, channel 2 or both channels.
AMC-21C 7	FILTER Switch	Selection of filter
8	Power ON/OFF switch	Controls primary power to the AMC-21C.
9	Fuse Holders for F1 and F2	Failure of a fuse is indicated by illumination of the fuse holder.
10	POWER lamp DS1	Lights when primary power is connected to the AMC-21C and switch S2 is on.
11	Fuse Spares	Spare Fuse Storage.

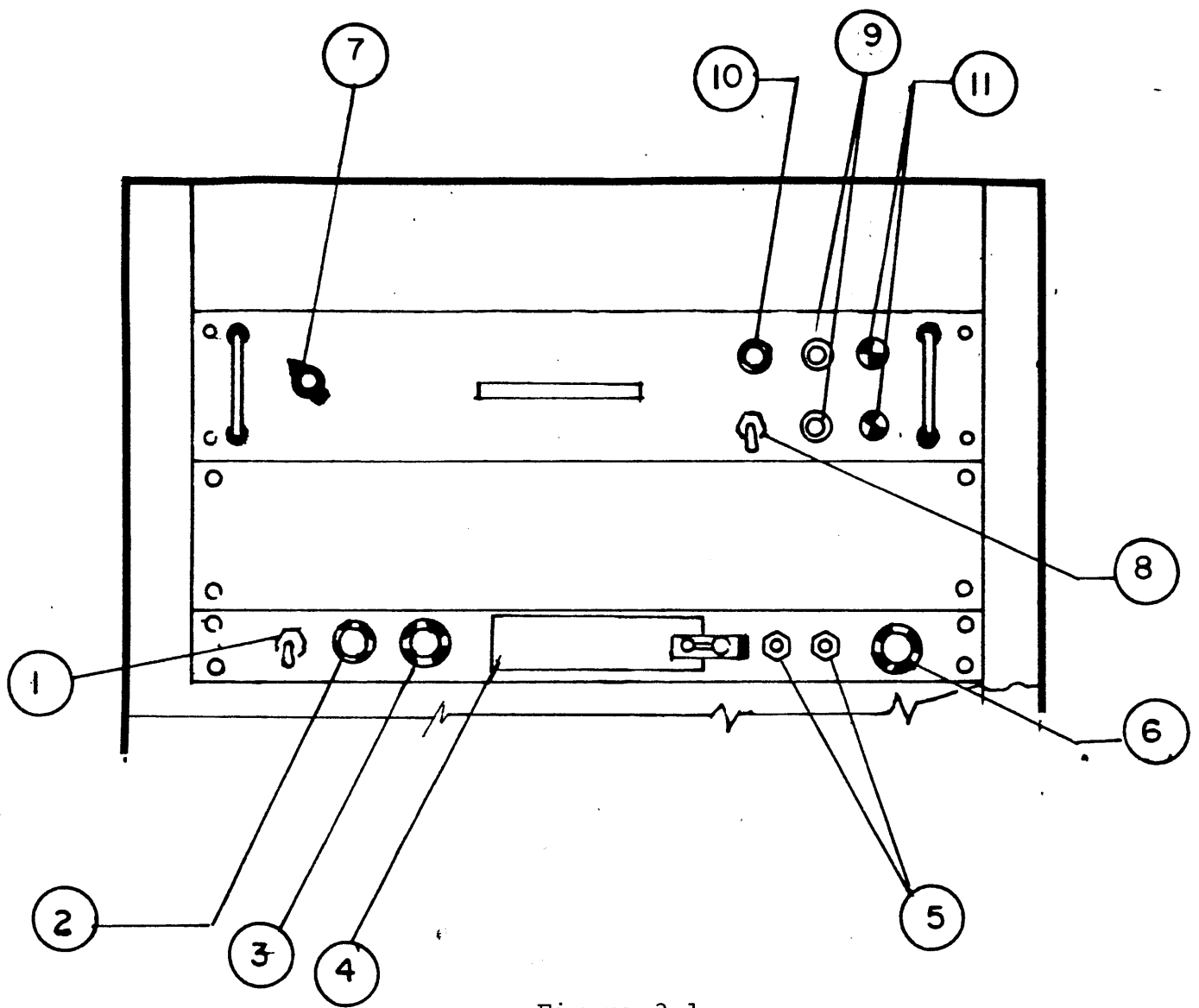


Figure 3-1  
 Typical Controls and Indicators  
 For SYM-5212

## SECTION 4

### PRINCIPLES OF OPERATION

#### 4-1. BLOCK DIAGRAM ANALYSIS

Refer to figure 4-1. The SYM-5212 system is a multi-channel (6) fixed tuned, 2-16 MHz (extended range to 32.0 MHz available) Radio Receiving System. Since all of the channels are identical in operation, only channel 1 will be discussed in the following paragraphs.

RF signals from the antenna are applied to the interface panel ANTENNA INPUT connector J102. (see figure 2-1) The signals are then transferred to the Antenna Multicoupler AMC-21C at J1. ANTENNA INPUT. The Antenna Multicoupler (see Appendix B) is a broadband antenna-to-receiver coupling device which permits the use of a common antenna by a number of communications receivers.

The RF signal out of the AMC-21C is transferred to each of the (STR) Strip Receivers. On the interface panel three terminal barriers are available for the audio output of each of the (STR) Strip Receivers.

See section 7 for overall system wiring. Appendix A and B detail principles of operation of each component part of the system.

Figure 4-1 illustrates a typical receiver installation.

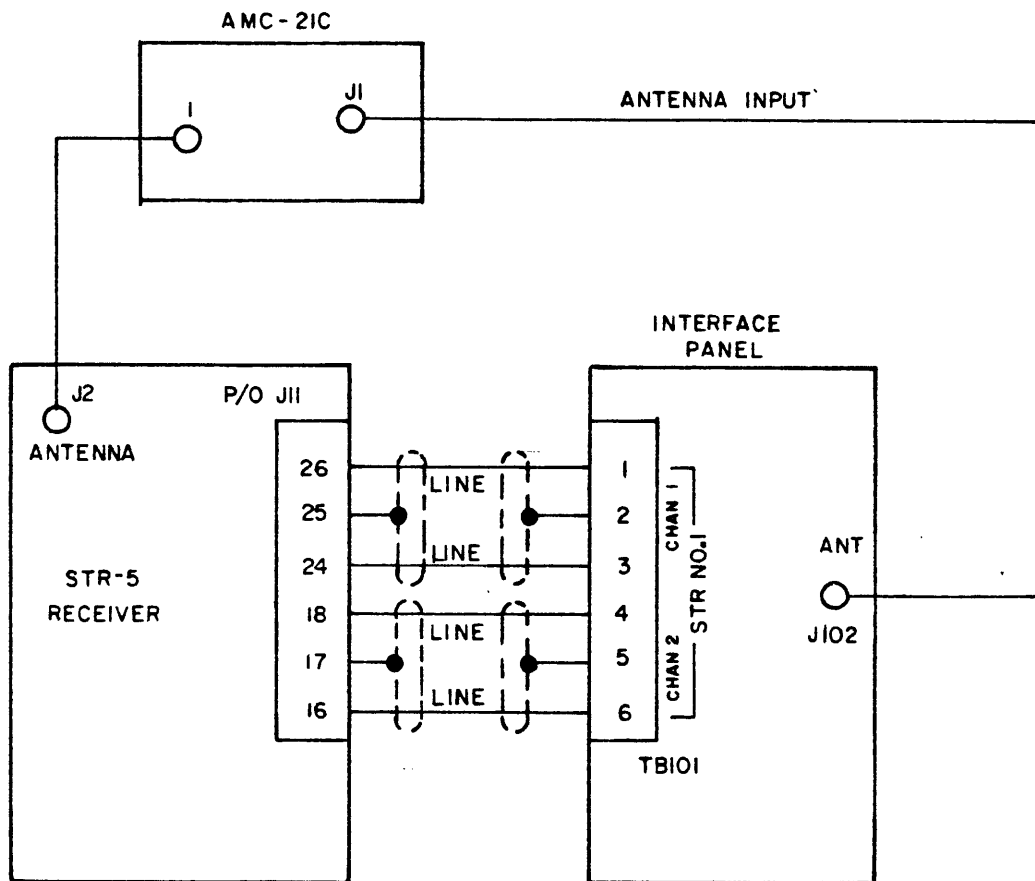


Figure 4-1  
Simplified wiring typical diagram

NOTE (AMC-21C)

The position of the output modules is important when fewer than the full complement of 8 modules (16 channels) is being used. In order to minimize intermodulation distortion, and to balance the RF feedline from the preamplifier to the output modules, the arrangement must be kept symmetrical. Refer to (Appendix B).

