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TECHNICAL MANUAL  
for  
AUTOMATIC RECEIVER REMOTE CONTROL SYSTEM, TAPE  
MODEL ARCA-1

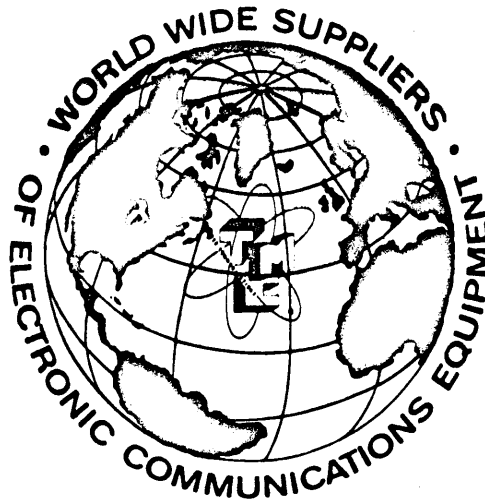


THE TECHNICAL MATERIEL CORPORATION  
MAMARONECK, N. Y.    OTTAWA, ONTARIO

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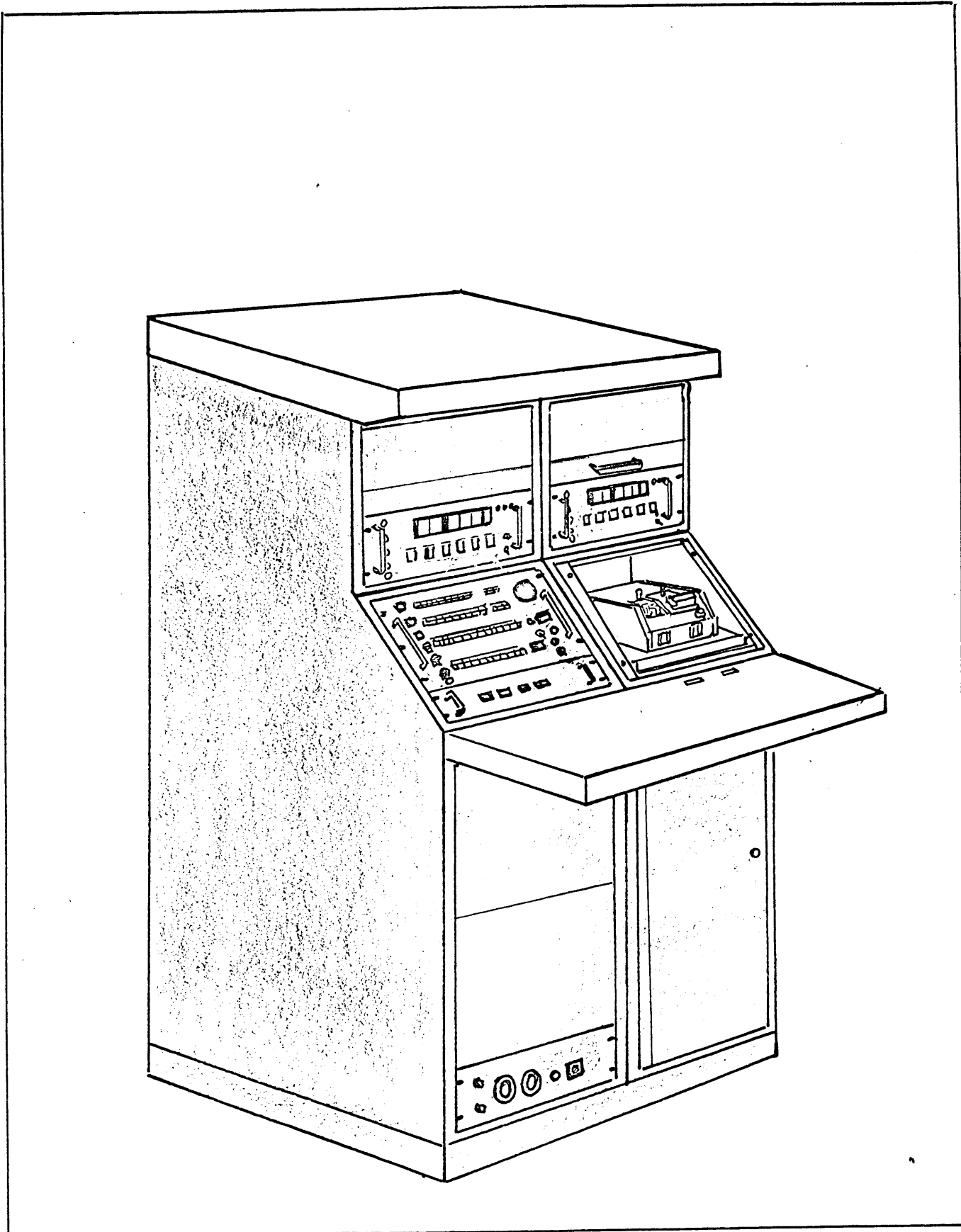


FIGURE 1-1. AUTOMATIC RECEIVER REMOTE CONTROL SYSTEM, TAPE, MODEL ARCA-1

## SECTION 1

### GENERAL DESCRIPTION

#### 1-1. FUNCTIONAL DESCRIPTION

AUTOMATIC RECEIVER REMOTE CONTROL SYSTEM, TAPE Model ARCA-1 (figure 1-1) is a remote control console, designed to operate in conjunction with TMC TechniMatic\* receiver systems.

AUTOMATIC RECEIVER REMOTE CONTROL SYSTEM, TAPE Model ARCA-1 (hereafter referred to as the ARCA) is used to tune, monitor and control two receiver systems remotely by means of punched tape, programmed cards or manual programming.

The console and modular units comprising the ARCA are as follows. (See figure 1-2).

a. ELECTRICAL EQUIPMENT CABINET, COPA-2 is a dual section equipment console designed to support and enclose modular units having standard 19 inch wide rack panels. The console is constructed of steel, having a formica top and protruding table. Illumination is provided by two top mounted lamps. Two rear access doors permit ease of equipment accessibility.

b. PERFORATOR-READER, MODEL RTKY-1 is provided to accept 5 level teletype information, punched on a card or tape, to perform a pre-programmed assignment. These assignments include: tuning a receiver to a finite frequency, tuning a synthesizer to the same frequency, setting the r-f gain, selecting the mode of detection and inserts or removes AFC from the circuit. The RTKY-1 will also punch a tape or card for any new operating frequency mode.

\*Trademark applied for.

c. ELECTRONIC PROGRAMMER, MODEL RTPA-1 provides an operator the ability to remotely tune either of two remote receiver systems. Tuning may be accomplished either manually, by means of pushbutton tuning, or automatically, by means of programmed tapes or cards in conjunction with the RTKY-1.

d. RECEIVER SELECTOR, MODEL RTRS-1 provides the ability to manually select, by means of pushbuttons, either of two remote receiver systems to be tuned. Selection is accomplished by routing a tuning code to the RTPA-1

e. CHANNEL FREQUENCY INDICATOR, MODEL RTIA-1 provides visual indication, by means of six nixie lights, of the RF frequency of the selected remote receiver system. This unit also provides six back-lighted readouts to display the IF bandwidth and mode of detection of each channel, AFC on or off, RF gain, a "fault", "in tune process" and "ready" light.

f. POWER CONTROL PANEL, MODEL DCP-2, an auxiliary panel containing three fused line voltage outlets. A main power circuit breaker controls the DCP-2 output which in turn, controls the ARCA power requirements.

## 1-2. PHYSICAL DESCRIPTION

The ARCA is comprised of a dual section equipment console housing six modular units. All units are functionally mounted to permit ease of operation and observation for a seated operator. A protruding desk top provides added work space illuminated by two overhead hooded lamps. All units are easily accessible for maintenance from the rear of the console, enclosed by two vented access doors.



### 1-3. TECHNICAL SPECIFICATIONS

**TUNING SIGNAL OUTPUT:**

Serial pulses in 7.42-unit teletype transmission pattern with 22 millisecond (60 wpm) or 13.7 millisecond (100 wpm) pulse widths. For code, see RTPA-1 instruction manual.

**READBACK AND SIGNAL INPUT:**

Serial pulses in 7.42-unit teletype transmission pattern with 22 millisecond (60 wpm) or 13.7 millisecond (100 wpm) pulse widths. Continuous cycling of 12 codes per cycle in sequence as listed in RTIA-1 instruction manual.

**TAPE:**

1 inch, 7/8 inch or 11/16 inch standard tape with 5, 6, 7 or 8 level code structure.

**INPUT POWER REQUIREMENTS:**

115 volts a-c, 60 cycle, single phase.

**PHYSICAL DIMENSIONS:**

60 inches high x 42 inches wide x 30 inches deep. (not including 14-1/2 inch protruding table top.)

