

# TMC SPECIFICATION

NO. S S-934

REV: 0 A

COMPILED: W. Keenan

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SHEET 1 OF 22

TITLE: SPECIFICATIONS FOR TMC INSTRUCTION MANUALS

## A. DEFINITIONS

The following specifications are to be used as a guide in determining the content of commercial manuals that are prepared by TMC for shipment with equipment procured by military and commercial agencies; a definition of manuals is indicated in a, b, and c below.

a. INTERIM MANUAL. - An "interim manual" is defined as that manual which is generated from the time when no literature exists to the time when TMC is prepared to start generating a "preliminary" or "final" manual.

b. PRELIMINARY MANUAL. - A preliminary manual will be, in the normal development sequence, the second edition of technical literature covering an end item manufactured by TMC. A preliminary manual shall be considered as an advanced edition of the final manual.

c. FINAL MANUAL. - The content and writing specification for final manuals is bound under a separate cover. For all intents and purposes it is an enlargement or embellishment of the material contained in a preliminary manual.

### NOTE

It should not be construed that TMC's customers will receive an interim manual, a preliminary manual, and a final manual for an end item manufactured by TMC. Attached to the cover of an interim or preliminary manual will be returned - addressed, postage free card allowing the customer to indicate the destination of the equipment so that a final manual can be provided when available.

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## B. INTERIM MANUAL SPECIFICATION

1. The purpose of an interim manual is to provide the customer with useful information that will enable him to install and operate an end item manufactured by TMC.

2. GENERAL INFORMATION. - This manual shall contain as a minimum; a green cover, a warranty sheet, text, a functional block diagram, all available schematics, and available photos of the equipment.

This manual will not contain a record of correction sheet or a table of contents. As a general rule, this manual will not contain a spare parts list or voltage and resistance readings; these items will be provided only if they are available and firmed.

3. TEXT. - Text will include the following:

a. GENERAL INFORMATION. - This will provide the same information as contained in the sales service bulletin. When necessary, the sales service bulletin (if available) will be used sans alteration.

b. INSTALLATION. - All interim manuals will contain information pertaining to items (1) and (2) below. Only system manuals will contain information pertaining to item (3).

(1) Initial inspection upon receipt of equipment and the extent of TMC's obligation in replacing damaged parts.

(2) 115-vs 230-volt operation. Reference will be made to a writer's sketch or to the appropriate schematic if it is available. A system manual shall refer the reader to the individual manuals of the modular units that constitute the system.

(3) Interconnection of modular units within the system; reference will be made to a cabling diagram (if available).

c. OPERATOR'S INFORMATION. - This will provide sufficient information to operate the equipment. Manuals for modular units that function only as part of a system will refer to the system manual for operating information. Manuals for modular units that can provide a complete communications service while divorced from a system will contain operating information. Only generalized procedures covering the equipment's most common usage will be given. Specific control designations may not be given.

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## B. INTERIM MANUAL SPECIFICATION (cont'd)

d. PRINCIPLES OF OPERATION (Optional). - Circuit analyses will not be supplied in an interim manual unless they are available. When included in the interim manual, circuit analyses will provide a brief description of the unit or system on a simplified functional block diagram basis. The functional block diagram analysis will deal only with signal input and signal output information, and basically (in very general terms) what happens within the unit. A system block diagram analysis shall treat all modular-units as black boxes.

4. ART REQUIREMENTS (FUNCTIONAL BLOCK DIAGRAM, SCHEMATICS). - As a general rule, illustrations contained in an interim manual will be copies of pencil line art. In the absence of finished, drafted art, writer's sketches shall be acceptable.

5. REPRODUCTION. - The material contained in an interim manual need not be printed; it may be reproduced by xerox, ditto offset, mimeograph or some other like process. Final copy for an interim manual shall, under no circumstance, be better than typewritten manuscript copy. Pencil (hand-written) corrections to final copy shall be acceptable.

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## C. PRELIMINARY MANUAL SPECIFICATIONS

1. PURPOSE AND DEFINITION. - A preliminary manual will be issued in the absence of a final and formal printed manual. In the normal development sequence of a final printed manual, the preliminary manual will be the second edition of technical literature covering an end item manufactured by TMC. A preliminary manual shall be considered as an advanced edition of the final manual. The preliminary manual will provide the customer with sufficient information to install, to operate, and to perform basic maintenance for, the end item.

2. GENERAL. - This manual shall contain as a minimum: a green cover, a title page, a warranty sheet, applicable change notices, a record of correction sheet, a table of contents, text, a functional block diagram, applicable simplified block diagrams, all available schematics, voltage and a resistance measurements\*, a preliminary parts list (if available\*\*), and available photos of the equipment.

3. TEXT. - Text will be organized in sections to the same basic outline as used in TMC's final manuals. The content of each section is outlined in paragraphs a, b, c, d, and e, below.

a. GENERAL INFORMATION. - This section will contain a brief functional description, a physical description, technical specifications, and a listing of the electron tube and diode complement of the end item. System manuals will refer the reader to modular-unit manuals for descriptive information pertaining to the units that constitute the system.

b. INSTALLATION. - All preliminary manuals will contain information pertaining to items (1), (2), (3) and (4) below. Only systems manuals will contain information pertaining to items (5) and (6).

(1) Initial inspection upon receipt of equipment and the extent of TMC's obligation in replacing damaged parts. \*

\*Voltage and resistance measurements provided in this manual may or may not have been verified.

\*\*If there is no parts list available or if the parts list is incomplete, a note stating that the missing information "is to be supplied" shall be included.

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### C. PRELIMINARY MANUAL SPECIFICATIONS (cont'd)

(2) 115- vs 230-volts operation. Reference will be made to a writer's sketch or to the appropriate schematic if it is available. A system manual shall refer the reader to the individual manuals of the modular units that constitute the system.

(3) Physical dimensions.

(4) Power requirements. Power requirements for a system will be given either as a calculated approximation or as a measured value with P. F.

(5) Information that will enable complete positioning and inter-connect of the unit, using the system cabling diagram as a basis of discussion.

(6) Installation checkout procedure.

c. OPERATOR'S INFORMATION. - This section will provide sufficient information to operate the equipment in its various modes. Manuals for modular units that function only as part of a system will refer to the system manual for operating procedures. Manuals for modular units that can provide a complete communications service while divorced from a system will contain their own operating information. Specific control designations will be given when available; a table listing the controls and indicators and the function of each will be included. System manuals will contain specific modular-unit designations only when available.

This section will also provide information pertaining to operator's maintenance.

d. PRINCIPLES OF OPERATION. - This section will provide circuit analyses (block diagram analyses) that discuss signal inputs, signal outputs, control circuitry, special features, etc. All circuit analyses will be brief; no attempt will be made to explain special or unusual circuit design, i. e., although, in some cases, it may be necessary to state what a particular component does, no attempt will be made to explain how the component succeeds in performing its function.

Circuit analyses for system manuals shall discuss signal inputs and signal outputs of the system and of the modular units contained in the system. All discussion concerning the internal workings of any modular unit contained within the system will be kept on a block-diagram level wherein the various stages contained in a modular unit will be treated as black boxes.

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<b>C. PRELIMINARY MANUAL SPECIFICATIONS (cont'd)</b>																					

Circuit analyses for modular-unit manuals shall discuss each stage contained within the unit on a block diagram level. Inputs and outputs of each stage will be discussed; special or unusual circuitry may be mentioned but need not be explained.

e. MAINTENANCE AND TROUBLESHOOTING. - Troubleshooting (test) and alignment information, derived from TMC's test specifications, will be included in the preliminary manual. Systems manuals may refer the reader to the system operating procedures and/or the various modular-unit books instruction books for maintenance and troubleshooting procedure.