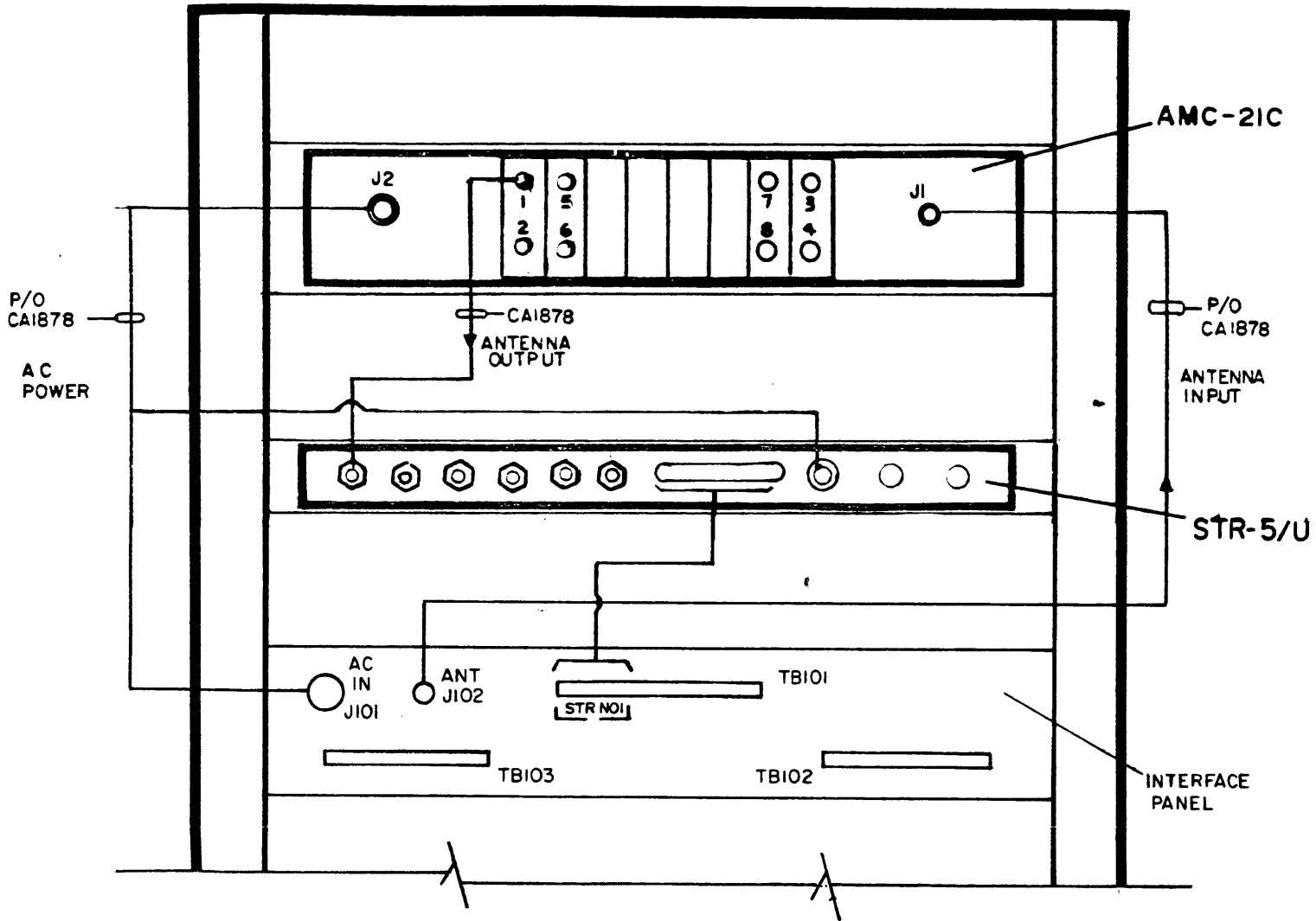


Figure 4-2  
Rear View SYM-5212  
Typical Connections

## SECTION 5

### MAINTENANCE AND TROUBLESHOOTING

#### 5-1. PREVENTIVE MAINTENANCE

a. General - The SYM-5212 has been designed to provide long term, trouble free operation under continuous duty conditions. However, in order to prevent failure of the equipment due to corrosion, dust, or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

At periodic intervals, the equipment should be removed from its mounting for cleaning and inspection. All accessible covers should be removed and the wiring and all components inspected for dirt, corrosion, charring, discoloring or grease. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease from other parts with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects.

#### WARNING

WHEN USING TOXIC SOLVENTS, MAKE CERTAIN THAT ADEQUATE VENTILATION EXISTS. AVOID PROLONGED OR REPEATED BREATHING OF THE VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. FLAMMABLE SOLVENTS SHALL NOT BE USED ON ENERGIZED EQUIPMENT OR NEAR ANY EQUIPMENT FROM WHICH A SPARK MAY BE RECEIVED. SMOKING, "HOW WORK", ETC. IS PROHIBITED IN THE IMMEDIATE AREA.

#### CAUTION

WHEN USING TRICHLOROETHYLENE, AVOID CONTACT WITH PAINTED SURFACES DUE TO ITS PAINT REMOVING EFFECTS.



b. Modular Unit Maintenance - The individual modules; STR-5/U and AMC-21C, should be removed and tested in accordance with their technical manuals and then the system tested.

c. Test Equipment Required - Test equipment required to test and align the system is listed below:

- (1) One Signal Generator, GH-606B or equivalent.
- (2) One VTVM, Ballantine Model 314 or equivalent.
- (3) One VOM, Simpson 260 or equivalent.
- (4) One RF generator

MODULAR UNIT	FUSE	RATING	FUNCTION
STR	F1	.25A/115V	(AC Input) Protection
	F1	.125A/230V	
	F2		Protects +12V Distribution
AMC-21C	F1	.75A-115VAC	(AC Input) Protection
	F1	.4A-230VAC	
	F2	.75A-115VAC	use for
	F2	.4A-230V	AMC-21C-12-16
	F1	.5A-115VAC	(AC Input Protection)
	F1	.25A-230VAC	use for
	F2	.5A-115VAC	AMC-21C-4-8
	F2	.25A-230VAC	

TABLE 5-1. Fuse Replacement Information

## SECTION 6

### PARTS LIST

#### 6-1. INTRODUCTION

Reference designations have been assigned to identify electrical parts of the System exclusive of the modular units making up the system. The parts lists for the modular units will be found in the modular unit technical manual, Appendix A and B.

The system parts designations will be found on the system interconnect wiring diagram. The following is a listing of the parts and their corresponding description. The TMC part number is the number to be used when ordering the part from The Technical Materiel Corporation; 700 Fenimore Road, Mamaroneck, New York 10543.