Table 1-1. Equipment Supplied

NOMENCLATURE	QUANTITY
Electrical Equipment Cabinet, Model COPA-2 (CY-4596/FRR-72)	1
Channel Frequency Indicator, Model RTIA-1 (ID-1277/FRR-72)	2
Electronic Programmer, Model RTPA-1 (MK-6758/FRR-72)	1
Selector, Receiver Model RTRS-1 (MK-6759/FRR-72)	1
Perforator-Reader, Model RTKY-1 (TT-477/FRR-72)	1
Power Control Panel, Model DCP-2	1

ELECTRICAL EQUIPMENT  
CABINET, MODEL COPA-2

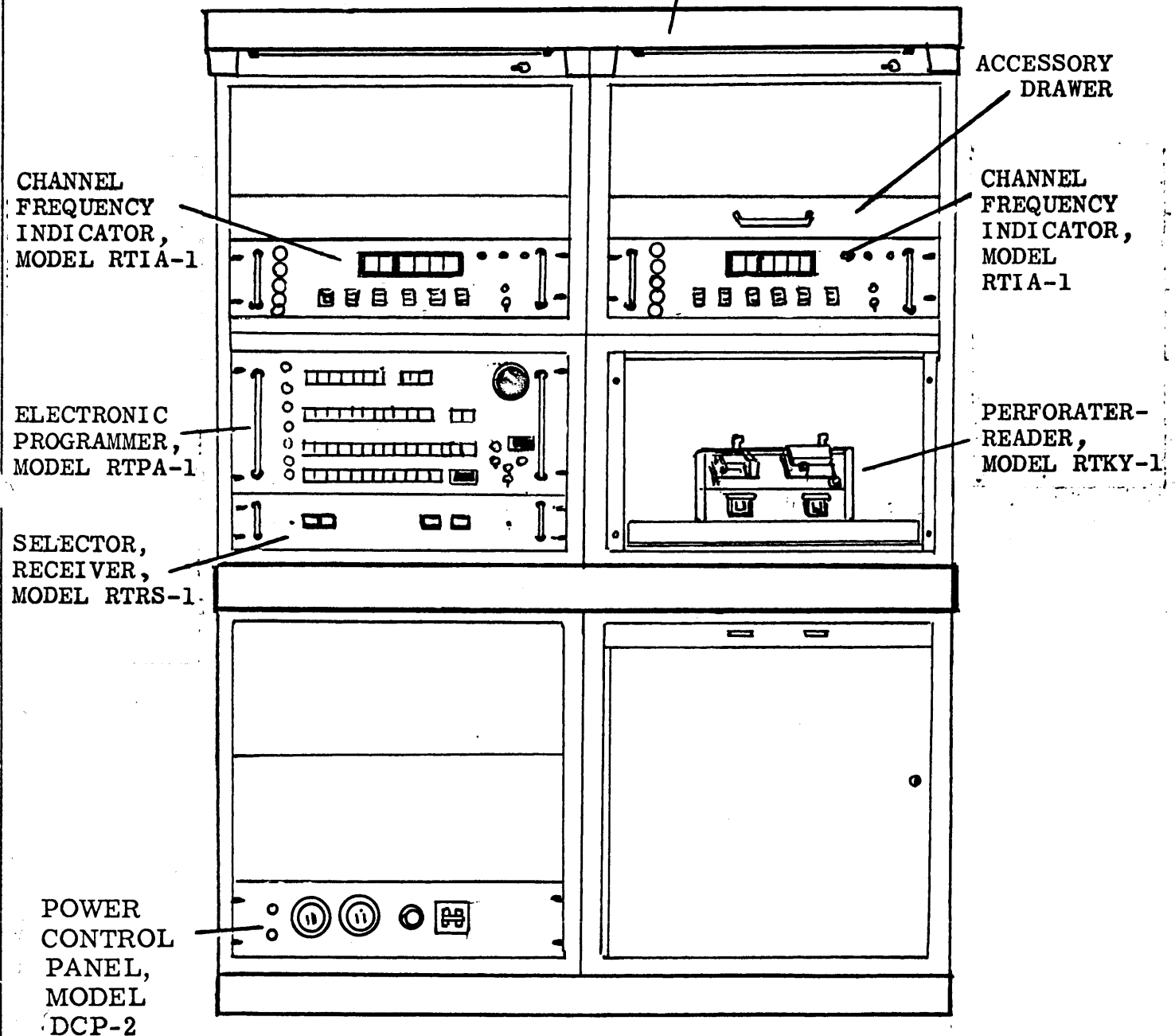


Figure 1-2. Model ARCA-1, Component Location.

SECTION 2  
INSTALLATION

2-1. INITIAL INSPECTION

Each modular unit comprising the ARCA system has been thoroughly inspected and tested at the factory before shipment. Upon arrival at the operating site, inspect the unit packing case and its contents immediately for possible damage. Unpack the equipment carefully. Inspect all packing material for parts which may have been shipped as loose items.

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. MECHANICAL INSTALLATION

All the modular units used in the ARCA are equipped with standard width 19 inch rack panels. They are designed to be mounted to the operating console, model COPA-2.

To mount any of the modular units, place the unit into the console chassis rack and secure the front panel with screws to the console rack frame.

See figure 1-2 for modular unit mounting locations.

See figure 2-1 for ARCA outline dimensions.

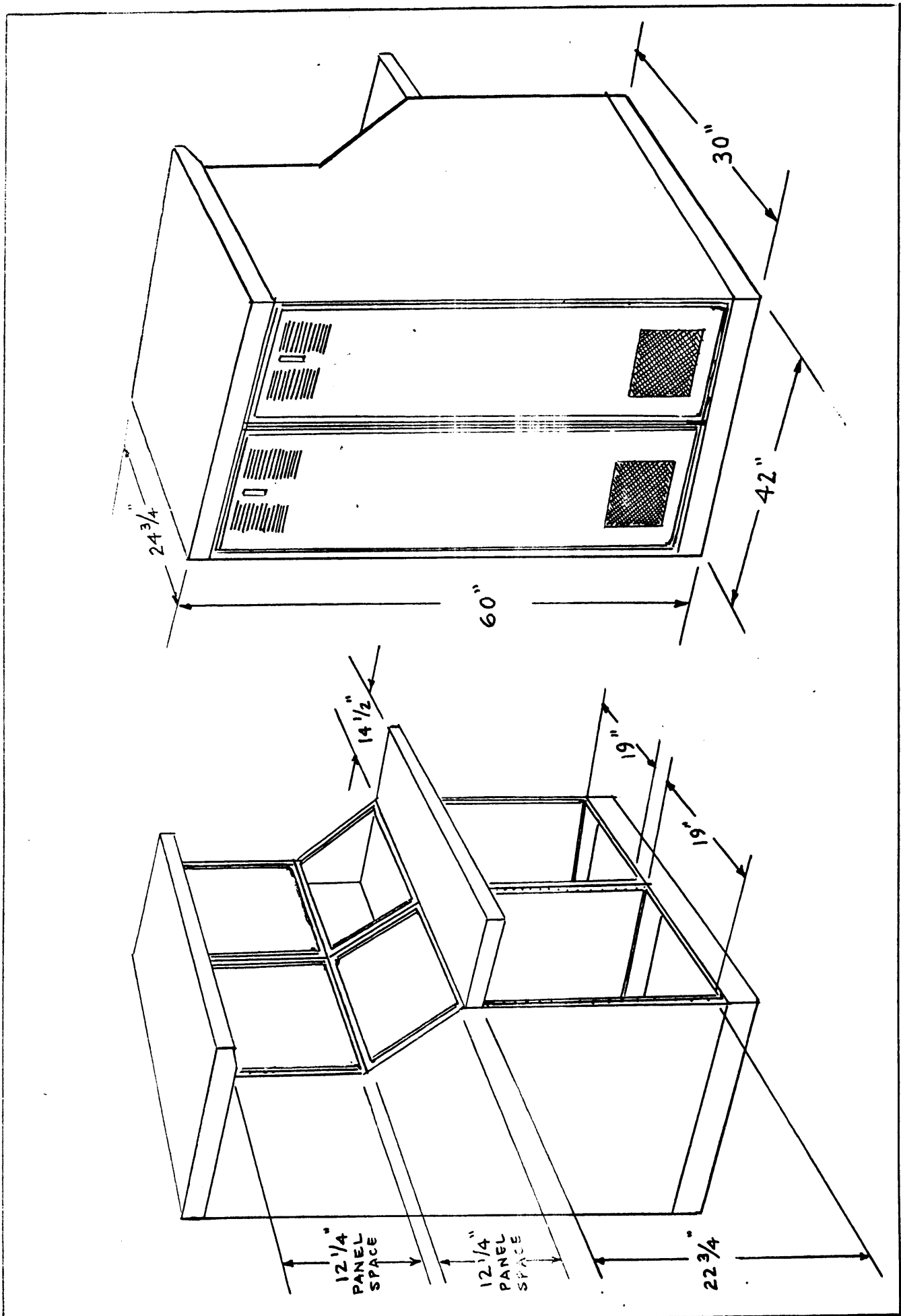


Figure 2-1. Outline Dimensional Drawing.

### 2-3. ELECTRICAL INSTALLATION.

Electrical installation of the ARCA consists of connection of 115 volts a-c to the input of the Power Control Panel, Model DCP-2. The output of the DCP-2 is routed to the input side of line filter FL9001. With this arrangement, the DCP-2 front panel MAIN POWER circuit breaker will control the a-c power requirements of the entire ARCA.

The three-wire power cable is to be routed through one of the console cable access holes, through the DCP-2 a-c input cable clamp, and connected to terminal board TB1. See figure 2-2 for input power connection details.

The associated receiver and transmitter interconnections are mated to the ARCA modular units via terminal board TB9002.

The receiver inputs to the ARCA are to be connected to terminals 7 and 8 (for receiver ~~2~~ readback information) and terminals 5 and 6 (for receiver ~~1~~ readback information). *Correct*

The output tuning signals to the transmitter are to be connected to terminals 3 and 4.

See figure 2-3 for input and output interconnection details.

See figure 2-4 for ARCA-1 interconnection cabling diagram.