A table of special test equipment and tools required to perform troubleshooting and maintenance procedures will also be included, if applicable.

4. ART REQUIREMENTS (LINE DRAWINGS AND PHOTOGRAPHS). - Line drawings contained in a preliminary manual will, as a general rule, be pencil-line art. In the absence of finished drafted art, writer's sketches shall be acceptable; these, however, will be kept to a minimum. Photographs contained in a preliminary manual will be copies of contact prints; photos will not be retouched. If glossy prints are available, they may (in some cases) be used. If glossy photos or readable copies of photos are not available, a slip sheet (blank page bearing the title of the photo) containing a note stating that the photograph will be supplied at a later date shall be acceptable.

5. REPRODUCTION. - Final copy for a preliminary manual shall, under no circumstance, be better than typewritten manuscript copy. Pencil (hand-written) corrections to final copy (text and art) shall be acceptable. The material contained in a preliminary manual need not be printed; it may be reproduced by xerox, ditto offset, mimeograph or some other like process.

The following pages describe technical manual format on a section - by - section outline basis.

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## D. FINAL MANUAL FORMAT

### SECTION 1

#### GENERAL INFORMATION

##### 1-1 FUNCTIONAL DESCRIPTION

(Brief, non-technical explanation of equipment).

- a. TMC nomenclature.
- b. Reference to frontis piece.
- c. Simple statement of what equipment is:
  - (1) What it does.
  - (2) What equipment it is used with.
  - (3) Modes of operation available.
  - (4) Simple block diagram, if inclusion reduces length of text.
  - (5) External power source, if applicable.
- d. If equipment is inseparable component of a specific system, include in addition:
  - (1) Common name of system.
  - (2) General descriptive information of other units with which equipment is functionally associated.

##### 1-2 PHYSICAL DESCRIPTION

- a. Type of installation (rack, mounting, etc.) applicable.
- b. Dimensions.
- c. Weight.
- d. Center of gravity.
- e. Metering.
- f. Location of controls and indicators.
- g. Location of terminals (input and output).
- h. Location of fuses.

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## D. FINAL MANUAL FORMAT (cont'd)

- i. Chassis slides.
- j. Human engineering.
- k. Special access doors or plates.
- l. Equipment supplied listing in tabular form if package will contain more than one item.
- m. A listing of specialized test equipment for depot type of maintenance or accessory items such as remote control units shall be listed under the heading of "Optional Items Not Normally Supplied". This listing shall be in tabular form.

### 1-3 TECHNICAL SPECIFICATIONS

All electrical and physical specifications required to provide installer, operator or maintenance technician with quick reference to following, derived as feasible from appropriate bulletins:

- a. Frequency range.
- b. Size.
- c. Operating power.
- d. Impedences (input and output).
- e. Modes of operation.
- f. Similar applicable information (see technical bulletin).



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## D. FINAL MANUAL FORMAT (cont'd)

### SECTION 2 INSTALLATION

#### 2-1 UNPACKING AND HANDLING

(Normally a standard paragraph respecting care, inspection, liability and assistance, but add sufficient information to cover anything unusual, such as: protective straps, tape, or blocks that should be removed from skids or shipping platforms. Essentially do not include routine uncrating procedures, but anticipate problem areas.

#### 2-2 MECHANICAL INSTALLATION

Information essential for physically installing equipment in its housing, including outline dimensional drawing showing dimensions required for installation. Following additional, when applicable:

a. If chassis slides provided, procedural installation steps. Normally a small diagram of the slide details will avoid a lengthy text.

b. If equipment is disassembled before shipment, complete re-assembly instructions are required.

#### 2-3 ELECTRICAL INSTALLATION

All information essential to complete electrical installation including,

a. Power requirements (Primary voltage, frequency, phase).  
b. Transformer wiring-change diagrams, when applicable, for all feasible primary input voltages.

c. Instructions for connection of electrical leads to equipment in most appropriate form for complexity of problem. An illustration (half-tone or line drawing) should call out the precise connection points.

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## SECTION 3 OPERATOR'S SECTION

### 3-1 GENERAL

Brief description of following, when applicable:

- a. General operating capabilities
- b. Pre-operational considerations (crystal selection, special dial settings).
- c. Side band theory applicable, only if it involves relatively uncommon aspects.
- d. Arbitrary limitations, if any, on operating procedures.

### 3-2 CONTROLS AND INDICATORS

- a. Location and function of all controls and indicators required for operation, normal or other.
- b. Refer to illustrations in section 2 for controls on rear panel and to section 5 for controls located internally.

### 3-3 OPERATING PROCEDURES

Detailed operating information in procedural form when feasible, to include: preliminary control setting, starting, operating procedure for various modes, and stopping (shut down).

- b. Adequate reference to illustrations for clarity in locating proper controls and indicators.
- c. When the unit can be operated only as an integral part of a larger system, refer to the appropriate system manual. If, however, the modular unit procedures can be coherently isolated from the overall system procedures, the appropriate procedures for the unit should be included in the modular unit manual, with general reference to the system operative procedure.

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## SECTION 4 PRINCIPLES OF OPERATION

### 4-1 GENERAL

a. Brief description of nature of unit and how it is functionally used with other allied equipment. This should not duplicate paragraph 1-1, but should be just sufficient to lead into the following text.

b. Arbitrary limitations, if any, placed upon information.

### 4-2 OVERALL FUNCTIONAL ANALYSIS

a. Brief explanation of how the various sections, printed circuit boards, or major circuits of the unit or system are functionally related. Normally a combination of austere text and a simplified functional block diagram should prove to be the most compact and understandable vehicle.

b. Where a unit contains many PC boards, the functional analysis text shall reference these boards to their particular functions on the block diagram. Conversely, each block on the diagram shall reference the particular board or boards associated with its function, and shall include a brief block sub-diagram if:

(1) The main block represents more than one PC board (in which case each PC board would become a block of the sub-diagram); or,

(2) The main block represents a single PC board that performs more than one discrete function (eg.- DEMODULATOR/AUDIO board, in which case each function would become a block of the sub-diagram).

If (1) and (2) above are followed, each main block should represent at least one PC board. If a main block is found to include only part of a PC board, then the block or blocks should be redrawn to include at least one PC board per block, consistent with a logical overall functional sequence.

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c. Note that the functional analysis and block diagram shall operate only on a very general "system" level. Discussion of signal input, output, and flow shall reference an appropriate figure in Section 7, and will instruct the reader to refer to this figure for a detailed description of the PC board or circuit under discussion; however, Section 4 should note the type of signal currently under discussion (RF, DC, etc.). Simplified schematics will be used in Section 4 only when it is necessary to provide information directly affecting overall operation of the unit. Where necessary for clarification and/or simplification of test procedures, a separate simplified functional block diagram may be included for each applicable mode of operation. Each simplified diagram should show signal flow, control positions, etc. only for a particular mode. Thus, the test technician can quickly isolate the operative (and/or inoperative) stages for a particular mode. Generally, individual PC board or circuit descriptions will be located (along with individual schematics and block diagrams, if required for circuit description) in Section 7.

### 4-3 CIRCUIT ANALYSIS

Circuit descriptions shall be sufficiently detailed so as to portray a logical sequence of events, such as interstage signal flow, switching functions, and the interrelation of the various circuits and/or PC boards. It is very important to impress upon the reader the reason (from a functional system standpoint) for a particular circuit or PC board; therefore, discussion in this section should focus upon and make reference to the functional description of the PC board or circuit rather than to a TMC part number or assembly number.