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J101	Connector, AC Power	JJ175
J102	Connector, Antenna	UG/625
TB101	Terminal Board	TM100-14
TB102	Terminal Board	TM100-14
TB103	Terminal Board	TM100-17

SECTION 7

SCHEMATIC DIAGRAM

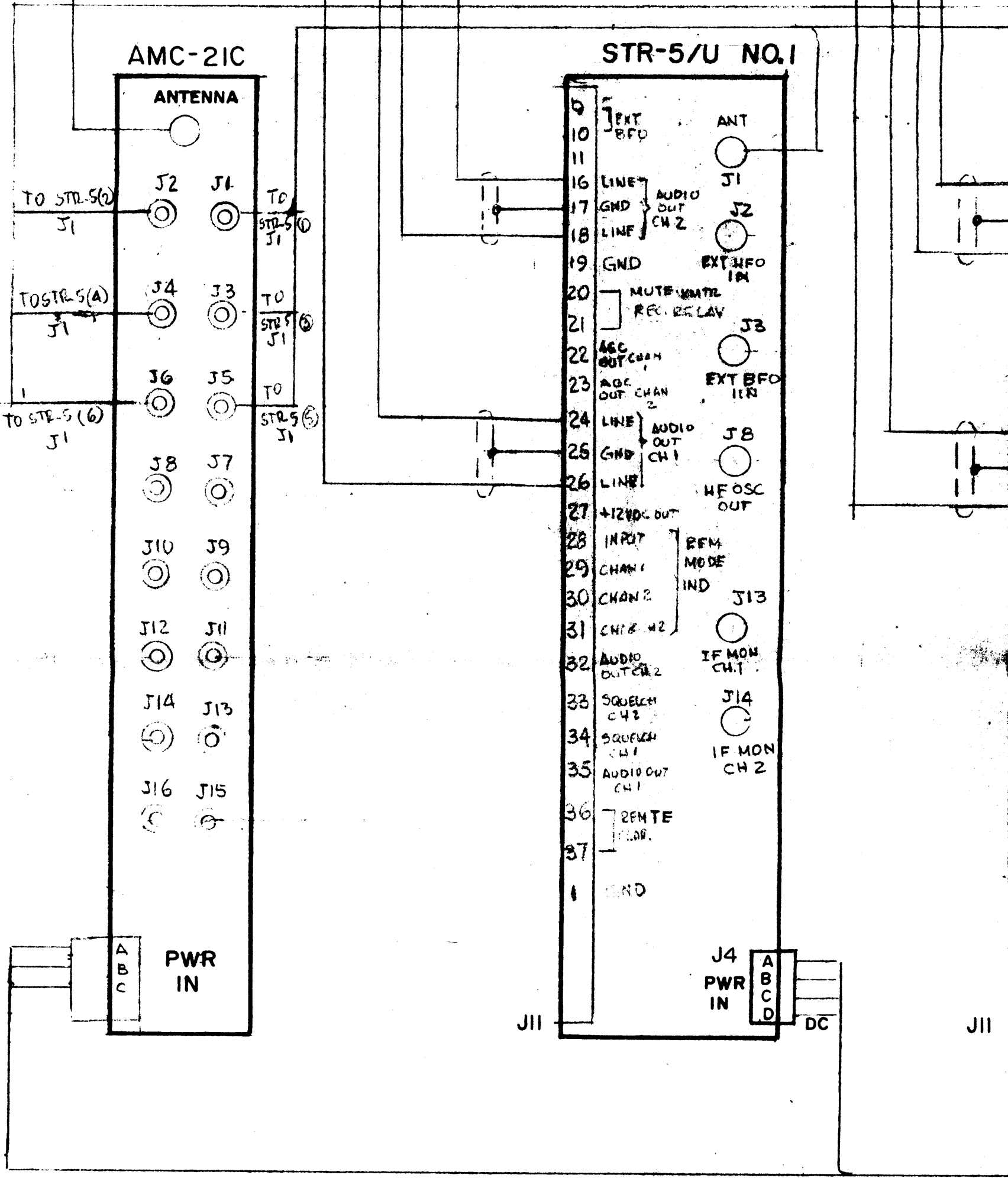
ANTENNA  
J102

1 2 3 4 5 6 7 8 9 10 11 12 13 14

D

C

B

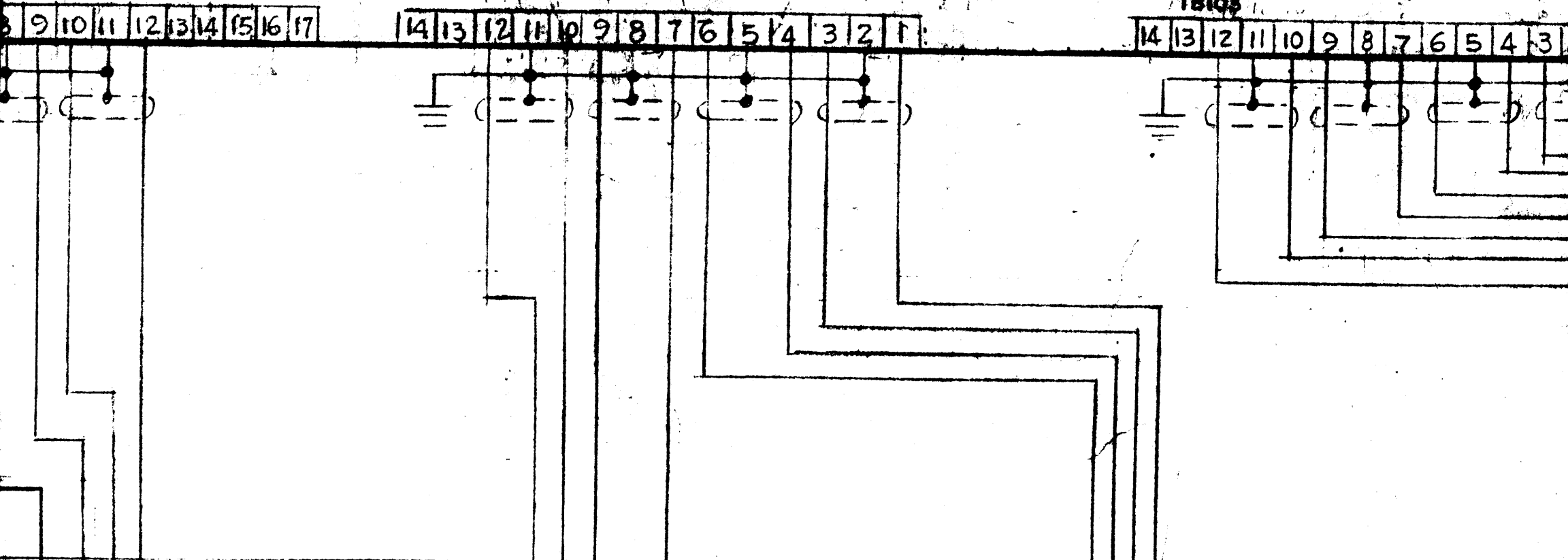


# INTERFACE PANEL

TB101

TB102

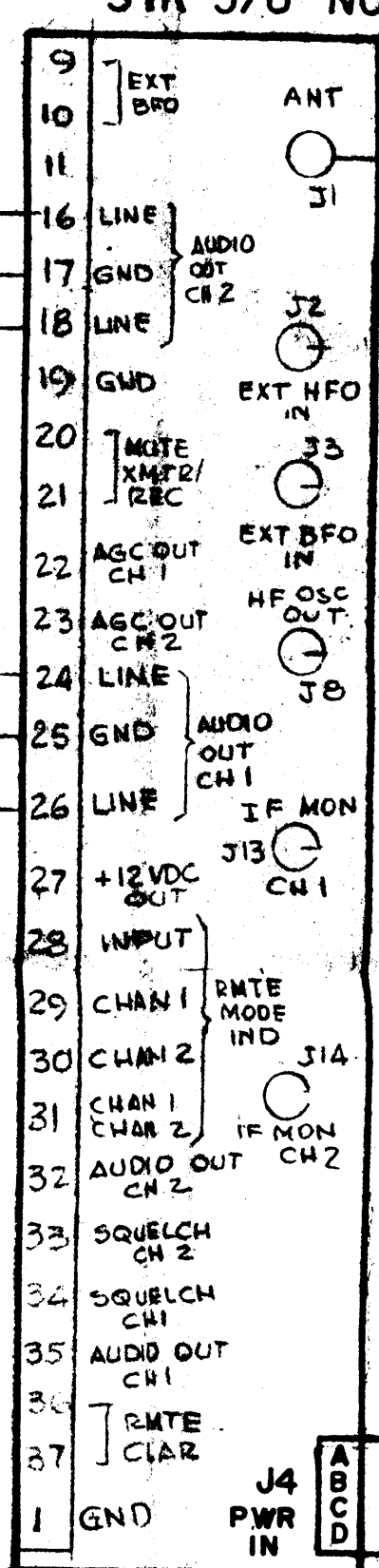
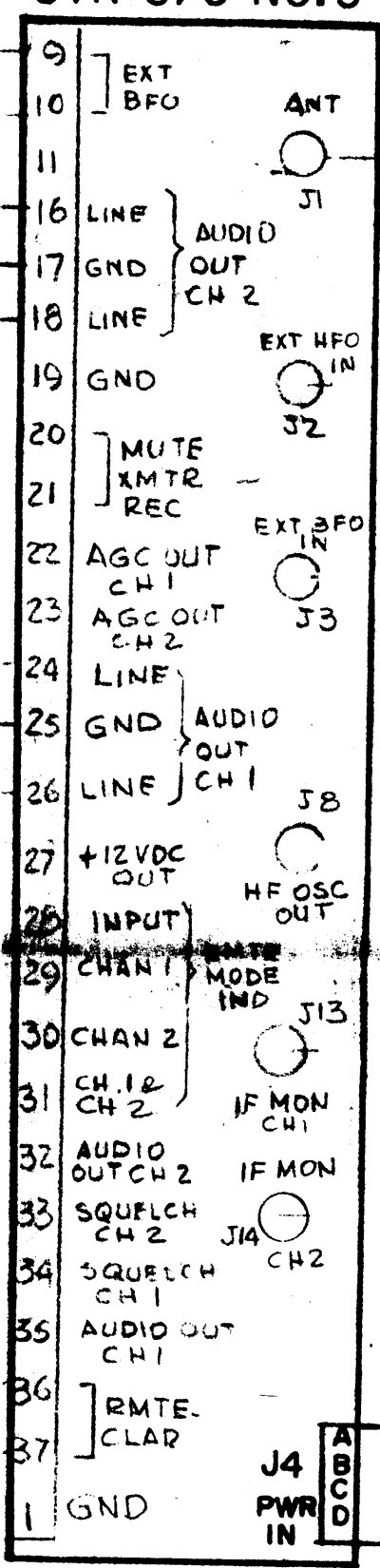
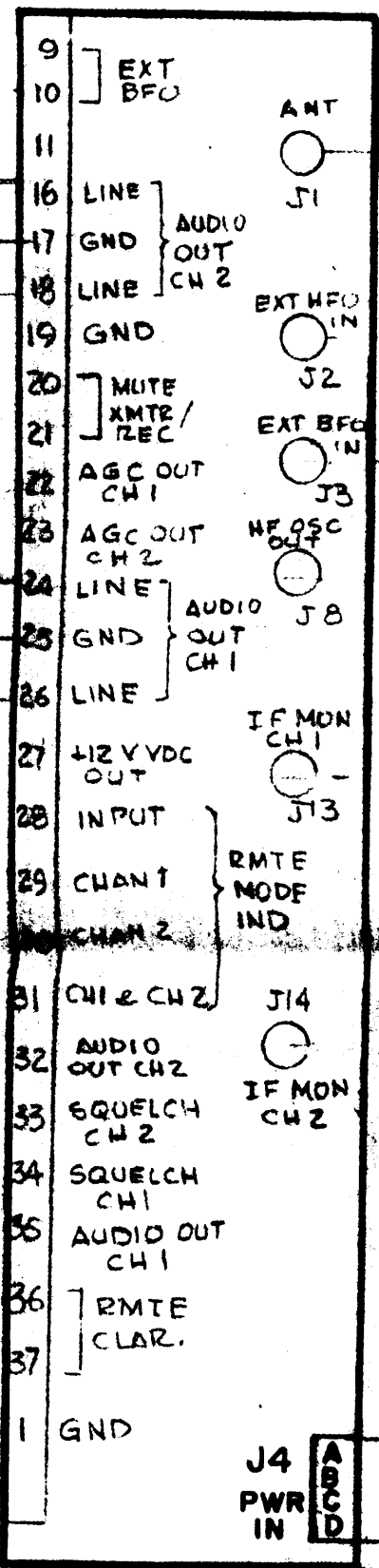
TB103



## STR-5/U NO.2

## STR-5/U NO.3

## STR-5/U NO.4



J11

J11

J11

J4 PWR IN

J4 PWR IN

J4 PWR IN

DC

DC

DC

AC IN  
J101

REVISIONS

E.M.N.NO	DRAFT	CHKD	ZONE	LTR	DESCRIPTION	DATE
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				X2	SYMBOLS CLARIFIED ON STR 3, 4, 5 & 6 CONNECTION W/INT. REVISE	5-20-8 5-27-8