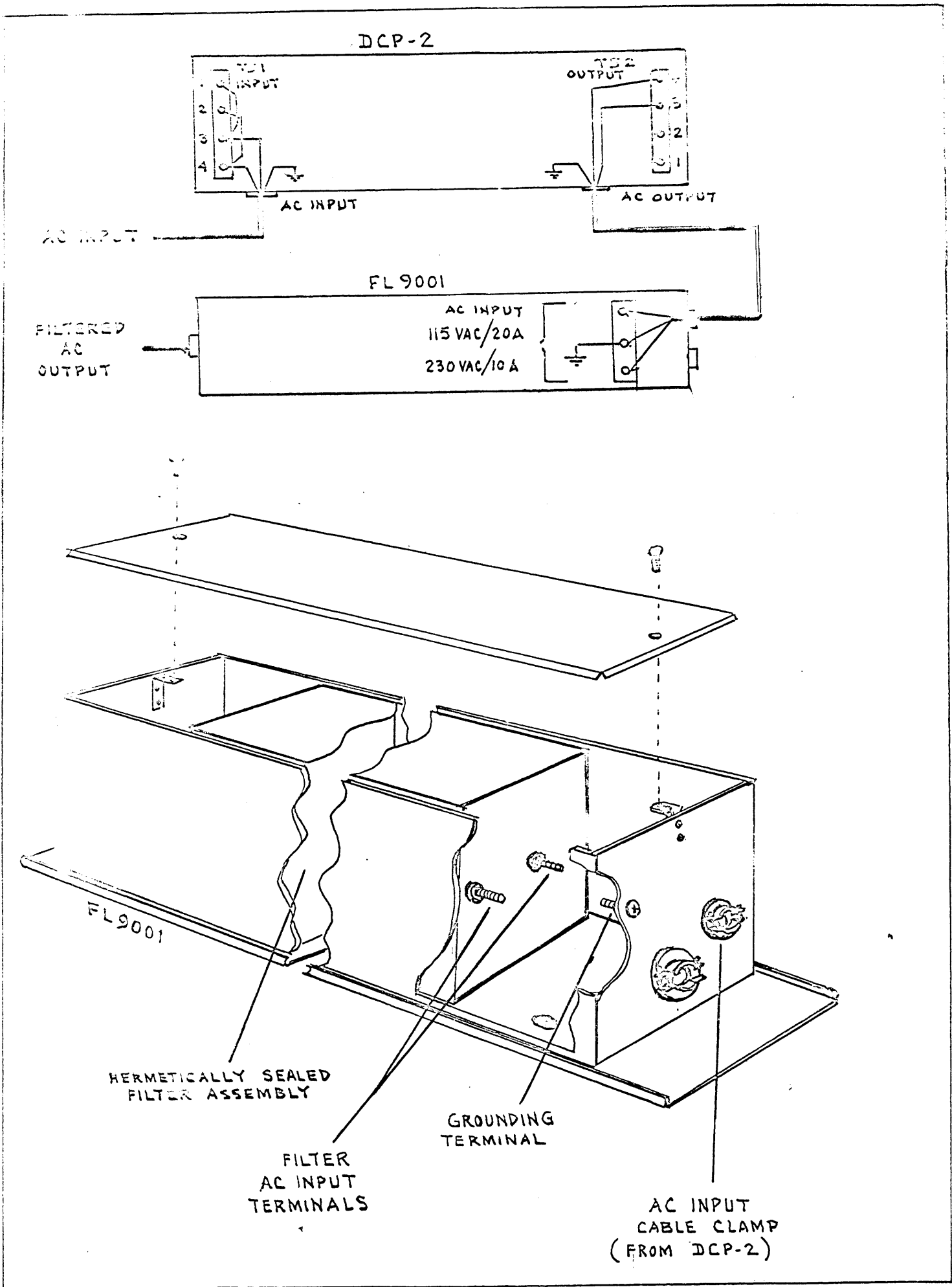


Figure 2-2. Input Power Connections.

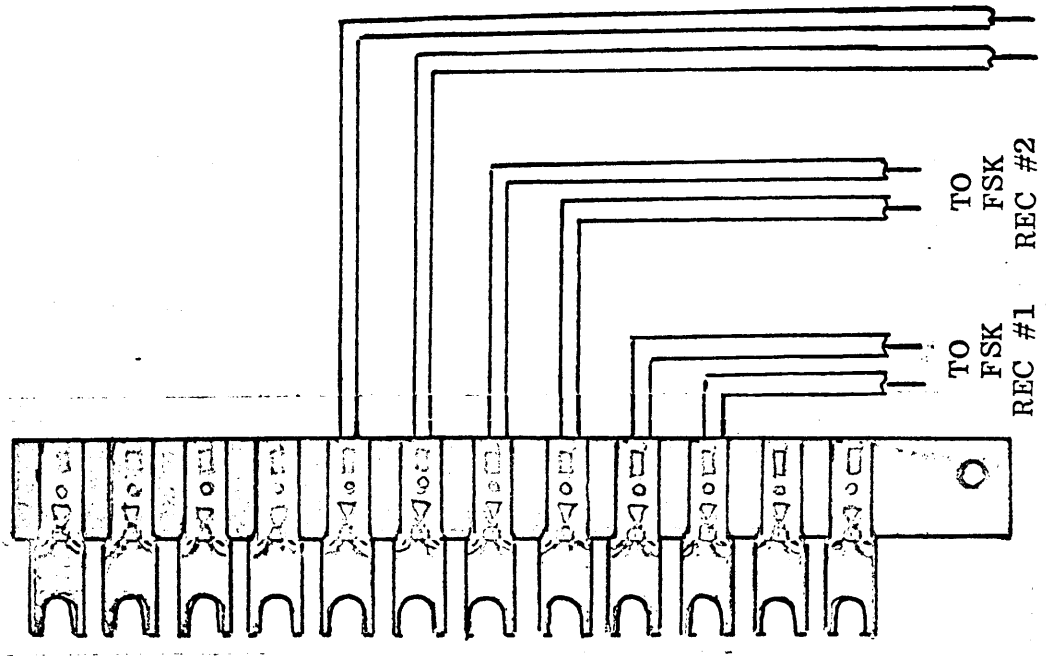
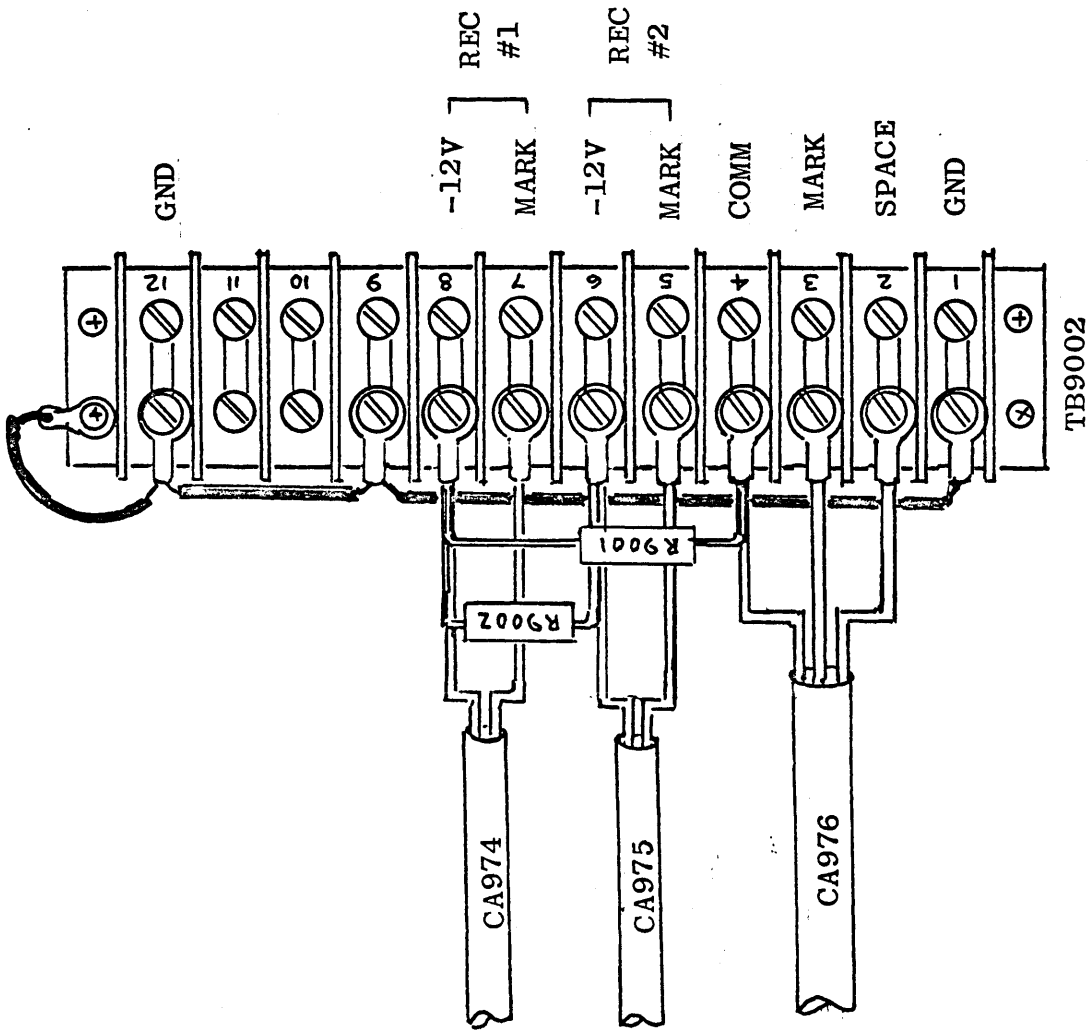