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## SECTION 5 MAINTENANCE

### 5-1 PREVENTIVE MAINTENANCE

- a. Series of preventive maintenance procedures required to properly maintain the equipment.
- b. When time factors other than usage, such as deterioration of batteries, are concerned indicate specific time periods.

### 5-2 TROUBLESHOOTING

- a. Organise text to facilitate location of trouble in a functional section, stage and component, in that order, using the production test specifications as the technical guide. Note that the test specifications must be understood, validated, and rewritten in an intelligible form.
- b. Equipment performance tests which are not essential for troubleshooting will not be included.
- c. Test equipment and special tools required to perform troubleshooting procedures should be specified when not obvious. Name, type, manufacturer and model number for each piece of equipment should be include. Note that the basic test specifications may specify more than is needed for troubleshooting, and that consequently that which is required for troubleshooting has to be identified.
- d. Internal views are usually required to show component locations corresponding to the troubleshooting instructions. Such components should be clearly labeled or otherwise identified.

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### 5-3 REPAIR AND REPLACEMENT

Details should be included if:

- a. The required procedure for removal and/or replacement of any component is not obvious.
- b. Realignment is necessary after replacement.
- c. Positioning or polarity is critical.
- d. Particular techniques of repair or replacement of components such as printed circuit boards, transistor, etc, are required.
- e. Mention that replacement of an electron tube in a frequency-determining circuit (oscillator stages, etc.) does not guarantee satisfactory results. Some circuits may function better with one tube than with another even though both are new.
- ~ f. Fuse replacement information (in tabular form).

### 5-4 ALIGNMENT

- a. All alignment procedures required for maintenance of satisfactory equipment operation shall be included. If none is required (power supplies, loudspeaker panels, etc.) do not include this section.
- b. List equipment and special tools required for alignment shall be included if not obvious. Those that are identical with troubleshooting equipment or tools will not be repeated, but rather a general reference made to paragraph 5-2.

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## SECTION 6 PARTS LIST

### 6-1 INTRODUCTION

Include the same standard introduction explaining the following parts list unless the specific contract requires different information. This will normally only apply when the manual is being generated as a result of a successful military competitive bid.

### 6-2 TABULAR PARTS LISTING

a. In alphanumeric order of reference symbols, enter (in successive columns) the reference symbol, description, and TMC part numbers of each replaceable part (Note that integrated and/or encapsulated circuits are replaceable only as a unit, and should be listed as such). The parts list shall contain a title sheet on which there shall be an explosion (to the lowest functional level for which a discrete assembly exists) of replaceable electrical component assemblies in the particular unit.

b. Parts lists for individual component assemblies (such as PC boards) will normally be part of the detailed individual circuit description section, and will be contained within a fold-out circuit description "package" to be inserted in Section 7, immediately following the overall wiring harness diagram(s).

### 6-3 NOMENCLATURE

Tabular parts lists shall be prepared in accordance with TMC part number specs, as well as applicable MIL part numbers.

REF: H-61 (MIL) Cataloging Handbook.  
S755 (TMC) Coil and Transformer Nomenclature.  
S570 (TMC) Abbreviations.  
Y32.16-1965 (ASA) Reference Designation Specification.

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## SECTION 7 SCHEMATIC DIAGRAMS

### 7-1 INTRODUCTION

Section 7 shall contain an index of schematics, and will normally be assembled as follows:

- a. Title page with index.
- b. Overall chassis wiring diagram(s). Include wiring harnesses, front/rear panel interconnections, power input connections, etc.
- c. Schematic, parts list, wave form analysis and functional description for each individual PC board or major circuit as indicated in the attached sample. A block diagram of the individual board or circuit may be included if required for clarification.

NOTE: For units that are customer-specialized and/or one-of-a-kind systems, of schematics will take the form of copies run off by Reproduction. Two complete sets of schematics will be provided: one set to be bound into the book, and another set to be enclosed in an envelope firmly attached to the book itself at the end of Section 7.

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Following is an example of a schematic foldout and detailed circuit analysis.



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## METER DRIVER BOARD

Meter Driver Board A-8469 receives a 250 kHz IF input at pins 2 and 3 from a low-impedance output IF buffer. T301 acts as an isolation transformer, and drives diodes CR301 and CR302 with 250 kHz. CR301 and CR302 rectify the 250 kHz voltage into pulsating DC and feed it to a filter network comprising C301, L301, and RFC 303, which in turn applies the filtered DC to the input of DC amplifier Z301, an integrated circuit. Voltage at the input (terminal 3) of Z301 should not exceed +0.5 volts with respect to ground (pin 1 of the board).

Z301 has an amplification factor of approximately 40, and should exhibit an output voltage of +20 volts to ground at output terminal 7, with +0.5 volts at terminal 3. When terminal 3 of Z301 is shorted to ground, voltage at terminal 7 should rise to approximately +30 volts to ground. Potentiometer R317 adjusts idling current of Z301; with terminal 3 shorted to ground, idling current through R317 should be on the order of 1 ma.

Output of Z301 feeds a time-averaging network consisting of C305, C306, C307, C310, R303, R304, and R312. This network in turn will draw a DC current proportional to the average current drawn by Z301 through an external meter load of not less than 4 ohms.

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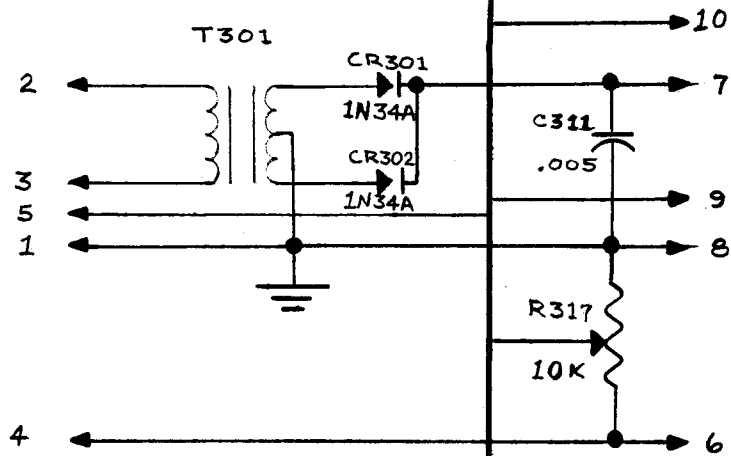
## D. FINAL MANUAL FORMAT (cont'd)

### CHANGE NOTICE AND ADDENDUM SHEETS

The following CHANGE NOTICE or ADDENDUM sheets will be used when an Engineering modification effects a piece of equipment for which a Tech Manual already has been provided.

(Refer to sample ADDENDUM for proper format.)

<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>TMC PART NO.</u>
C301	C: FXD CER 5000 PF GMV; 500 VDCW	CC-100-15
GR301	SEMICONDUCTOR: DIODE	1N34A
CR302	Same as CR301	
R317	R: VAR COMP 10K OHM 10% LIN	RV4LAYSAL03A
T301	TRANSFORMER: INPUT	TT-869



PAGE  
FOLDOVER

Schematic Diagram, Meter Driver Board A-8469

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## ART IDENTIFICATION

### 1-1 IDENTIFICATION NUMBERING OF ILLUSTRATIONS.

1-1a. All illustrations appearing in a manual shall have an identification number; This number shall be placed in the lower left corner of the art (inside the crop marks) as close to the art as possible and shall become a permanent part of the illustration. For obvious reasons, the ultimate position of the number shall not interfere with or create confusion with any of the callouts or the art. Once a piece of art is identified, it shall maintain its original number regardless of where it is used.