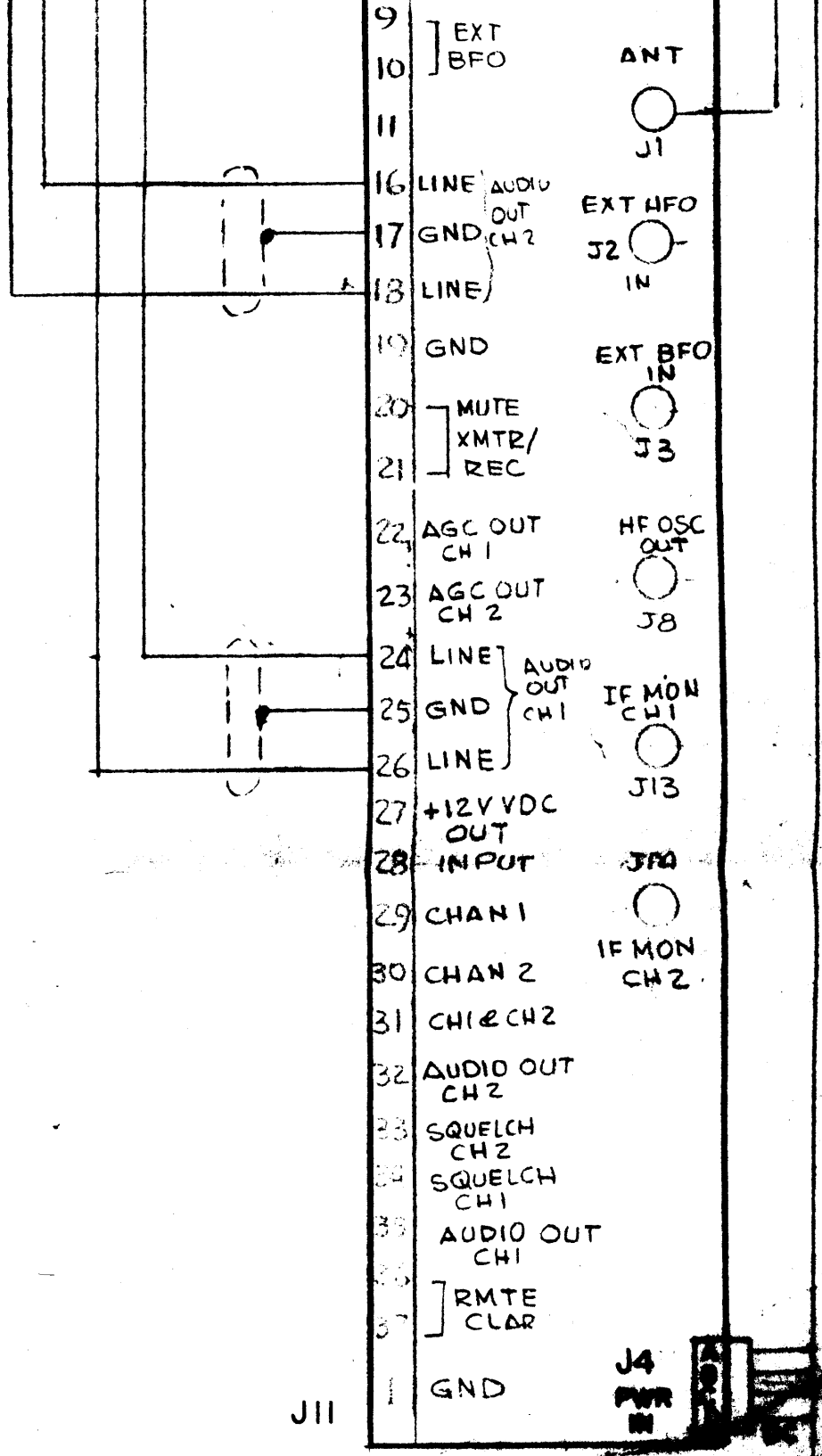
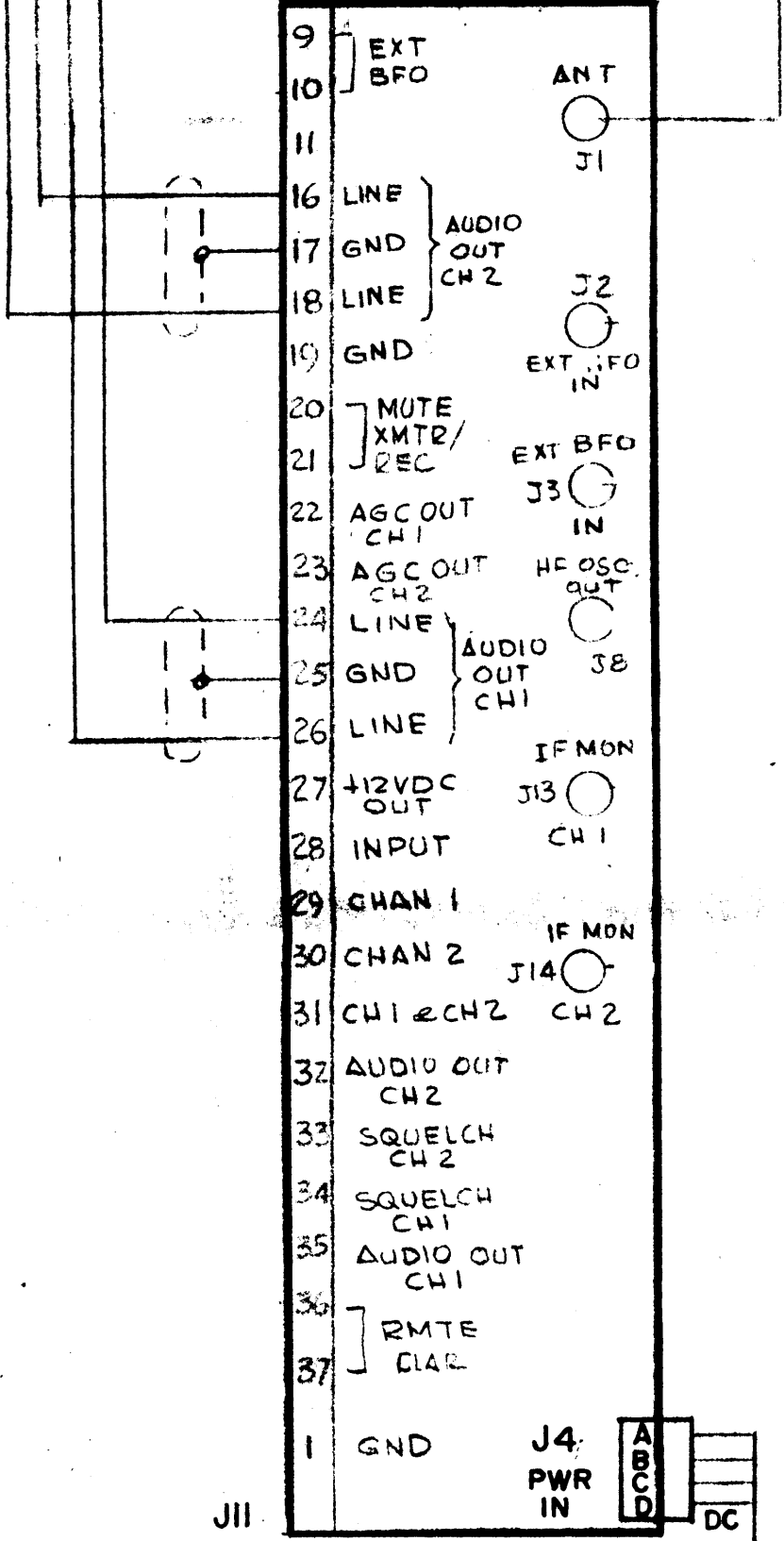
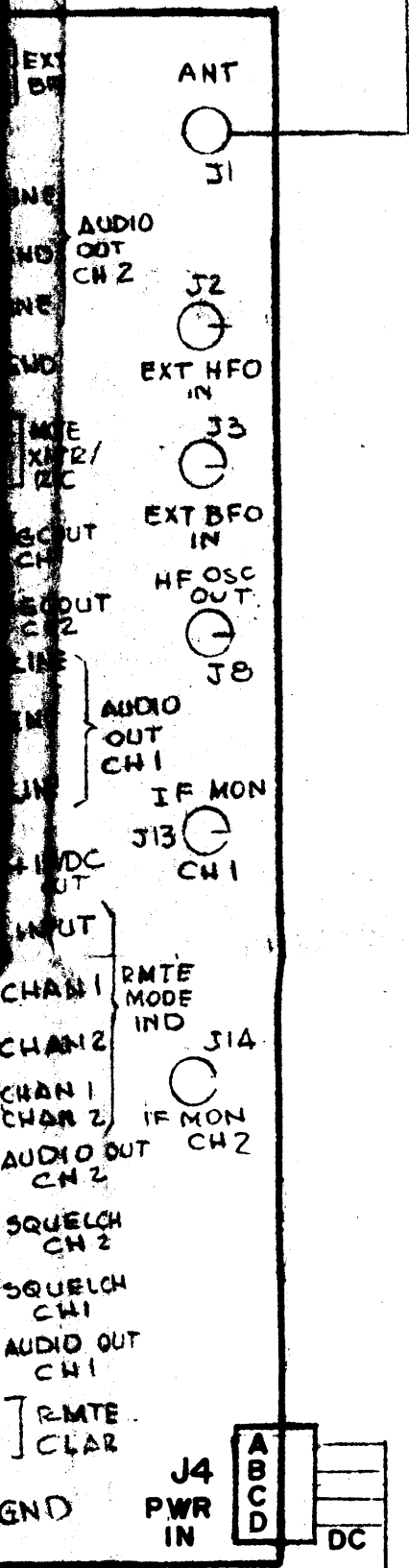
8 7 6 5 4 3 2 1

A B C

STR-5/U NO.4

STR-5/U NO.5

STR-5/U NO.6



3

2

1

AC IN  
J101

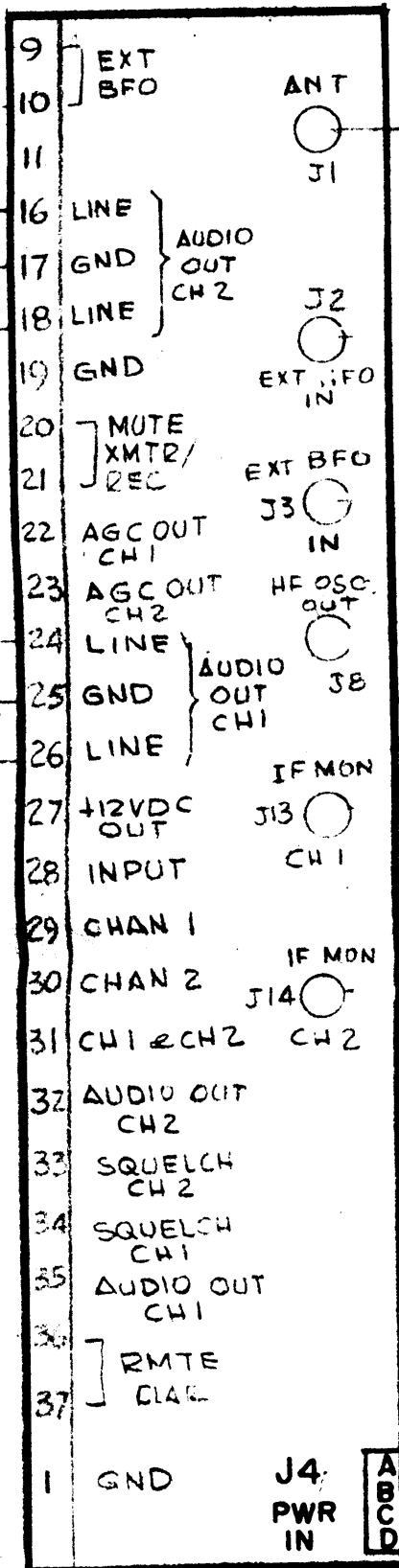