Figure 2-3. Input and Output Signal Connections

**COPA-2**

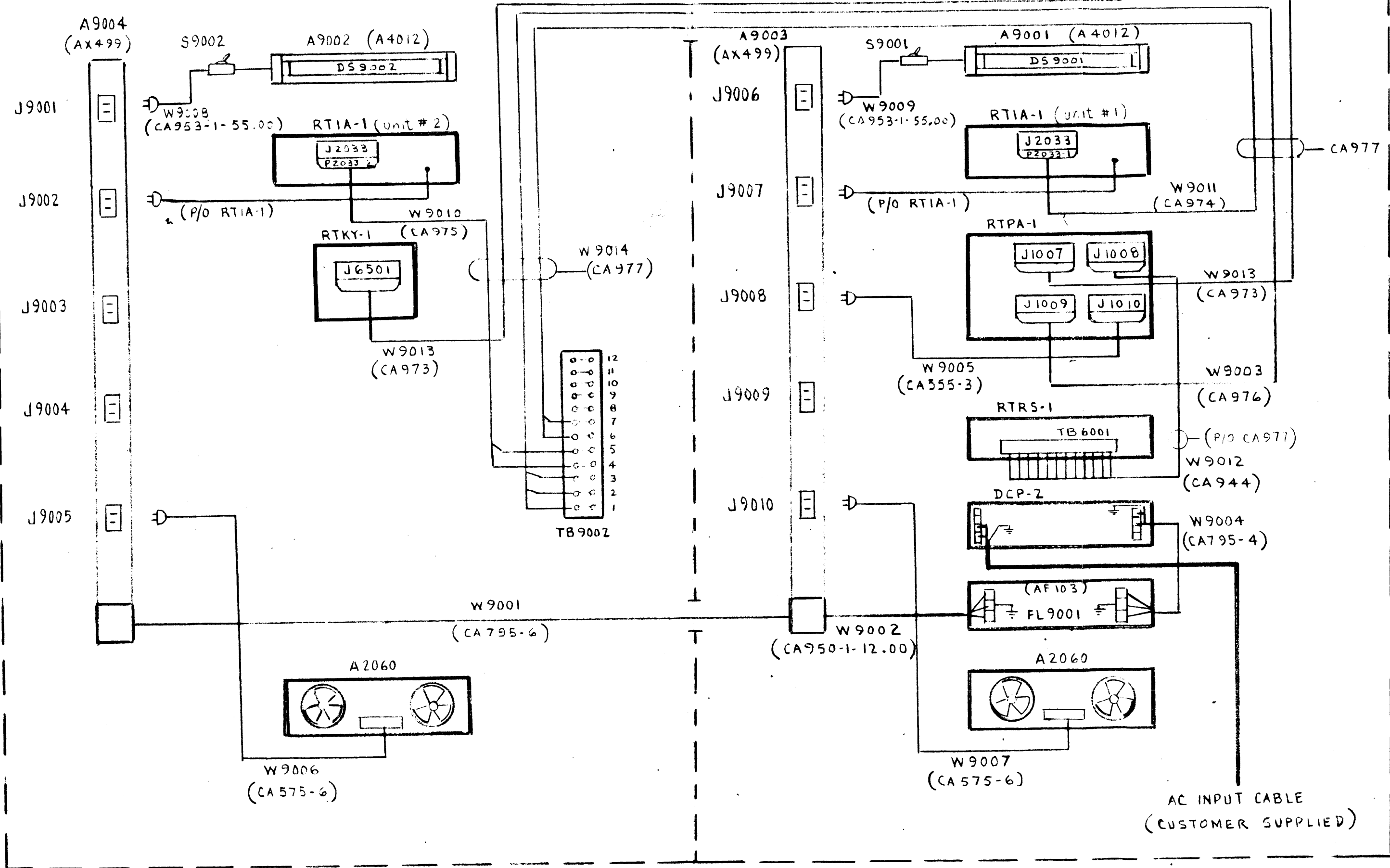


Figure 2-4. Interconnection Diagram, Model ARCA-1.



## SECTION 3

### OPERATOR'S SECTION

#### 3-1. GENERAL.

The ARCA consists of six modular units all functionally designed and positioned to permit ease of operation and observation for a seated operator. By proper use of the various controls and indicators, listed in table 3-1, and by use of the operating procedures listed in table 3-2, the operator may quickly tune or program the associated remote receiver systems. The tuning instructions may be initiated either by pre-programmed tape, pre-programmed cards or manually, by use of the RTPA-1 Electronic Programmer unit pushbuttons.

Monitoring of the remotely tuned receiver systems is also provided to the operator. This is accomplished by read-back information, transmitted back from the remote receiver systems, to be displayed on two RTIA-1 Channel Frequency Indicator units. This feature is provided to indicate to the operator, the proper acknowledgment of the remote receiver system to the transmitted tuning instructions. Read-back information includes operating frequency indications, IF bandwidth (of each channel), mode indication, RF gain and AFC positioning (on or off). In addition, activation of a "READY" light, "IN TUNE PROCESS" light and a "FAULT" light will also occur.

The FAULT light indicates that the receiver is no longer in a state of being tuned and the receiver did not reach a tuned state.

### 3-2. OPERATOR'S INSTRUCTIONS

The operator may tune a remote receiver system either manually or automatically.

Manual tuning is accomplished by manually pressing the appropriate tuning pushbuttons on the Electronic Programmer unit RTPA-1.

Automatic tuning is accomplished by means of a pre-programmed tape or card in conjunction with the Perforator-Reader unit RTKY-1. The Perforator-Reader unit accepts an eight level tape or card, of which the five levels that are common to the 7.42 or 7.00 Baudot code are used.

Additional tapes or cards may also be programmed or punched by the operator, using the RTPA-1 and RTKY-1, to be used for future tuning instructions or for checkout of manual tuning instructions.

When the system is tuned by means of the Perforator-Reader RTKY-1, the time required for the complete transmission of tuning information is approximately three seconds. The selected receiver will complete its tuning cycle in anywhere from one to nineteen seconds. This does not mean, however, that the operator must wait for the tuning process on one receiver to be completed before starting the tuning of the second receiver. The second receiver can be tuned immediately following completion of the transmission of information to the first receiver.

### 3-3. OPERATOR'S MAINTENANCE.

The operator may, at certain times, be required to perform various aspects of operator's maintenance. This type of maintenance may consist of simply keeping the unit clean and observing for normal panel indications and secure interconnections.

However, should normal operating procedures produce unsatisfactory results, a check of the interconnects and associated equipment levels to the ARCA may clear the fault. A check of the protective fuses may also be necessary.

#### NOTE

Never replace a fuse with one of higher rating unless continued operation is more important than probable damage to the equipment. If a fuse burns out immediately after replacement, do not replace it a second time until the trouble has been located and corrected.

The operator is also required to periodically empty the chad collector container, located on the right-underside of the RTKY-1 Perforator-Reader unit. To empty the chad collector container, simply lift the front end of the RTKY-1 and remove the container from its retaining well. Replace empty container in the same manner.

The tape-feed reel (figure 6-1) should also be checked for sufficient tape supply and friction-free rotation. This precaution may prevent operational malfunctions due to improper tape feed.

Table 3-1. OPERATING CONTROLS AND INDICATORS.

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTIA-1  Channel Frequency Indicator	1	LINE, fuse  +12 V, fuse  -12 V, fuse  BLOWER, fuse  -180 V, fuse	Input line protective fuse.  Positive 12 volt line protective fuse.  Negative 12 volt line protective fuse.  Blower assembly line protective fuse.  Negative 180 volt line protective fuse.
	2	CHAN-A-IFBW indicator	Intermediate frequency bandwidth of monitored receiver. Indicates IF bandwidths of 1, 6, 15, 3.5U, 3.5 L, 7.5U and 7.5L Kilocycles of channel A.
	3	CHAN-A-DET. indicator	Indicates type of detection of monitored receiver for channel A. Indications of AM, CW and SSB are provided.
	4	AFC, indicator	Indicates monitored receiver AFC condition, ON or OFF.

*for the channel*

*See page 10*

Table 3-1. OPERATING CONTROLS AND INDICATORS. (CONT)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTIA-1  Channel Frequency Indicator (cont)	5	RF GAIN, in- dicator	Indicates RF gain of monitor receiver.
	6	CHAN-B-IFBW, indicator	Intermediate freq- uency bandwidth of monitored receiver. Indicates IF band- widths of 1, 6, 15, 3.5U, 3.5L, 7.5U and 7.5L Kilocycles of channel B.
	7	CHAN-B-DET, indicator	Indicates type of detection of moni- tored receiver for channel B. Indi- cations of AM, CW and SSB are pro- vided.
	8	ON-OFF, power toggle switch	Applies line volt- age to activate unit when in ON position. OFF position deacti- vates unit.
	9	POWER, indi- cator lamp, white lens.	When lit, indicates line voltage is applied to unit. Indicates activation of unit when power toggle switch is in ON position.
	10	FAULT, indi- cator lamp, red lens.	When lit, indicates a fault in monitored receiver tuning.
	11	READY, indi- cator lamp, green lens	When lit, indicates monitored receiver is ready for tuning.

Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTIA-1  Channel Frequency Indicator (cont)	12	IN TUNE CESS, indi- cator lamp, yellow lens.	When lit, indicates monitored receiver is in process of being tuned.
	13	RF frequency readouts, six "nixie" num- eral indica- tors	Numeral "nixie" lights indicate frequency setting of monitored re- ceiver.
RTRS-1  Selector, Receiver	14	NO PUNCH, pushbutton	When pressed, per- mits tuning or pro- gramming the extern- al receiver without punching a tape; disconnects external tape punch unit (RTKY-1) from cir- cuit. Pushbutton lights when pressed.
	15	PUNCH, push- button	When pressed, per- mits a tape to be punched while tun- ing or programming a receiver. Push- button lights when pressed.
	16	1, receiver selector pushbutton	When pressed, provides a "receiver 1" selection tuning code to the pro- grammer unit (RTPA-1). Pushbutton lights when pressed.
	17	2, receiver selector pushbutton	When pressed, provides a "receiver 2" selection tuning code to the programmer unit (RTPA-1). Pushbutton lights when pressed.

Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
DCP- 2 Power Control Panel	18	UTILITY OUTLETS  UTILITY POWER	Polarized utility a-c power receptacles with associated protective fuses.
	19	MAIN POWER	Dual toggle switch type main power circuit breaker with associated main power indicator.
RTPA-1  Electronic Programmer	20	AC IN, fuse	AC input line voltage protective fuse.
		+12 V, fuse	Positive 12 volts line protective fuse.
-12 V, fuse	Negative 12 volts line protective fuse.		
-18 V, fuse	Negative 18 volts line protective fuse.		
+6 V, fuse	Positive 6 volts line protective fuse.		
-24 V, fuse	Negative 24 volts line protective fuse.		
28 VAC LAMPS, fuse	28 volts a-c, panel lamps protective fuse.		
21	IF BANDWIDTH, 7-lighted pushbuttons  1  6	When one of the two IFBW pushbutton, (in the FUNCTION row is pressed, these push- buttons are operative when pressed.  1 kilocycle symmetri- cal  6 kilocycle symmetri- cal	

Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTPA-1  Electronic Programmer (cont)	21 (cont)	15	15 kilocycles symmetrical.
		3.5 U	3.5 kilocycles upper sideband.
		3.5 L	3.5 kilocycles lower sideband.
		7.5 U	7.5 kilocycles upper sideband.
		7.5 L	7.5 kilocycles lower sideband.
	22	KILOCYCLES/RF GAIN, 12-lighted pushbuttons	When KC pushbuttons in the FUNCTION row are pressed, KILOCYCLES pushbuttons 0 through 10 are used to select the desired frequency in kilocycles.  When the RF GAIN pushbutton in the FUNCTION row is pressed, the AGC and the 0 through 10 pushbuttons are operative when pressed.
	23	DETECTION, 3-lighted pushbuttons.  AM, CW, SSB	These pushbuttons select the type of detection desired, operative when the CH. A DET or CH. B DET pushbuttons in the FUNCTION row are pressed.



Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTPA-1  Electronic Programmer (cont)	24	AFC, 2- lighted push- buttons.  ON, OFF	These pushbuttons select AFC control ON or OFF, oper- ative when the AFC pushbutton in the FUNCTION row is pressed.
	25	Four-posi- tion selec- tor switch.  TAPE READER	This position is used when the remote receiver system is to be tuned by a punched tape, with- out use of the RTPA-1 tuning push- buttons. When in TAPE READER posi- tion, the TAPE READ pushbutton 44 is pressed.
		TAPE PUNCH	This is position is used when a tape is to be punched by use of the RTPA-1 tuning pushbuttons.
		MANUAL PRO- GRAM/ TAPE PUNCH	This position is used when a remote receiver system is to be manually tuned with the RTPA-1 pushbuttons, and a tape is to be punched either as a record or for future tuning in- structions.

Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
<p>RTPA-1  Electronic Programmer (cont)</p>	<p>25 (cont)</p>	<p>MANUAL PROGRAM</p>	<p>This position is used when a remote receiver system is to be tuned manually, by means of the RTPA-1 push-buttons, without punching a tape.</p>
	<p>26</p>	<p>MEGACYCLES 15-lighted pushbuttons</p>	<p>When one of the two MC pushbuttons in the FUNCTION row is pressed, these pushbuttons are operative when pressed. The frequency in megacycles is etched on each pushbutton. The top row of numbers corresponds to the settings for pushbutton MC 2-18 in the FUNCTION row. The bottom row of numbers corresponds to the settings for pushbutton MC 17-31 in the FUNCTION row.</p>
	<p>27</p>	<p>FUNCTION, MC 2-16, MC 17-31, 2-lighted pushbuttons.</p>	<p>Each of the two MC pushbuttons, when pressed, selects the indicated operating frequency range.</p>
<p style="text-align: center;">NOTE</p> <p>When performing the tuning process, all FUNCTION pushbuttons are to be pressed in sequence, from left to right.</p>			

Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTPA-1  Electronic Programmer (cont)	28	100 KC, lighted push- button	When pressed, the ten KILOCYCLES (0-9) pushbuttons are operative when pressed; used to select the 100 kc operating frequency increment.
	29	10 KC, lighted pushbutton	When pressed, the ten KILOCYCLES (0-9) pushbuttons are operative when pressed; used to select the 10 kc operating frequency increment.
	30	1 KC, lighted pushbutton	When pressed, the ten KILOCYCLES (0-9) pushbuttons are operative when pressed; used to select the 1 kc operating frequency increment.
	31	.1 KC, lighted pushbutton	When pressed, the ten KILOCYCLES (0-9) pushbuttons are operative when pressed; used to select the desired i-f bandwidth for channel A.
	32	CH. A IFBW lighted push- button.	When pressed, the seven IF BANDWIDTH pushbuttons are operative when pressed; used to select the desired i-f bandwidth for channel A.
	33	CH. A DET lighted pushbutton	When pressed, the three DETECTION pushbuttons are operative when pressed; used to select the desired type of detection.

Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTPA-1  Electronic Programmer (cont)	34	CH. B IFBW lighted push- button	When pressed, the Seven IF BANDWIDTH pushbuttons are operative when pressed; used to select the desired i-f bandwidth for channel B.
	35	CH. B DET lighted pushbutton	When pressed, the three DETECTION pushbuttons become operative when pressed; used to select the desired type of detection.
	36	AFC, lighted pushbutton	When pressed, the two AFC pushbuttons become operative when pressed; used to select AFC acti- vation, ON or OFF.
	37	RF GAIN, lighted push- button	When pressed, the twelve RF GAIN push- buttons become oper- ative when pressed; used to select the desired r-f gain setting (0 to 10) or AGC control.
	38	TUNE, lighted pushbutton	When pressed, allows the remote receiver decoder unit to start the tuning process; pressed after completion of tuning operation.

*Label changed* →

0

Table 3-1. OPERATING CONTROLS AND INDICATORS. (cont)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROL OR INDICATOR	FUNCTION
RTPA-1  Electronic Programmer (cont)	39	PUNCH READER POWER, indica- tor lamp.	When lit, indicates punch reader is re- ceiving power from the RTPA-1.
	40	ON-OFF, punch reader power toggle switch.	When in the ON posi- tion, power is applied to the punch reader unit.
	41	ON-OFF, pro- grammer power toggle switch.	When in the ON posi- tion, applies oper- ating voltage to the RTPA-1.
	42	PROGRAMMER POWER, indi- cator lamp.	When lit, indicates that operating power is applied to the RTPA-1 and that unit is operative.
	43	TIMER, jack	Used to connect extern- al timer unit to auto- matically start the tuning process of a remote receiver system. Electrically parallels the TUNE pushbutton.
	44	TAPE READ, lighted push- button.	When pressed, allows the remote receiver system to be tuned by a programmed tape only; pressed when selector switch is in TAPE READER position.

TABLE 3-1. OPERATING CONTROLS AND INDICATORS. (CONT)

UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROLS OR INDICATOR	FUNCTION
RTKY-1  Perforator- Reader	45	Card Guide	Used to guide a punched-card through the tape reader deck.
	46	Tape Reader Deck	Accepts a pre-punched 5, 6, 7 or 8 level code structure, 1 inch, 7/8 inch or 11/16 inch standard tape or pre-punched card.
	47	Tape Punch Deck	Punches any 1 inch, 7/8 inch or 11/16 inch standard tape or card to 5, 6, 7 or 8 level code structure.
	48	Chad Deflector Box	Used to deflect chad down through unit, emptying through a port at the bottom of the unit.
	49	Tape-punch Guide Adjust	Used to adjust tape guide to properly position various tape widths.
	50	Tape-punch Guide.	Used to guide a tape into the tape-punch deck. Tape is to be placed over the tape-punch guide. A card is placed under the tape-punch guide.

TABLE 3-1. OPERATING CONTROLS AND INDICATORS. (CONT)

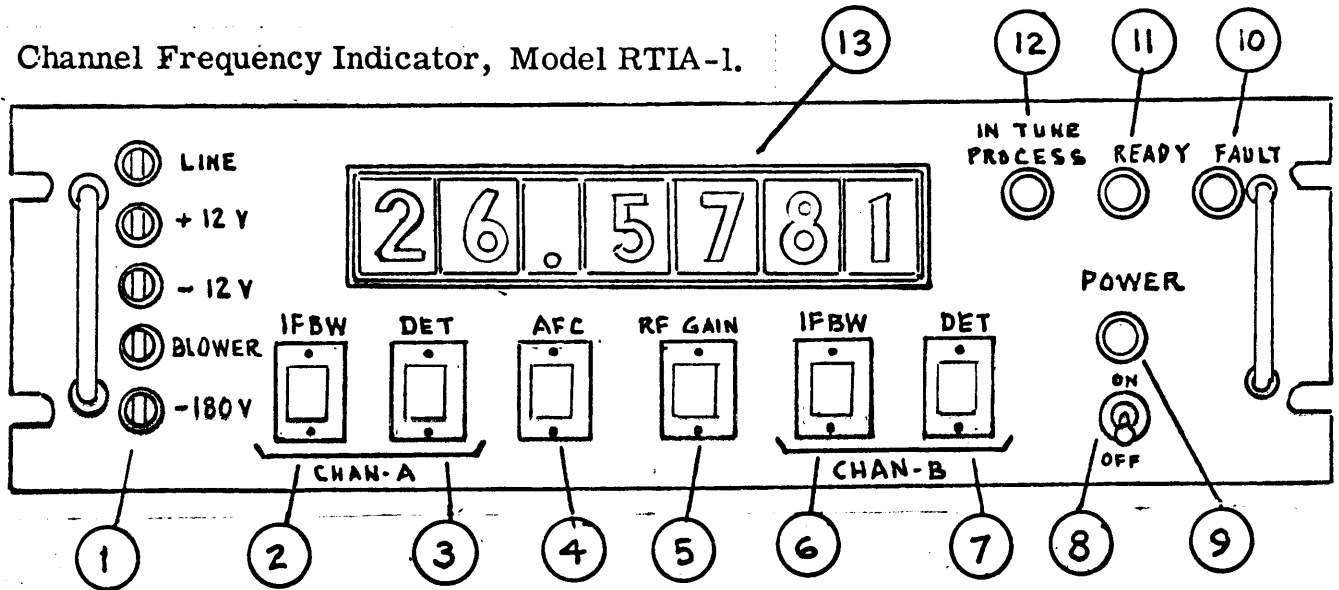
UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROLS OR INDICATOR	FUNCTION
RTKY-1  Perforator- Reader (cont)	51	Tape Feed Pushbutton	When pressed, allows card or tape to be drawn through the tape-punch deck. Also used to advance tape or card during punch process, to permit blank or delete feeding between messages.
	52	Tape Tension Switch Roller	Tape is threaded over roller for smooth and straight tape feeding to the tape-punch or tape reader deck.
	53	Tape Tension Switch Lever	This lever acts as an ON/OFF switch, acting under tape pressure or manually activated.  Tape is to be threaded behind the tape tension switch lever for proper operation.  Pull tape tension switch lever out to de-energize tape-punch or tape reader deck. Push in for activation.