1-1b. If an identified piece of art is modified, the modified change shall be assigned a new identification number. Changes in figure numbers and titles of assigning and affixing identification numbers to various types of art. In all cases, identification numbers shall be sized so that they reduce to fourpoint lettering in final print.

### 1-2 TMC DRAWINGS.

1-2a. TMC drawings (for example CK-638, CA-615, MS-2118-1, A-138, etc.) that are used as original art for a manual shall be assigned the CK-, CA-, MS-, or A- number, etc. providing the drawings have not been modified. A modification is any temporary change made to the original other than opaqueing the grid coordinates, the title, and the revision box.

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1-2b. METHOD OF AFFIXING IDENTIFICATION NUMBER. - To avoid permanent markings on TMC art, the method of placing the identification number on the TMC drawings shall be as follows:

### NOTE

If the title box (bearing the TMC drawing number) is to be printed, disregard the temporary method of affixing the identification number.

1. Type the appropriate CK-, CA-, MS-, or CA- number, etc. on a piece of self-adhesive correction tape.
2. Neatly place tape on lower left corner of TMC drawing.

### 1-3 MODIFIED TMC DRAWINGS, PHOTOGRAPHS OR PUBLICATION DEPARTMENT ORIGINALS.

1-3a. Artwork in this category shall be assigned the IN-number of the associated manual, followed by a dash (or hyphen) and the sequential number of the art as it appears in the manual. For example, if figure 3-1 is the 19th illustration in a manual (IN-100), figure 3-1 shall be numbered 100-19.

1-3b. MULTIPLE OVERLAYS.- When an art board has multiple overlays each overlay shall be assigned the identification number (refer to paragraph 1-3a) for the basic (original) art board followed by a dash (or hyphen) and the sequential number of the overlay.

### EXAMPLE:

Assume that an art board with three overlays first appears in manual IN-100. Assume also that the first overlay (and the art board) is figure 3-1 and is the 19th illustration in the manual; the second and third overlays are figures 5-4 and 5-7 respectively. The first overlay shall be numbered 100-19-1; the second and third overlay shall be numbered 100-19-2 and 100-19-3 respectively. When assigning identification numbers to the remaining art, figures 5-4 and 5-7 are considered as the 19th illustration.

# TMC SPECIFICATION

NO. S 934

REV:

A

COMPILED:

CHECKED:

APPD:

SHEET 21 OF 22

TITLE:

SPECIFICATION FOR TMC INSTRUCTION MANUALS

## D. FINAL MANUAL FORMAT (cont'd)

1-3c. NEGATIVE NUMBERS FOR HALF TONES. - In addition the the identification number (paragraph 1-3a), half tones shall also be identified by the negative number (see example below) of the photograph used; this number is assigned by the photographer.

### EXAMPLE:

6 4 0 2 . 1 1 - 5

year = 1964   month = Feb.   day = 11th   5th photo taken

The above photo was the 5th photo taken on Feb. 11, 1964  
The negative for this photo is filed by the number shown above at the photographer's studio.

1-3d. METHOD OF AFFIXING IDENTIFICATION NUMBERS. - The method of placing the identification number on this type of artwork shall be determined by its originator. Schematics, block diagrams, cabling diagrams, half tones with or without callouts, etc. shall have the identification number placed on them at the time of generation. Photographs with callouts shall have the identification number placed on the overlays containing the callouts. The method described in paragraph 1-2b or mechanical lettering may be used on half tones (reduced or otherwise).

Negative numbers for half tones shall be typed or mechanically littered on the binding edge of the repro page. The number shall be placed on the upper lower half of the page (whichever is closer to the half tone) so that it will not be destroyed when the page is three-hole punched. Further, the top of the number shall be placed close to the edge of the page and the bottom of the number shall be placed closest to the center of the page.

# TMC SPECIFICATION

NO. S 934

REV: A

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APPD:

SHEET 22 OF 22

TITLE:

SPECIFICATION FOR TMC INSTRUCTION MANUALS

D. FINAL MANUAL FORMAT (cont'd)

## 1-4 IDENTIFICATION OF ART BOARDS AND LINE ART FOR FILING AND REF.

1-4a. GENERAL. - All art board and line art drawings shall be identified with the number established in paragraph 1-3a and with an "EQUIPMENT USED ON" stamp (figure 1). The following paragraphs establish the methods of affixing the identification number and the stamp.

1-4b. ART BOARDS. - The identification number shall be placed on the outside of the flap in the upper left corner (figure 2) and the "EQUIPMENT USED ON" stamp shall be placed in the center of the flap. On half tones, in addition to the identification number, the negative number (paragraph 1-3c) shall be legibly pencilled on the back of the art board in the lower left corner.

1-4c. LINE ART. - The identification number shall be placed on a piece of masking tape and then on the back of the drawing as shown in figure 3. The "EQUIPMENT USED ON" stamp shall be placed immediately above the identification number as shown in figure 3.





CHANGE NO. 4



## INSTRUCTION BOOK CHANGE NOTICE

Date May 5, 1967

Manual affected: STABILIZED CRYSTAL OSCILLATOR MODEL TRX-1 IN 4006

The following change is to be incorporated in Section 1 General Information  
Page 1-1, Paragraph 1-2  
Change CR-45/u to read CR47A/u

The following Figures in Section 4 Troubleshooting are no longer valid,  
Page 4-1, figure 4-1. Block Diagram of Model TRX-1  
Page 4-4, figure 4-3 Simplified Schematic of HFO circuitry

The following change is to be incorporated in Section 4 Troubleshooting  
substitute figure 4-9. Page 4-9/4-10  
Attached to this change notice, for figure 4-9, Page 4-9/4-10 now in manual.

The following change is to be incorporated in Section 7.  
Substitute figure 7-1 page number 7-3/7-4. Attached to this change notice,  
for figure 7-1 page number 7-3/7-4 now in manual.

The following change is to be incorporated in Section 6 Parts List.  
Substitute new Parts List attached to change notice for old Parts List now  
in manual.

SHOULD ADDITIONAL COPIES OF THIS CHANGE NOTICE BE REQUIRED, PLEASE CONTACT:

THE TECHNICAL MATERIEL CORP., 700 Fenimore Road, Mamaroneck, New York

Attn.: Director of Eng. Services.

# SECTION 6

## PARTS LIST

### 6-1. INTRODUCTION

The parts list presented in this section is a cross-reference list of parts identified by a reference designation and TMC part number. In most cases, parts appearing on schematic diagrams are assigned reference designations in accordance with MIL-STD-16. Wherever practicable, the reference designation is marked on the equipment, close to the part it identifies. In most cases, mechanical and electro-mechanical parts have TMC part numbers stamped on them.

To expedite delivery when ordering any part, specify the following:

- a. Reference symbol.
- b. Description as indicated in parts list.
- c. TMC part number.
- d. Model and serial numbers of the equipment containing the part being replaced; this can be obtained from the equipment nameplate.