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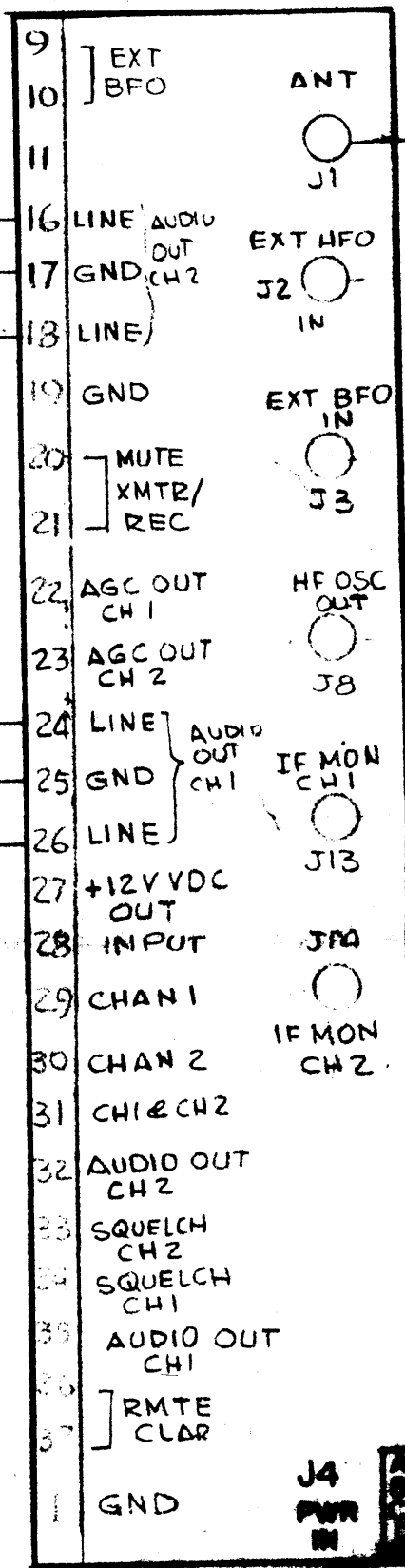
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				X2	SYMBOLS CLARIFIED	5-20-82	
ON STR 3, 4, 5 & 6 CONNECTION W/INT-REVISE						5-27-82	