TABLE 3-1. OPERATING CONTROLS AND INDICATORS. (CONT)

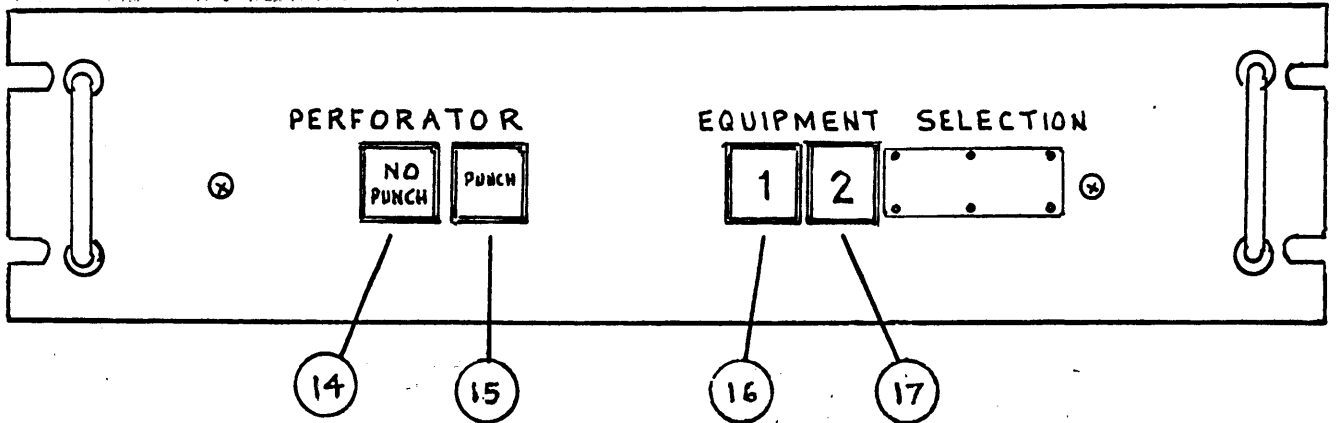
UNIT (See Figure 3-1)	SERIAL DESIGNATION NO.	CONTROLS OR INDICATOR	FUNCTION
RTKY-1  Perforator- Reader (cont)	54	Tape Tension Switch Bracket Guide	Tape is threaded from the tape supply equipment, under and behind the tape tension switch bracket guide.
	55	Tape-reader Guide Adjust	Used to adjust tape guide to properly position various tape widths.
	56	Tape-reader Guide	Used to guide a punched-tape into the tape-reader deck. Tape is to be placed over the tape reader guide. A punched-card is placed under the tape-reader guide.



Channel Frequency Indicator, Model RTIA-1.



Receiver Selector, Model RTRS-1.



Power Control Panel, Model DCP-2.

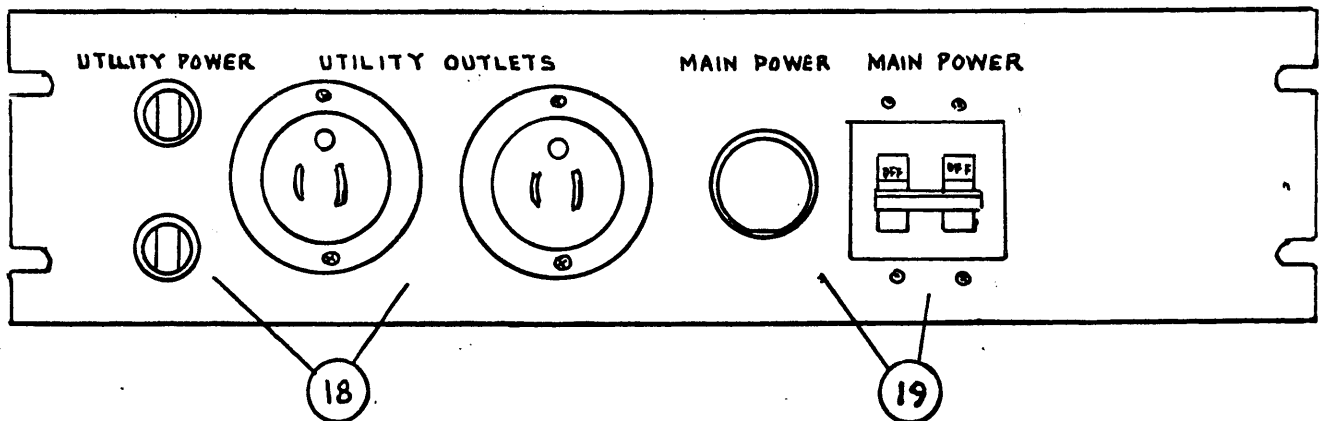


Figure 3-1a. ARCA-1 Modular Components

Electronic Programmer, Model RTPA-1.

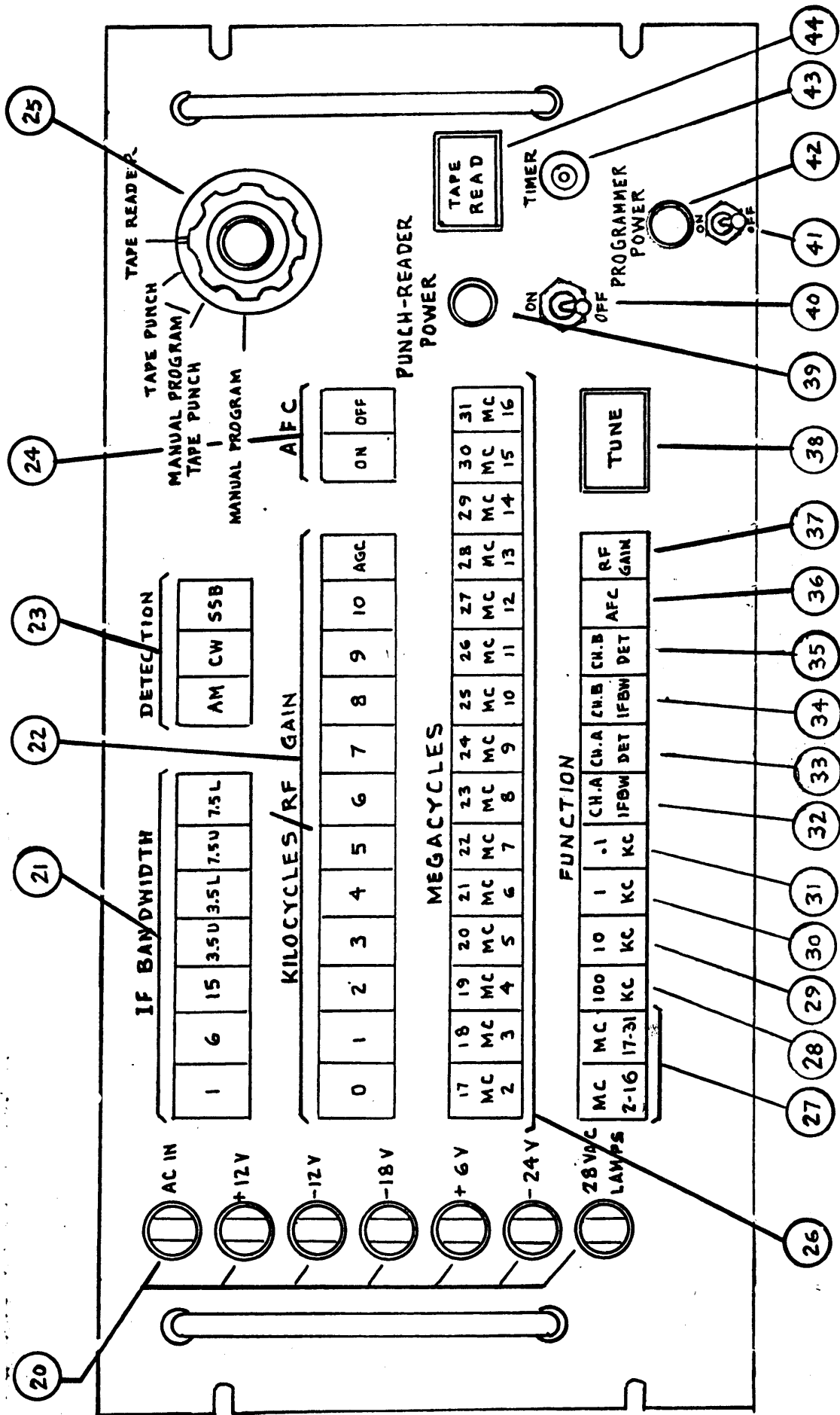
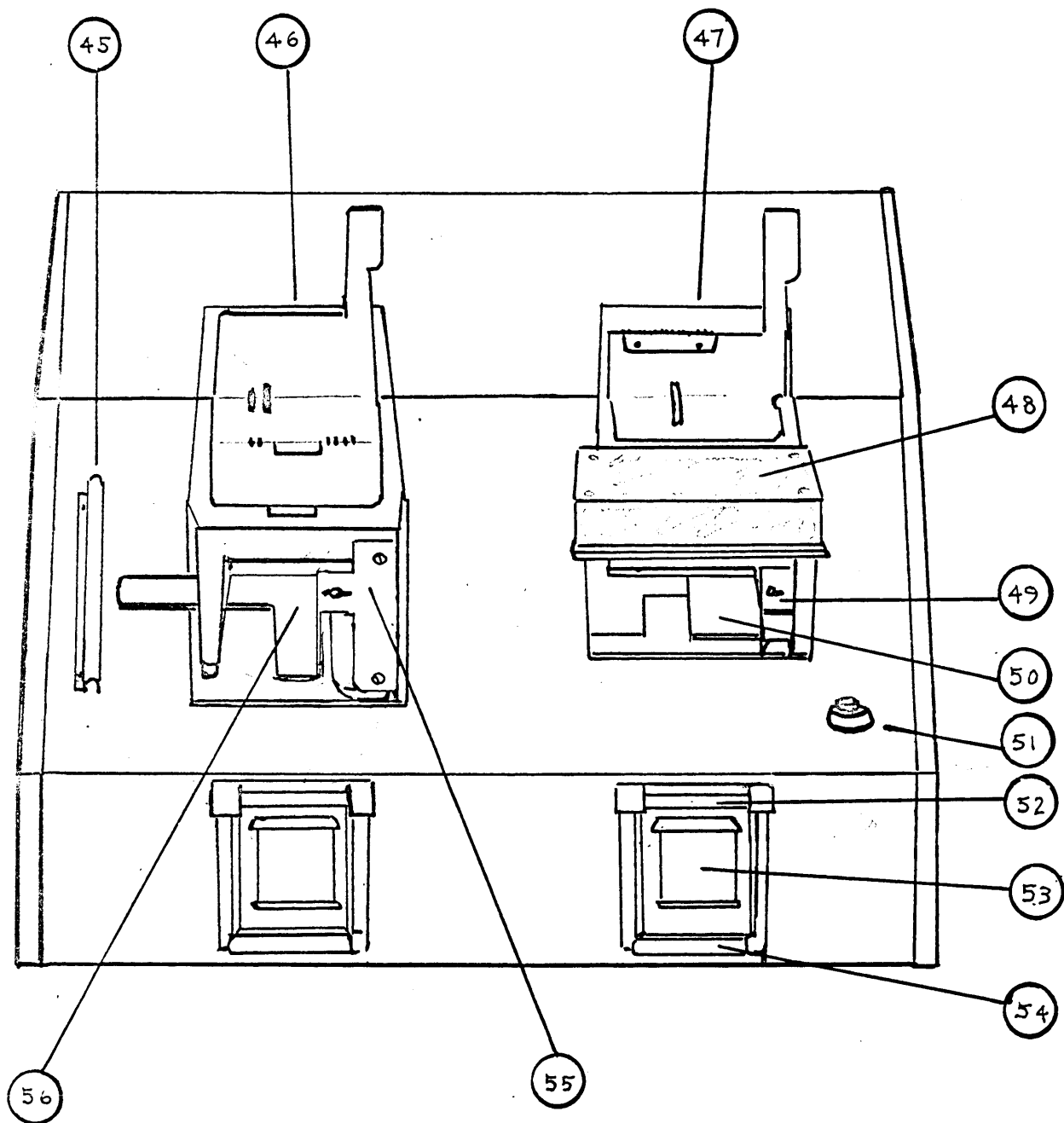