For replacement parts not covered by warranty (refer to warranty sheet in front of manual), address all purchase orders to:

The Technical Materiel Corporation  
Attention: Sales Department  
700 Fenimore Road  
Mamaroneck, New York

#### Assembly or Subassembly

Stabilized Crystal Oscillator, TRX-1 . . . . .	6-2
Oven Oscillator, A0111 . . . . .	6-11
Filter Radio Interference, A4449 . . . . .	6-11

PARTS LIST  
for  
STABILIZED CRYSTAL OSCILLATOR, TRX-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C101	CAPACITOR, FIXED, PLASTIC DIELECTRIC: .10 uf, $\pm 5\%$ ; 400 WVDC.	CN114R10-4J
C102	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C103	Same as C102.	
C104	CAPACITOR, FIXED, MICA DIELECTRIC: 680 uuf, $\pm 2\%$ ; 500 WVDC.	CM20F681G03
C105	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, $\pm 10\%$ ; 100 WVDC.	CM111C102K1S
C106	CAPACITOR, FIXED, CERAMIC DIELECTRIC: .02 uf, +80% -20%; 500 WVDC.	CC100-24
C107	CAPACITOR, FIXED, MICA DIELECTRIC: 24 uuf, $\pm 5\%$ ; 500 WVDC.	CM15C240J03
C108	CAPACITOR, FIXED, MICA DIELECTRIC: 100 uuf, $\pm 5\%$ ; 500 WVDC.	CM15F101J03
C109	Same as C102.	
C110	Same as C104.	
C111	CAPACITOR, FIXED, CERAMIC DIELECTRIC: .1 uf, +80% -20%; 500 WVDC.	CC100-32
C112	Same as C101.	
C113	Same as C106.	
C114	CAPACITOR, FIXED, MICA DIELECTRIC: 470 uuf, $\pm 2\%$ ; 500 WVDC.	CM15F471G03
C115	CAPACITOR, FIXED, CERAMIC DIELECTRIC: .1 uf, +80% -20%; 100 WVDC.	CC100-28
C116	Same as C115.	
C117	Same as C114.	
C118	CAPACITOR, FIXED, CERAMIC DIELECTRIC: .02 uf, +60% -40%; 150 WVDC.	CC100-35
C119	CAPACITOR, FIXED, CERAMIC DIELECTRIC: .001 uf, GMV; 500 WVDC.	CC100-29

## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C120	Same as C102.	
C121	CAPACITOR, FIXED, CERAMIC DIELECTRIC: .005 uf, GMV; 500 WVDC.	CC100-15
C122	CAPACITOR, FIXED, ELECTROLYTIC: 125 uf, 15 WVDC; polarized.	CE105-125-15
C123	Same as C122.	
C124	NOT USED	
C125	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 9-35 uuf; 100 WVDC.	CV112-2
C126	CAPACITOR, FIXED, MICA DIELECTRIC: 10 uuf, $\pm 5\%$ ; 500 WVDC.	CM15C100J03YY
C127	Same as C126.	
C128	Same as C125.	
C129	Same as C125.	
C130	CAPACITOR, FIXED, MICA DIELECTRIC: 15 uuf, $\pm 10\%$ ; 500 WVDC.	CM15B150K03
C131	CAPACITOR, FIXED, MICA DIELECTRIC: 330 uuf, $\pm 2\%$ ; 500 WVDC.	CM15F331G03
C132	Same as C106.	
C133	Same as C102.	
C134	Same as C106.	
C135	Same as C102.	
C136	CAPACITOR, FIXED, MICA DIELECTRIC: 47 uuf, $\pm 5\%$ ; 500 WVDC.	CM15C470J03
C137	CAPACITOR, FIXED, MICA DIELECTRIC: .002 uf, $\pm 10\%$ ; 500 WVDC.	CM100-14
C138	Same as C101.	
C139	Same as C106.	
C140	Same as C101.	

## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C141	Same as C106.	
C142	Same as C106.	
C143	CAPACITOR, FIXED, ELECTROLYTIC: 975 uf, -10% +75%; 300 WVDC.	CE112-5P
C144	CAPACITOR, FIXED, ELECTROLYTIC: 250 uf, -10% +75%; 300 WVDC.	CE112-4P
C145 thru C148	Same as C102.	
C149 thru C152	Same as C111.	
C153	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 5.5-18 uuf; 200 WVDC.	CV112-1
C154 thru C162	Same as C153.	
C163	Same as C107.	
C164	CAPACITOR, FIXED, MICA DIELECTRIC: 22 uuf, $\pm 5\%$ ; 500 WVDC.	CM15C220J03
CR101	SEMICONDUCTOR DEVICE, DIODE: germanium	DD102-1
CR102	SEMICONDUCTOR DEVICE, DIODE: germanium	1N34A
CR103	SEMICONDUCTOR DEVICE, DIODE: silicon	1N1084A
CR104 thru CR106.	Same as CR103.	
DS100	LAMP, NEON: 105/125 V, 1/25 watts; miniature bayonet base, T-3-1/4 bulb.	BI100-51
DS101	LAMP, INCANDESCENT: 6-8 V, 0.25 amps; bayonet base, T-3-1/4 bulb.	BI101-44
EV101	SHIELD, ELECTRON TUBE: 1-3/4" high x 0.930" base dia.	TS102U02

## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
EV102	Same as EV101.	
EV103	SHIELD, ELECTRON TUBE: 1-3/8" high x 0.930" base dia.	TS102U01
EV104	SHIELD, ELECTRON TUBE: 1-5/16" high x 1.079" base dia.	TS103U02
EV105	Same as EV101.	
EV106	Same as EV101.	
F101	FUSE, CARTRIDGE: 1 amp; 1-1/4" long x 1/4" dia.; slo-blo. (FOR 115 VOLT OPERATION)	FU102-1
F101	FUSE, CARTRIDGE: 1/2 amp; 1-1/4" long x 1/4" dia.; slo-blo. (FOR 230 VOLT OPERATION)	FU102-.5
FL101	FILTER, RADIO INTERFERENCE. (SEE SEPERATE PARTS LIST FOR BREAKDOWN.)	A4449
J101	CONNECTOR, RECEPTACLE, ELECTRICAL: RF; 1 round female contact, straight type.	UG625*/U
J102 thru J107	Same as J101.	
J108	CONNECTOR, RECEPTACLE, ELECTRICAL: male; current rating 10 amps at 250 V or 15 amps at 125 V; twist lock type.	JJ175
J109	CONNECTOR, RECEPTACLE, ELECTRICAL: 4 female contacts.	JJ120-2
J110	CONNECTOR, RECEPTACLE, ELECTRICAL: 9 male contacts, rated for 7.5 amps at 2,000 V RMS.	JJ193-9P
L101	COIL, RADIO FREQUENCY: fixed; 1.2 uh, $\pm 20\%$ ; molded case.	CL240-1.2
L102	COIL, RADIO FREQUENCY: fixed; 120 uh, $\pm 10\%$ ; molded case.	CL240-120
L103	COIL, RADIO FREQUENCY: fixed; .560 mh, $\pm 10\%$ ; molded case.	CL140-5
L104.1,.2 .3	CORE, TOROID: bead type.	CI120-1

## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L105.1,.2,.3	Same as L104.1,.2,.3	
L106	COIL, RADIO FREQUENCY: fixed; 47 uh, $\pm 10\%$ ; molded case.	CL240-47
L107	COIL, RADIO FREQUENCY: fixed; 2.5 mh, $\pm 10\%$ ; molded case.	CL140-1
L108	Same as L107.	
L109	Same as L107.	
L110.1,.2,.3	Same as L104.1,.2,.3	
L111.1,.2,.3	Same as L104.1,.2,.3	
L112	COIL, RADIO FREQUENCY: fixed; 1.1 uh, $\pm 20\%$ .	CL303
L113	Same as L112.	
L114	COIL, RADIO FREQUENCY: tuned; 1.1 uh	AC171
L115	COIL, RADIO FREQUENCY: fixed; 8.2 uh, $\pm 10\%$ ; molded case.	CL240-8.2
L116	Same as L115.	
L117.1,.2,.3	Same as L104.1,.2,.3	
L118.1,.2,.3	Same as L104.1,.2,.3	
P101	Part of A0111.	
P102	CONNECTOR, PLUG, ELECTRICAL: 9 female contacts; miniature type. Part of W102.	PL189-9S
R101	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF101J
R102	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, $\pm 5\%$ ; 1 watt.	RC32GF153J
R103	RESISTOR, FIXED, COMPOSITION: 560 ohms, $\pm 5\%$ ; 1 watt.	RC32GF561J
R104	Same as R102.	
R105	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF473J

## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R106	RESISTOR, FIXED, COMPOSITION: 56 ohms, $\pm 5\%$ ; 1 watt.	RC32GF560J
R107	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF104J
R108	RESISTOR, FIXED, COMPOSITION: 68 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF680J
R109	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF333J
R110	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF221J
R111	RESISTOR, FIXED, WIREWOUND: 3480 ohms, $\pm 1\%$ ; 10 watts.	RE65G3481
R112	Same as R102.	
R113	RESISTOR, FIXED, COMPOSITION: 390 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF391J
R114	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF392J
R115	RESISTOR, VARIABLE, COMPOSITION: 5,000 ohms, $\pm 10\%$ ; 2 watts.	RV4LAYS502 A
R116	Same as R114.	
R117	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF682J
R118	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF102J
R119	Same as R117.	
R120	RESISTOR, FIXED, COMPOSITION: 27 ohms, $\pm 5\%$ ; 1 watt.	RC32GF270J
R121	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 5\%$ ; 1 watt.	RC32GF223J
R122	RESISTOR, FIXED, COMPOSITION: 150 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF151J
R123	Same as R118.	



## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R124	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF123J
R125	Same as R109.	
R126	Same as R107.	
R127	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF103J
R128	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF101J
R129	Same as R128.	
R130	RESISTOR, FIXED, COMPOSITION: 10 ohms, $\pm 5\%$ ; 2 watts.	RC42GF100J
R131	RESISTOR, FIXED, WIREWOUND: 402 ohms, $\pm 1\%$ ; 10 watts.	RE65G4020
R132	Same as R101.	
R133	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, $\pm 5\%$ ; 1 watt.	RC32GF392J
R134	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF222J
R135	Same as R122.	
R136	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, $\pm 5\%$ ; 2 watts.	RC42GF683J
R137	RESISTOR, VARIABLE, COMPOSITION: 1,000 ohms, $\pm 10\%$ ; 2 watts.	RV4LAYS102A
R138	Same as R107.	
R139	RESISTOR, FIXED, COMPOSITION: 12 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF120J
S101	SWITCH, ROTARY: 1 section, 12 positions; non-short- ing type contacts, rated for 1 amp at 28 VDC or 5 amps at 110 VAC.	SW315
S102	SWITCH, ROTARY: 1 section, 3 positions; non-short- ing type contacts, rated for 1 amp at 28 VDC or 5 amps at 110 VAC.	SW314

## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S103	SWITCH, ROTARY: 1 section, 2 position; non-shorting type contacts, rated for 1 amp at 28 VDC or 5 amps at 110 VAC.	SW119
T101	TRANSFORMER, RADIO FREQUENCY: tuned; operating frequency range 2-40 mc; input impedance 1650 ohms center tapped; output impedance 50 ohms balanced; hermetically sealed case; plug-in type.	TR178
T102	TRANSFORMER, RADIO FREQUENCY: tuned; operating frequency 3.5 mc; nom. inductance 5.7 uh; aluminum case.	TT190
T103	TRANSFORMER, POWER: primary 115/230 V, 50/60 cps; secondary (a) 175 V RMS at 100 MADC, (b) 6.3 VAC at 2.5 amps; stell case.	TF238
V101	TUBE, ELECTRON: sharp-cutoff pentode; 7 pin miniature.	6EW6
V102	Same as V101.	
V103	TUBE, ELECTRON: medium-mu triode; 7 pin miniature.	6AF4
V104	TUBE, ELECTRON: twin tetrode; 9 pin miniature.	7645
V105	TUBE, ELECTRON: sharp-cutoff pentode; 7 pin miniature.	6AU6
V106	Same as V105.	
W101	WIRING HARNESS, BRANCHED: consists of, various lengths and colors of MIL type MWC insulated wire and one length of RF cable RG174/U.	CA717
W102	WIRING HARNESS, BRANCHED: consists of one connector sym. P102.	CA719
XCR101	NOT USED	
XCR102	NOT USED	
XCR103	HOLDER, RECTIFIER: 1-3/8" x 2-1/4"; polarized.	CU138
XCR104 thru XCR106	Same as XCR103.	