GDL

STR-5/U NO.5



STR-5/U NO.6



D

C

B

J11

J11

J4  
PWR IN

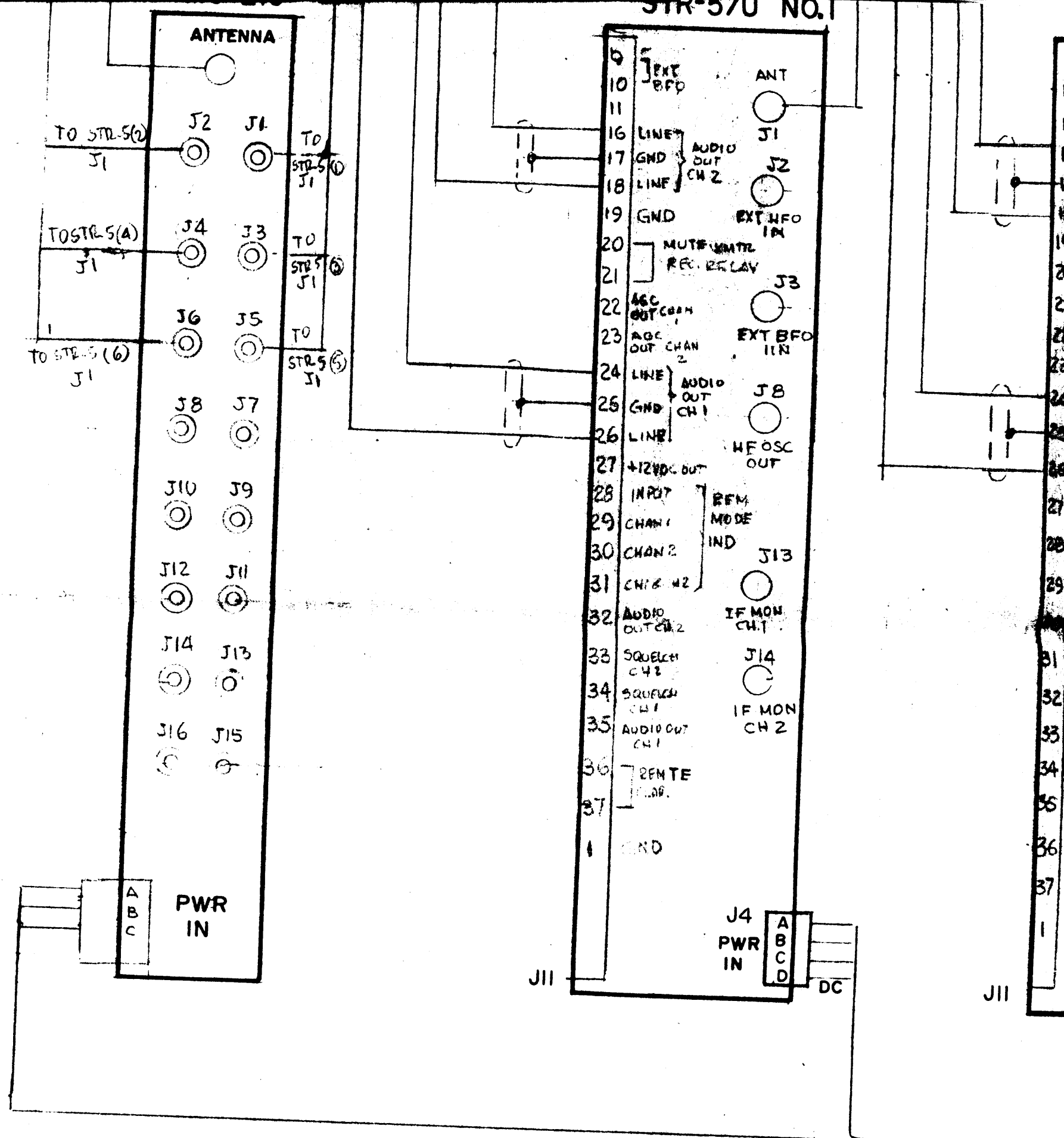
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PWR IN