Figure 3-1b. ARCA-1 Modular Components.



Perforator-Reader, Model RTKY-1.

Figure 3-1c. ARCA-1 Modular Components

Table 3-2. OPERATING PROCEDURES

UNIT	STEP	PROCEDURE (See figure 3-1 a, b, c)
RTPA-1  Electronic Programmer	1	Set selector switch (25) to desired position.  TAPE READER - Used when remote receiver system is to be tuned by programmed punched card or tape only.  TAPE PUNCH - Used when a tape or card is to be punched or programmed without effect to the remote receiver system.  MANUAL PROGRAM/ TAPE PUNCH - Used when the remote receiver system is to be tuned and a punched tape or card is desired.  MANUAL PROGRAM - Used when the remote receiver system is to be tuned without punching a tape or card.
RTRS-1  SELECTOR, RECEIVER	2	Press NO PUNCH (14) or PUNCH (15) pushbutton as desired.  NO PUNCH-Tape-punch unit disconnected.  PUNCH - Allows tape or card to be punched.
	3	Press receiver selector pushbuttons 1 (16) or 2 (17) as desired.  1 - Tuning process to be routed to remote receiver system 1.  2 - Tuning process to be routed to remote receiver system 2.
RTPA-1  ELECTRONIC PROGRAMMER	4	Set programmer power toggle switch (41) ON. PROGRAMMER POWER indicator (42) should light.

Table 3-2. OPERATING PROCEDURES (CONT)

UNIT	STEP	PROCEDURE (See figure 3-1 a, b, c)
RTPA-1 Electronic Programmer (cont)	5	Set punch reader power toggle switch (40) ON if selector switch (25) is at TAPE READER position. PUNCH READER POWER indicator (39) should light.
<p>NOTE</p> <p>The following tuning process is performed by pressing the FUNCTION pushbutton first and selecting the corresponding setting pushbutton second. It is advisable to perform the FUNCTION settings in a sequence, starting from left to right, Refer to RTPA-1 Instruction Manual.</p>		
	6	Press one of the two MC pushbuttons (27) corresponding to the desired operating frequency range.
	7	Press one of the MEGACYCLES pushbuttons (26) corresponding to the desired operating frequency in megacycles.
	8	Press the 100 KC pushbutton (28) .
	9	<p>Press one of the ten (0-9) KILO-CYCLES pushbuttons (22) corresponding to the first highest digit number in kilocycles.</p> <p>Example: Desired frequency = 26.5781 Press KILOCYCLES pushbutton 5 .</p>
	10	Press the 10 KC pushbutton (29) .
	11	<p>Press one of the ten (0-9) KILO-CYCLES pushbuttons (22) corresponding to the second highest digit number in kilocycles.</p> <p>Example: Desired frequency = 26.5781 Press KILOCYCLES pushbutton 7 .</p>

Table 3-2. OPERATING PROCEDURES (CONT)

UNIT	STEP	PROCEDURE (See figure 3-1 a, b, c)
RTPA-1  Electronic Programmer (cont)	12	Press the 1 KC pushbutton (30) .
	13	Press one of the ten (0-9) KILOCYCLES pushbuttons (22) corresponding to the third highest digit number in kilocycles.  Example: Desired frequency = 26.5781 Press KILOCYCLES pushbutton 8 .
	14	Press the .1 KC pushbutton (31) .
	15	Press one of the ten (0-9) KILOCYCLES pushbuttons (22) corresponding to the last digit number in kilocycles.  Example: Desired frequency = 26.5781 Press KILOCYCLES pushbutton 1 .
	16	Press CH. A IFBW pushbutton (32) .
	17	Press one of the seven IF BANDWIDTH pushbuttons (21) corresponding to the desired channel A i-f bandwidth.
	18	Press CH. A DET pushbutton (33) .
	19	Press one of the three DETECTION pushbuttons (23) corresponding to the desired channel A detection.
	20	Press CH. B IFBW pushbutton (34) .
	21	Press one of the seven IF BANDWIDTH pushbuttons (21) corresponding to the desired channel B i-f bandwidth.
	22	Press CH. B DET pushbutton (35) .

Table 3-2. OPERATING PROCEDURES (CONT)

UNIT	STEP	PROCEDURE (See figure 3-1 a, b, c)
RTPA-1  Electronic Programmer (cont)	23	Press one of the three DETECTION pushbuttons (23) corresponding to the desired channel B detection
	24	Press AFC pushbutton (36) .
	25	Press one of the two AFC pushbuttons (24) corresponding to the desired AFC requirements. <i>Add note about tuning C</i>
	26	Press RF GAIN pushbutton (37) .
	27	Press one of the twelve (0-AGC) KILOCYCLES/RF GAIN pushbuttons (22) corresponding to the desired r-f gain level setting.
	28	Press TUNE pushbutton (38) .
RTKY-1  Perforator- Reader	29	If tape or card is to be punched, either for future use or for monitoring during tuning process, insert tape or card into tape-punch deck as described in RTKY-1 Instruction Manual.  If remote receiver is to be tuned by a punched-card or tape, set RTPA-1 selector switch (25) to TAPE READER (44) on RTPA-1.  Proceed with RTKY-1 operation as described in RTKY-1 Instruction Manual.

## SECTION 4

### PRINCIPLES OF OPERATION

#### 4-1. INTRODUCTION

The ARCA is designed to function as a remote control station, permitting the operator to observe and tune two externally located receiver systems. The tuning information, either manually tuned, punched-tape or punched-card tuned, is applied to an FSK transmitter, to be relayed to the selected receiver site.

Readback information, from the receiver system being controlled, is applied to the display panel of the ARCA via an FSK receiver. This readback information indicates to the operator the condition and settings of the receiver being monitored.

#### 4-2. CIRCUIT DESCRIPTION

a. RECEIVER SELECTOR, MODEL RTRS-1. - The tuning start process from the Electronic Programmer RTPA-1, is routed to the Perforator-Reader RTKY-1 through the contacts of a relay. These relay contacts are controlled by the NO PUNCH and PUNCH pushbuttons. When the NO PUNCH pushbutton is pressed, the tuning start process is removed from the Perforator-Reader RTKY-1, permitting manual tuning at the Electronic Programmer RTPA-1 without punching a tape. Pressing the PUNCH pushbutton resets the relay, allowing the start process to be routed directly to the Perforator-Reader RTKY-1. Both NO PUNCH and PUNCH push-



buttons are locking type switches, lighting when pressed to indicate activation.

Pressing either of the two receiver selector push-buttons 1 or 2, will route a code back to the input of the Electronic Programmer RTPA-1, indicating the particular receiver system to be tuned. Receiver selector pushbuttons 1 and 2 are momentary contact switches, lighting when pressed to indicate activation.

b. PERFORATOR-READER, MODEL RTKY-1. - This unit is a semi-automatic feed tape reader and punch, providing synchronous operation to 50 characters per second. Both reader and punch also employ reverse feed, accommodating 1 inch, 7/8 inch or 11/16 inch standard tape with 5, 6, 7 or 8 level code. The RTKY-1 provides a manual index control on punch and a tape feed control permitting blank or delete feeding between messages.