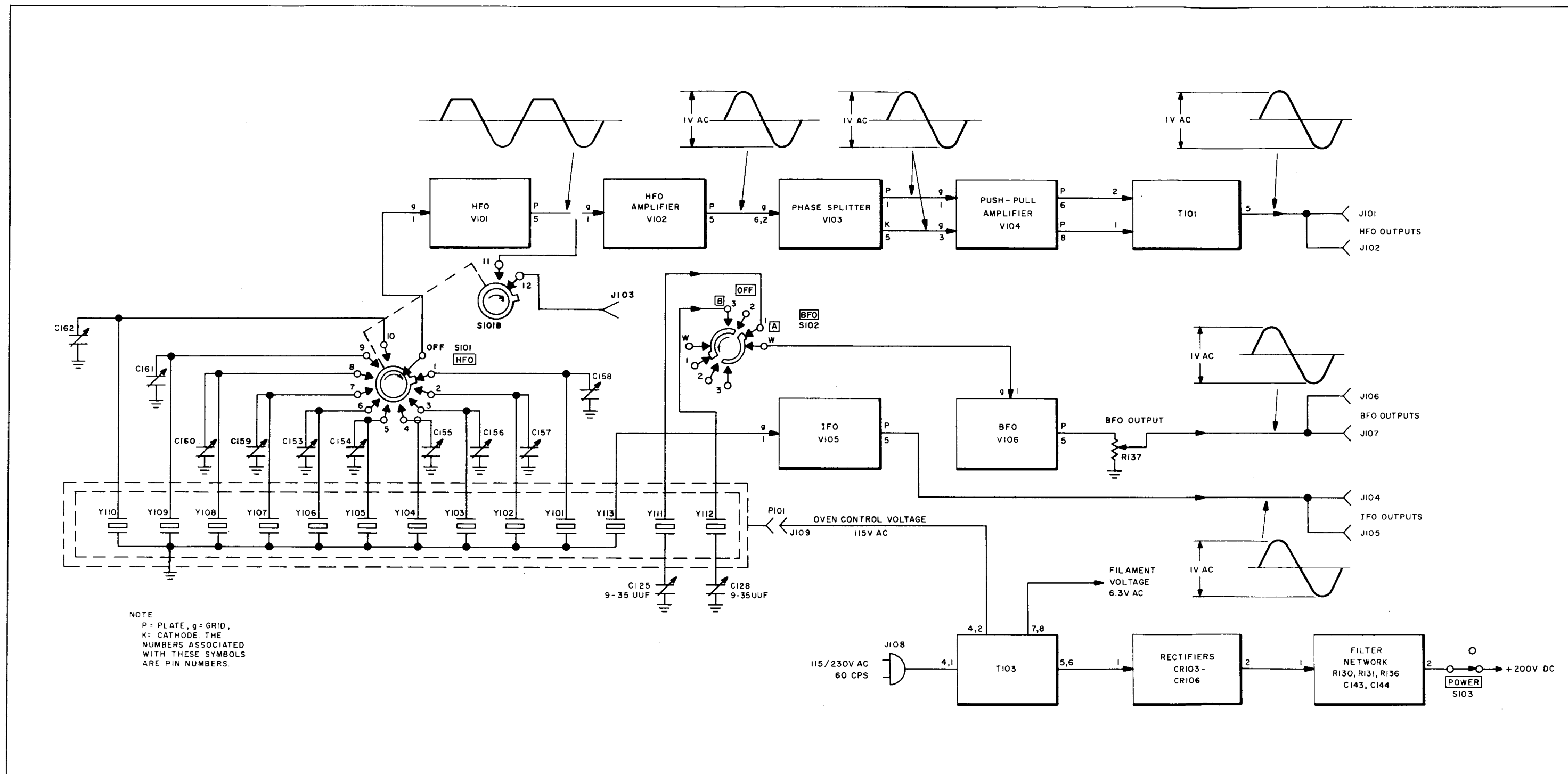
## PARTS LIST (CONT)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XDS100	LIGHT, INDICATOR: w/clear unfrosted lens; for miniature bayonet base T-3-1/4 bulb.	TS106-2
XDS101	LIGHT, INDICATOR: w/red frosted lens; for miniature bayonet base T-3-1/4 bulb.	TS106-1
XF101	FUSEHOLDER: extractor post type; accommodates cartridge fuse 1-1/4" long x 1/4" dia; bushing mounted.	FH103
XT101	SOCKET, ELECTRON TUBE: 7 pin miniature.	TS130MPW
XV101	SOCKET, ELECTRON TUBE: 7 pin miniature.	TS102P01
XV102	Same as XV101.	
XV103	Same as XV101.	
XV104	SOCKET, ELECTRON TUBE: 9 pin miniature.	TS103P01
XV105	Same as XV101.	
XV106	Same as XV101.	
XY101	SOCKET, CRYSTAL: 2 contacts; 0.050 " dia., spaced 0.486" C to C.	TS104-1
XY102 thru XY113	Same as XY101.	
Y101	CRYSTAL UNIT, QUARTZ: (Frequency per customer requirements.)	CR27/U-FREQ
Y102 thru Y110	Same as Y101.	
Y111	CRYSTAL UNIT, QUARTZ: .458 mc, $\pm$ .002%; operating temperature 70 to 80°C; HC-6/U type holder.	CR47A/U-.458P
Y112	CRYSTAL UNIT, QUARTZ: .452 mc, $\pm$ .002%; operating temperature 70 to 80°C; HC-6/U type holder.	CR47A/U-.452P
Y113	CRYSTAL UNIT, QUARTZ: 3.500 mc, $\pm$ .002%; operating temperature 70 to 80°C; HC-6/U type holder.	CR27/U3.500P
Z101	OVEN OSCILLATOR. (SEE SEPERATE PARTS LIST FOR BREAKDOWN)	A0111

PARTS LIST  
for  
OVEN OSCILLATOR, AO111

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 500 WVDC.	CC100-32
HR1	HEATING ELEMENT: 110/220 V; 20 watts; 2 wire lead type terminals.	RR102-1
HR2	Same as HR1.	
P101	CONNECTOR, PLUG, ELECTRICAL: 4 male contacts, straight type.	PL106-1
R1	RESISTOR, FIXED, COMPOSITION: 10 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF100J
S1	SWITCH, THERMOSTATIC: SPST; 60 watts at 30 VAC/DC, 150 watts at 120 VAC/DC; hermetically sealed brass case with coating of film type; 2 copper wire leads.	SS106-1
PARTS LIST for FILTER RADIO INTERFERENCE, A4449		
C1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 300 WVDC.	CC100-37
C2 thru C4	Same as C1.	
L1	COIL, RADIO FREQUENCY: 8.20 uh, $\pm 10\%$ ; molded case.	CL270-8.2
L2	Same as L1.	





010634006

Figure 4-9. TRX-1, Service Block Diagram

EXCITER DRAWER

MODEL AX687

The Exciter Drawer, Model AX687, performs the same function as Model AX688, with the following exception:

The Model AX687, does not contain SWR overload circuitry.

Changes to the manual are in the following areas:

- 1) Figure 1-1, is no longer applicable, see line drawing attached to addendum.
- 2) Paragraph 3-2, delete step 2.
- 3) Table 3-1, delete number 2.
- 4) Figure 3-1, Front Panel View, delete number 2, SWR switch.
- 5) SECTION 4, PRINCIPLES OF OPERATION is no longer applicable, Refer to revised PRINCIPLES OF OPERATION, attached to addendum.
- 6) Figure 4-1, is no longer applicable, refer to revised Functional Block Diagram attached to addendum.
- 7) Table 5-1, Delete steps 3,4 and 5.
- 8) Figure 7-1, Schematic Diagram for Model AX688 is no longer applicable, Refer to Schematic Diagram for Model AX687 attached to addendum.

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL (Refer to Figure 4-1).

The Exciter Drawer houses the Exciter Unit, and also contains control relays for the associated transmitter. The block diagram shows the interequipment signal flow between the Exciter Drawer the Exciter and the transmitter with the Remote Unit.

4-2. CIRCUIT DESCRIPTION.

The Exciter Drawer contains a -28vdc power supply, a HV ON-OFF relay K200, and a protective, latching type relay K204, which prevents current from entering, the exciter circuits during CW operation.

When power switch S200, is placed in the ON position phase 2 is applied through the switch to plug P200, which supplies primary power to the exciter unit. Phase 1 and 2 is applied directly to the primary of step down transformer T200. Transformer T200, supplies the 28vac operating voltage to rectifier diode assembly CR201. The -28vdc developed in the rectifier circuit delivers a pulse to the coil of relay K204, pulling the wiper to it. The wiper remains in this position until a pulse is delivered to the other coil.

High Voltage ON-OFF relay K200, remains in the deenergized condition until the remote HV ON-OFF switch which is located on the associated remote panel, is closed.

In the energized state relay K200, allows the Remote HV Indicator, and the associated transmitter HV circuit to operate.