A  
B  
C  
D

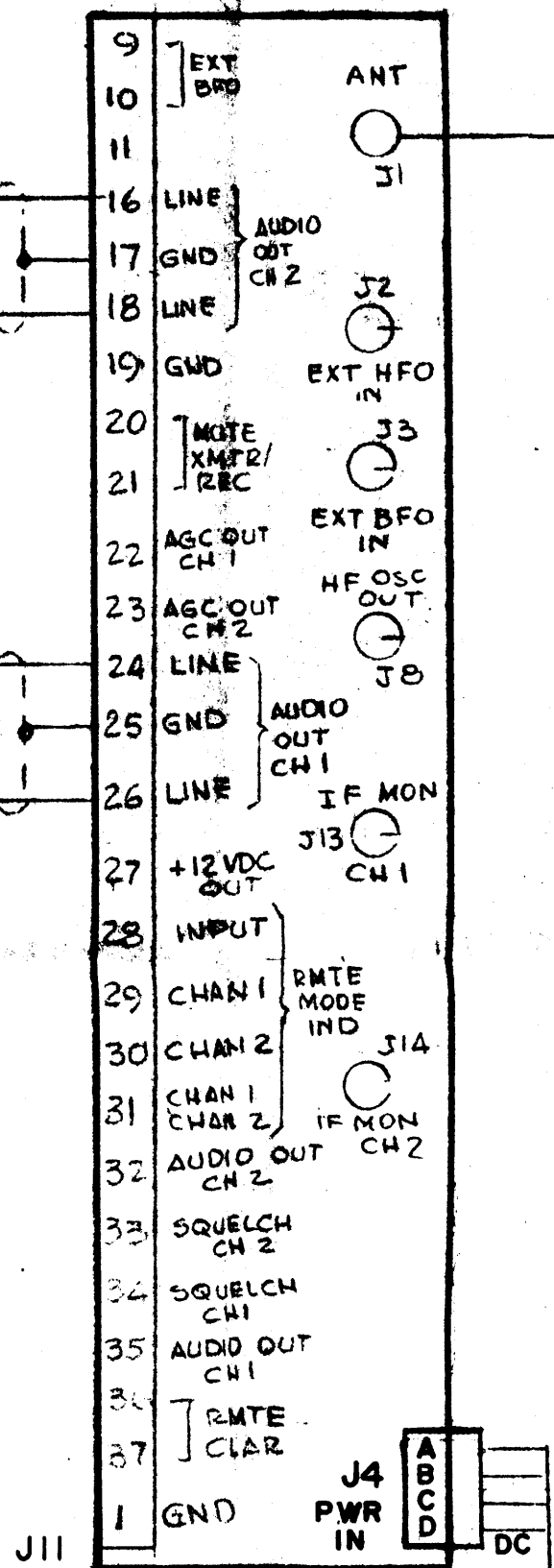
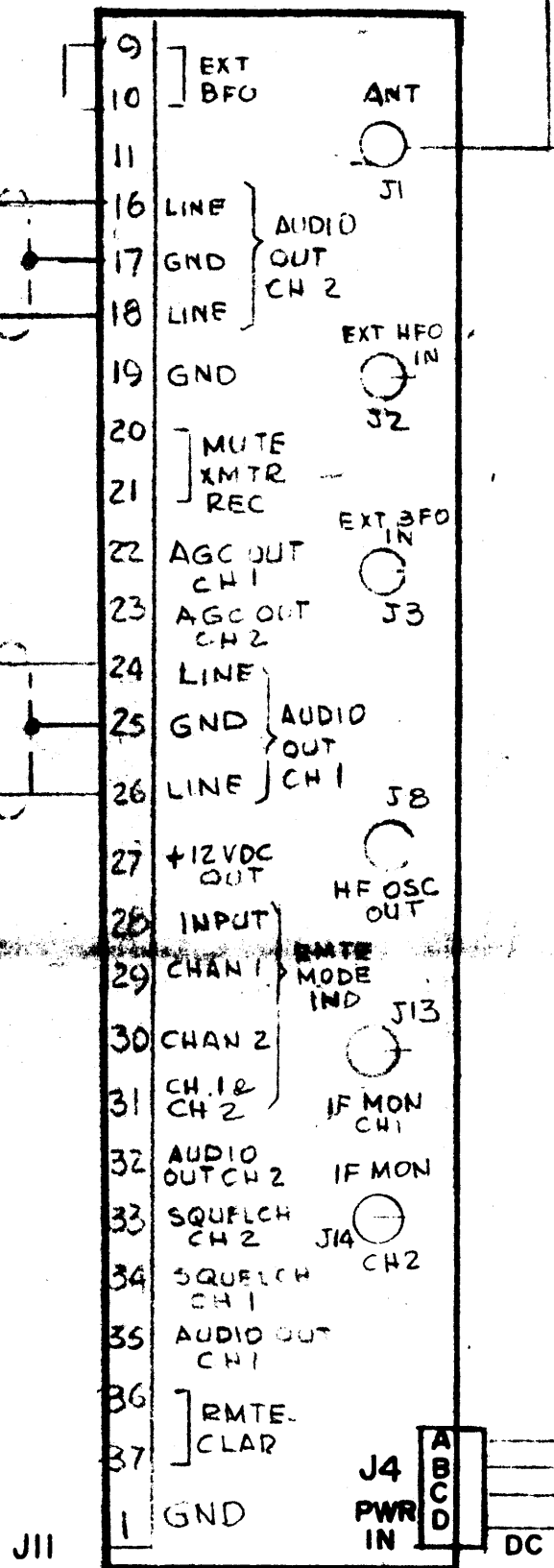
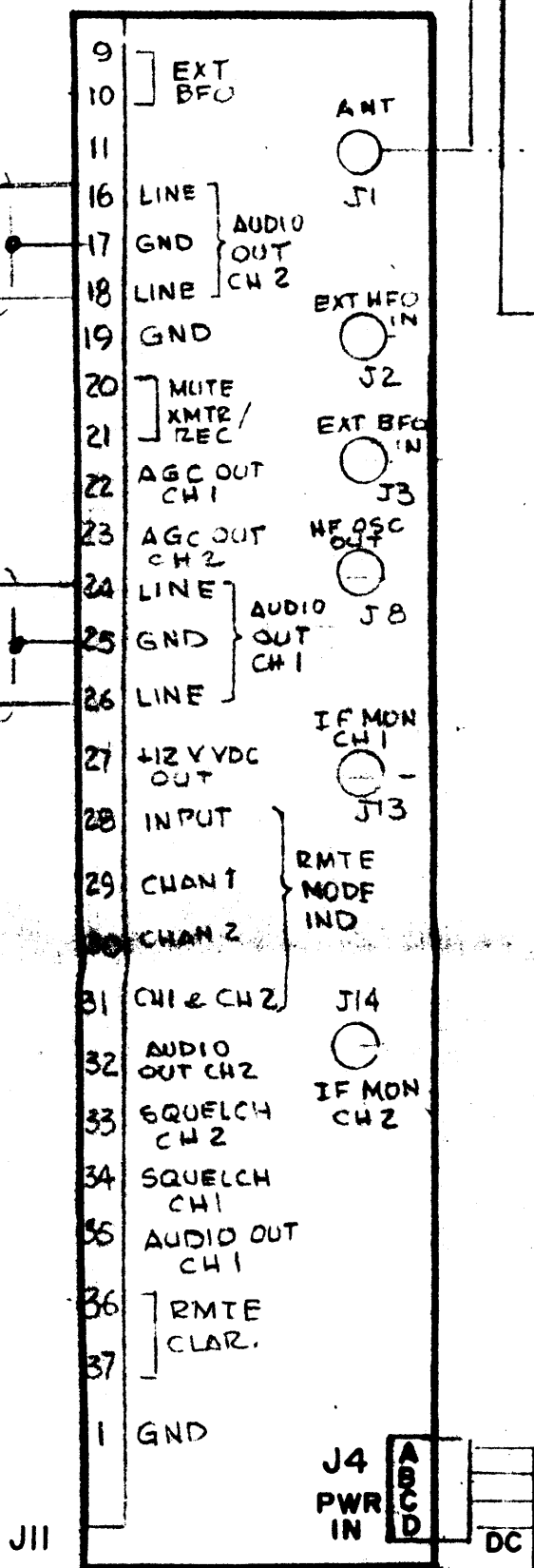
A  
B  
C  
D