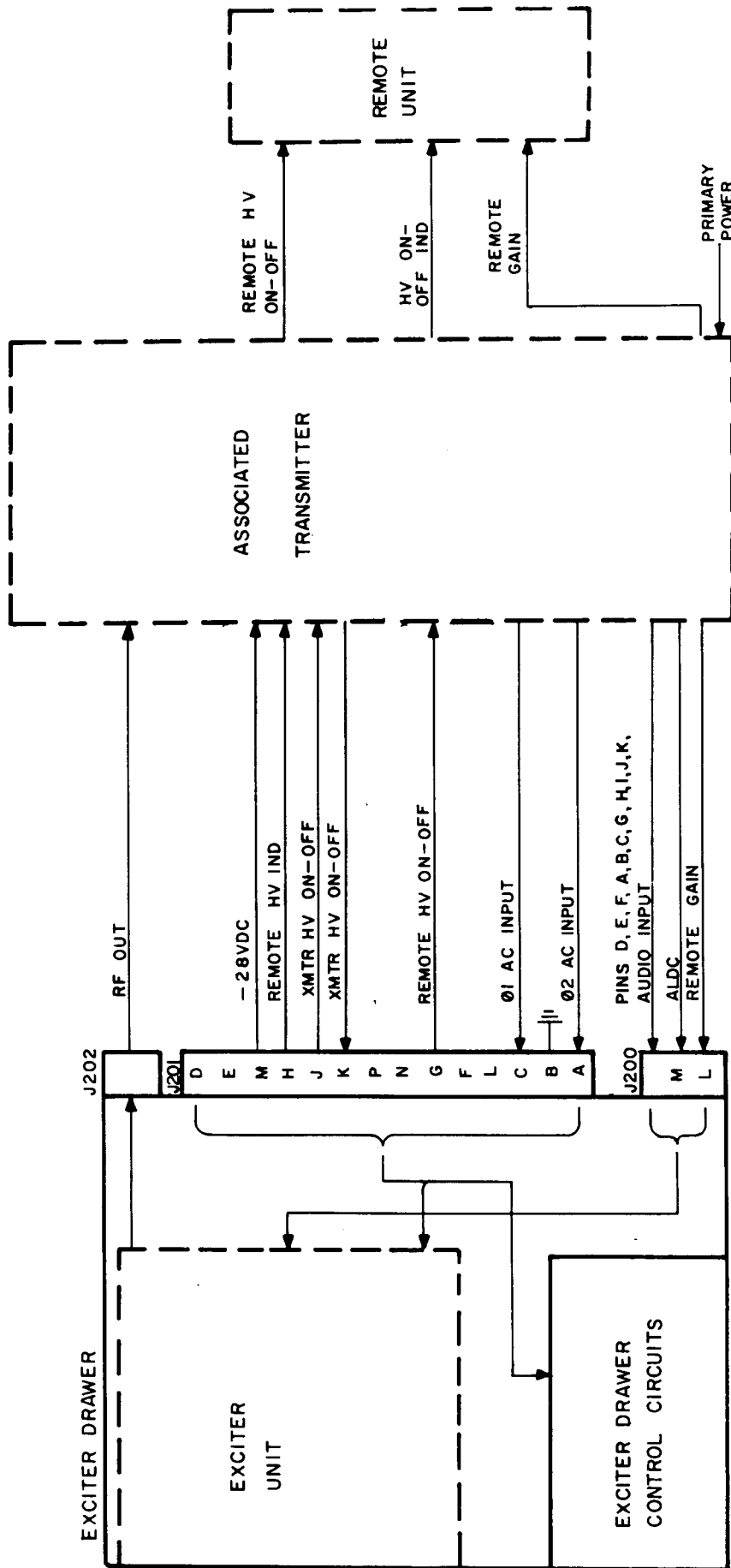


Figure 4-1. Interequipment, Functional Block Diagram

AX687

EXCITER DRAWER

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C200	Capacitor, Fixed; Ceramic: Feed Thru Type: 2000 uufd; <u>+20%</u> 500 WVDC.	CK704AW202M
C201	Same as C200	
C202	Same as C200	
C203	Same as C200	
C204	Same as C200	
C205	Same as C200	
C206	Same as C200	
C207	Same as C200	
C208	Same as C200	
C209	Same as C200	
C210	Same as C200	
C211	Same as C200	
C212	Same as C200	
C215	Capacitor, Fixed, Ceramic: 100,000 PF, +80%-20%; 500 WVDC.	CC100-32
C217	Same as C215	
C218	Capacitor, Fixed, Mica .01 UFD <u>+1%</u> 300 WVDC.	CM35F103F03
C219	Same as C218	
C220	Same as C218	
C221	Same as C218	
C222	Same as C218	
C223	Same as C218	
C224	Same as C218	
C225	Same as C218	
C226	Same as C218	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C227	Same as C218	
C228	Same as C218	
C229	Same as C218	
C230	Same as C218	
C231	Capacitor, Fixed, Electrolytic 2000uf: 50 WVDC Polarized.	CE116-8VN
C232	Same as C231	
CR200	Semicondcutor, Device Diode: Silicon	IN2484
CR201	Semiconductor, Rectifier Bridge Peak Reverse Volts 200 Rms Input Volts 140 DC Output Current 3 Amps.	DD130-200-3.00
E200	Terminal, Feed-Thru Breakdown Voltage 60 Rms-3200	TE114-2
E201	Same as E200	
E202	Same as E200	
F200	Fuse, Cartridge Type 1 Amp: Time Delay	FU102-1
F201	Same as F200	
K200	Relay, General Purpose: DPDT 10 Amp Resistive, 5 Amp Inductive at 115 VAC/26 VDC:	RL168-2010-24DC
K204	Relay, Mercury - Wetted Contact (For P15 Only)	RL167-1
R202	Resistor, Fixed Wire Wound 350 ohms $\pm 5\%$ , 5 Watts	RR114-10W
R203	Same as R202	
R204	Same as R202	
R209	Resistor, Fixed Composition 5600 ohms $\pm 5\%$ 1/2 Watt (P-15 Only)	RC20GF562J
R210	Resistor, Fixed Composition 270 ohms $\pm 5\%$ 1/2 Watt	RC20GF271J
R211	Resistor, Fixed Composition 330 ohms $\pm 5\%$ 1/2 Watt	RC42GF331J
R212	Resistor, Fixed Composition 56 ohms $\pm 5\%$ 1/2 Watt	RC42GF560J

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S200	Switch Rotary, 1 section 2 position 30° Angle of Throw.	SW225
T200	Transformer Power Isolation Stepdown Primary Input 105, 115, 125, or 210, 230, 250V; 50/60 KHZ, Single Phase.	TF269 TF269
XF200	Fuseholder, Bayonet Base 100/250V Neon Lamp.	FH104-3
XF201	Same as XF200	
XF202	Fuse Holder, Bayonet Base 22 - 10 33V	FH104-11
XK200	Socket, Tube: Octal: High Crown	TS101P01

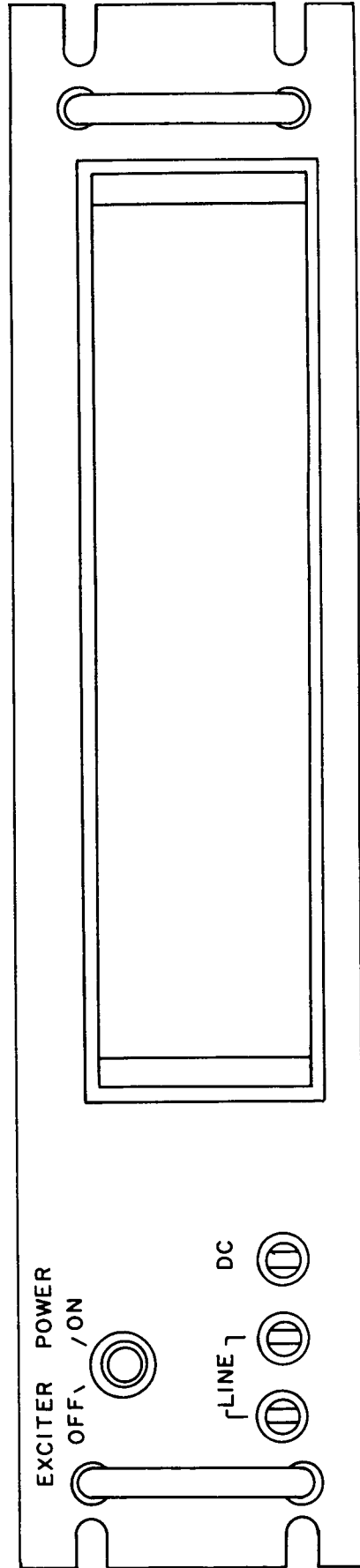


FIGURE 1-1. FRONT VIEW OF EXCITER DRAWER, MODEL AX687