DC

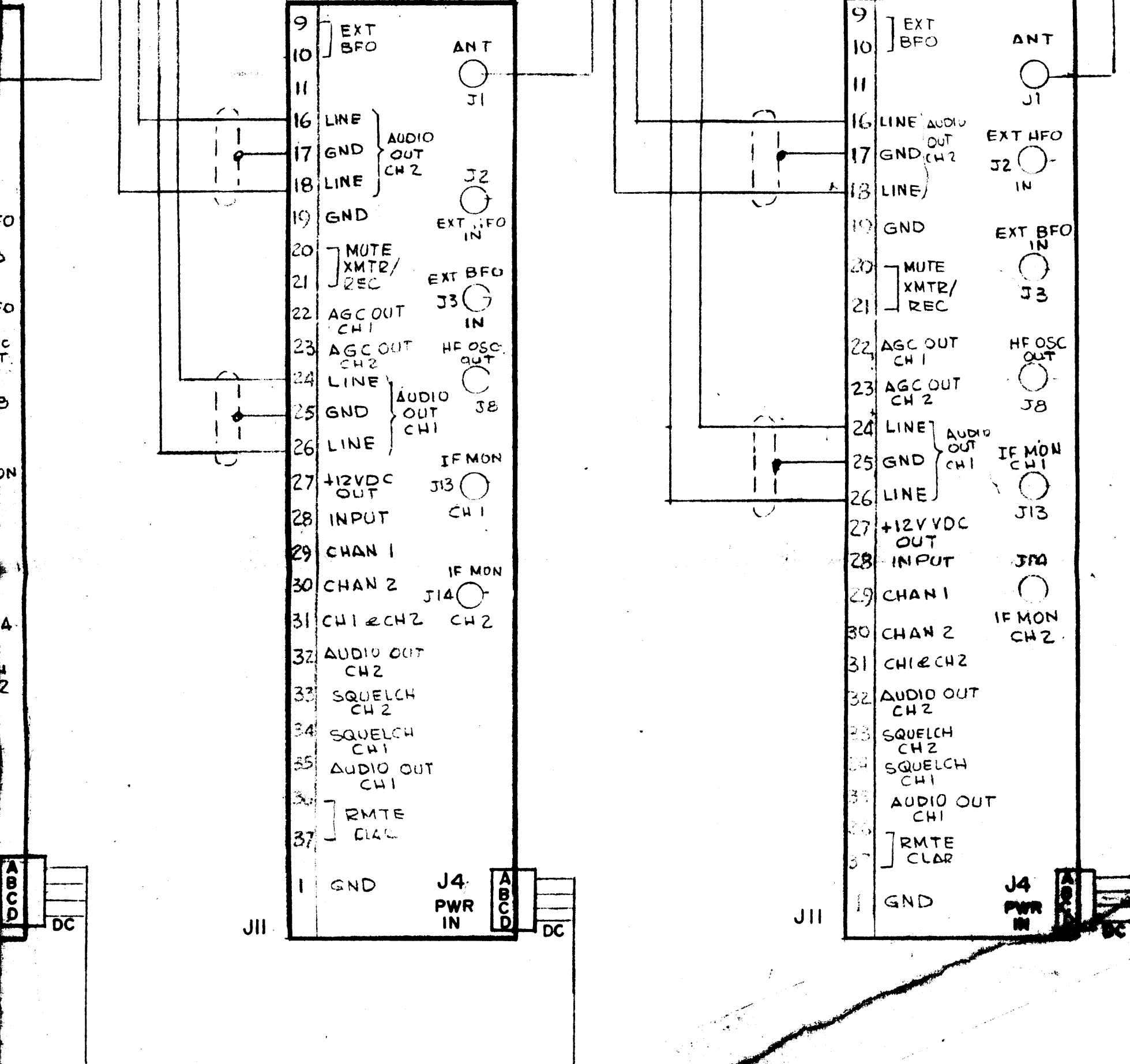
DC







SYM 5212		
QTY / UNIT	MODEL USED ON	ASBY NO.
APPLICATION		
CODE		
NOTICE TO PURCHASERS RECEIVING THIS DRAWING IS TO BE KEPT AS A RECORD OF THE ORIGINAL DRAWING AND NOT TO BE REPRODUCED OR COPIED FOR ANY OTHER PURPOSE.		



UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
AND INCLUDE CHEMICALLY APPLIED  
OR PLATED FINISHES

TOLERANCES ON

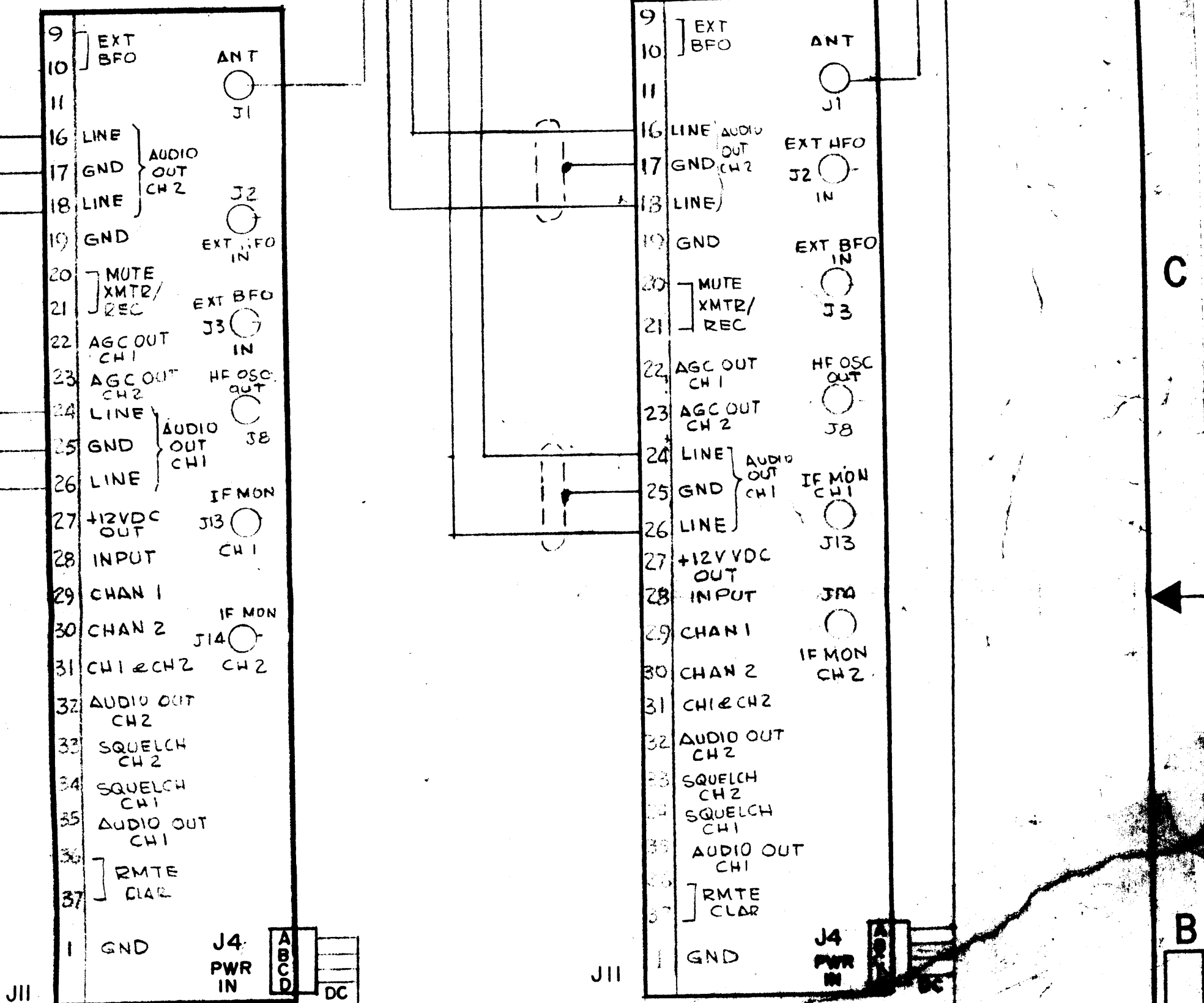
DECIMALS	FRACTIONS
X ± .05	± 1/64
XX ± .01	ANGLES
XXX ± .005	± 0° 30'

MATERIAL

Figure 7-1

Interconnect Wiring Diagram

SYM-5212



C

B

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
AND INCLUDE CHEMICALLY APPLIED  
OR PLATED FINISHES

TOLERANCES ON  
DECIMALS      FRACTIONS  
X ± .05          ± 1/64  
.XX ± .01        ANGLES  
.XXX ± .005     ± 0° -30'

MATERIAL

Figure 7-1  
Interconnect Wiring Diagram  
SYM-5212

# TMC SPECIFICATION

NO. S1402

REV:

COMPILED:

CHECKED:

APPD:

SHEET

OF

TITLE: FINAL TEST CHECK OFF SHEET FOR SYM-5212

SYSTEM CHECK-OFF SHEET  
FOR STRIP RECEIVER SYSTEM  
SYM-5212

MECHANICAL INSPECTION

- A. SLIDES IN PLACE AND OPERATIONAL . . . . . \_\_\_\_\_
  
- B. CABLES CORRECTLY JUNCTIONED AND SECURE . . . . . \_\_\_\_\_
  
- C. COVERS IN PLACE AND SECURE . . . . . \_\_\_\_\_
  
- D. INTERFACE PANEL WIRING CORRECTLY ROUTED . . . . . \_\_\_\_\_
  
- E. OVERALL HARDWARE SECURE . . . . . \_\_\_\_\_

ELECTRICAL TEST

REFER TO INDIVIDUAL  
STRIP RECEIVER (STR-5) AND ANTENNA MULTICOUPLER AMC-21C  
CHECK-OFF SHEETS

TESTED AND INSPECTED BY \_\_\_\_\_

DATE \_\_\_\_\_

APPROVED \_\_\_\_\_