The RTKY-1 is provided to accept 5-level teletype information, punched on a card or tape to perform a pre-programmed assignment to an external receiver system. This unit is selected by the RTRS-1 and operated via the RTPA-1. The RTKY-1 will punch a tape when the PUNCH pushbutton on the RTRS-1 is pressed. Tape punch input and tape reader output is routed to the RTPA-1 programmer.

c. ELECTRONIC PROGRAMMER, MODEL RTPA-1 - The tuning start process is routed from the RTPA-1 to the Perforator-Reader RTKY-1 when the PUNCH pushbutton on the Remote Equipment Selector RTRS-1 is pressed. The receiver to be

tuned is selected by the receiver selector pushbuttons 1 and 2 on the RTRS-1. When receiver 1 is selected, a negative 12 volt signal is fed to the input circuit on the 1, 2 and 4 bit lines. When receiver 2 is selected, a negative 12 volt signal on the 1 and 4 bit lines is received. These codes, at the input circuit, indicate to the RTPA-1, which of the two receivers are to be controlled or tuned. Selection of automatic tuning, by means of the Perforator-Reader RTKY-1, manual tuning and tape punch, tape punch only or manual tuning only is provided by means of the front panel selector switch.

d. CHANNEL FREQUENCY INDICATOR, MODEL RTIA-1.- Readback information from an external receiver system, is applied to the indicators of the RTIA-1 via an FSK receiver. This readback information includes the r-f frequency of the receiver displayed on six nixie lights. Six backlighted readouts indicate the IF bandwidth, mode of detection of each channel, AVC on or off and RF gain. "Fault", "tune" and "ready" indicator lamps are also included in readout information. The ARCA contains two RTIA-1 units, one for each receiver system.

See figure 4-1 for a simplified wiring/block diagram of the ARCA-1 system.

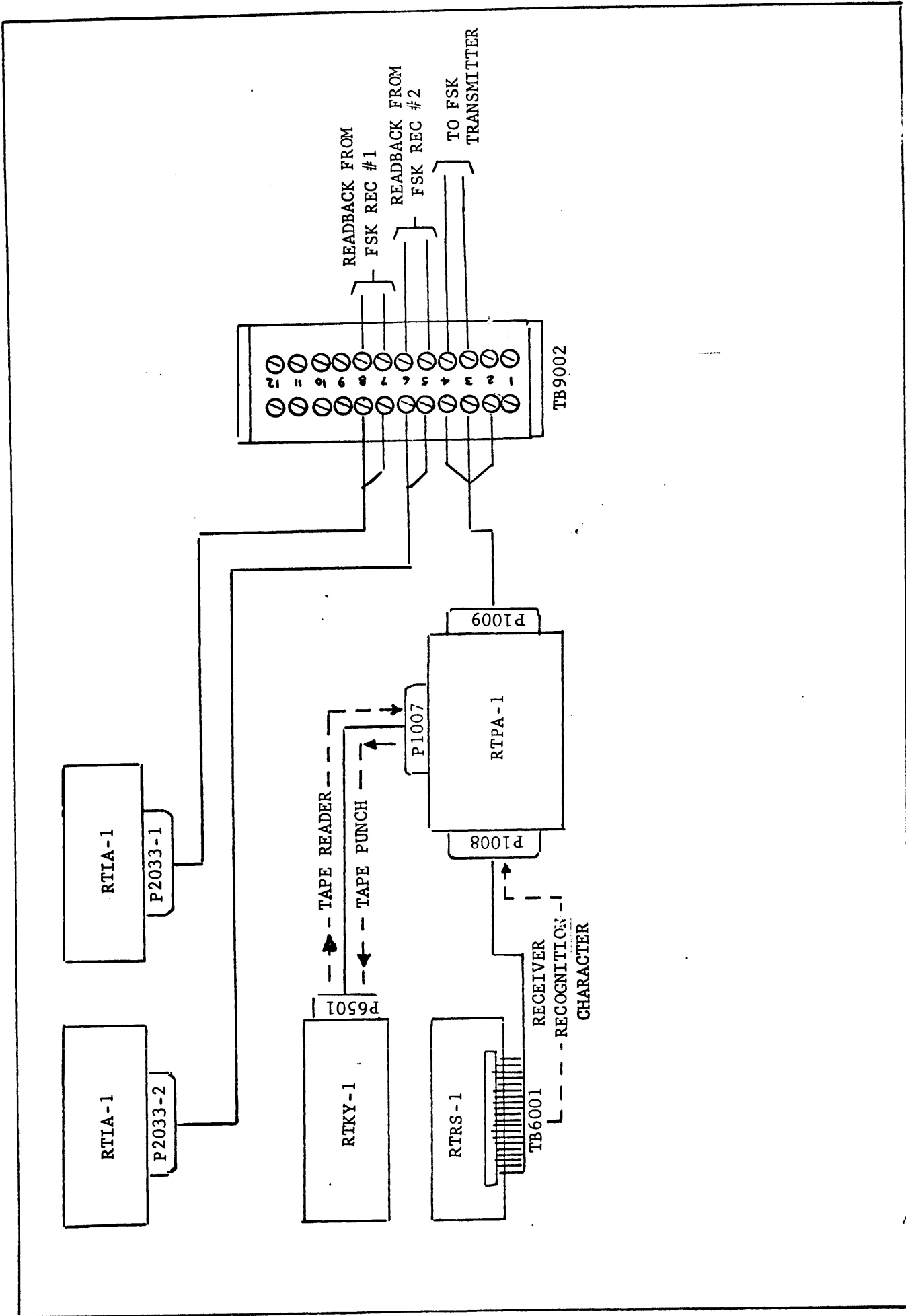


Figure 4-1. Simplified Wiring/Block Diagram

SECTION 5  
TROUBLESHOOTING

5-1. INTRODUCTION

This section explains how to locate and diagnose equipment troubles. By proper use of the various troubleshooting aids provided in this manual, the technician can locate and diagnose the fault at hand. When a fault has been located, the technician should then refer to the troubleshooting procedures listed in the instruction manual of the particular unit at fault.

The following troubleshooting aids are provided.

- a. Interconnection diagram, figure 2-4, table 5-1.
- b. Operating controls and indicators, table 3-1.
- c. Simplified wiring/block diagram, figure 4-1.
- d. Troubleshooting techniques, paragraph 5-2.

5-2. TROUBLESHOOTING TECHNIQUES

When a piece of equipment has been operating satisfactorily and suddenly fails, the cause of failure may be due to circumstances occurring at the time of failure or due to symptoms of part failures. Therefore, the first check is to ascertain that proper equipment operating voltages are present and that all fuses and interconnecting cables are in proper functional condition.

If the above mentioned checks fail to locate the fault, the technician should then proceed by performing the tuning

procedure listed in table 3-2 and observing for abnormal indications. Refer to the individual modular manuals for each modular unit comprising the ARCA system for further troubleshooting aids.

Table 5-1 is a list of wiring interconnections, listing unit and connector or fanning strip pin numbers. This chart will prove to be of great assistance in troubleshooting when used in conjunction with interconnection diagram figure 2-4.

TABLE 5-1. INTERCONNECTION CABLE ROUTING CHART

UNIT CONNECTOR TERMINATIONS	
FROM	TO
RTKY-1	RTPA-1
A P6501	5 P 1007
B	6
C	7
D	8
E	9
F	10
H	11
J	12
R	13
S	14
T	15
U	25
V	26
W	19
X	37
Y	27
b	28
c	29
d	30
f	31
g	32
k	33
n	34

UNIT CONNECTOR TERMINATIONS	
FROM	TO
TB9002	RTIA-1
6	A P2033-1
5	C
8	A P2033-2
7	C
	RTPA-1
2	A P1009
3	C
4	E
RTPA-1	RTRS-1
1 P1008	1 TB 6001
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14

TABLE 5-1. INTERCONNECTION CABLE ROUTING CHART

UNIT CONNECTOR TERMINATIONS	
FROM	TO
RTPA-1 (cont)	RTRS-1 (cont)
15	15
16	16
17	17
18	18
19	19
20	20

## SECTION 6

### MAINTENANCE

#### 6-1. INTRODUCTION

Maintenance may be divided into three categories: operator's maintenance, preventive maintenance and corrective maintenance.

Operator's maintenance procedures are described in paragraph 3-3 of the Operator's Section.

Preventive maintenance procedures, described in paragraph 6-2 of this section, provide information useful in preventing unnecessary equipment failure or malfunctioning.

Corrective maintenance procedures, described in paragraph 6-3 of this section, provide information useful in locating and correcting the cause of equipment failure or malfunctioning.

#### 6-2. PREVENTIVE MAINTENANCE

a. In order to prevent equipment failure due to dust, dirt or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

At periodic intervals, the modular units comprising the ARCA should be removed from the console for cleaning and inspection. The wiring and all components should be inspected for dirt, dust, corrosion, grease or other harmful conditions. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease with any suitable cleaning solvent. Use of carbon



tetrachloride should be avoided due to its highly toxic effects. Trichloroethylene or methyl chloroform may be used, providing the necessary precautions are observed.

#### 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, "hot work", etc. is prohibited in the immediate area.

#### CAUTION

When using trichlorethylene, avoid contact with painted surfaces, due to its paint removing effects.

b. To prevent possible malfunction of the Perforator-Reader unit RTKY-1, it is required that the chad-collector container, located on the right-underside of the RTKY-1, be periodically emptied. To empty the chad collector container, simply lift the front end of the RTKY-1 and remove the container from its retaining well. Replace empty container in the same manner.

The slide mounted tape-feed reel should also be periodically checked for sufficient tape supply and friction-free rotation. A tape-tension spring, located in the tape reel support housing, is to be periodically checked for proper tension. This tension, not to exceed 2 ounces, is applied to maintain sufficient tension of the tape feed to the RTKY-1 unit, thereby preventing tape back-lash effects.

See figure 6-1 for physical locations of the above mentioned components.

### 6-3. CORRECTIVE MAINTENANCE

Corrective maintenance of the ARCA will consist mainly of component replacement. Refer to the applicable modular unit instruction manual for corrective maintenance procedures. It should be noted that when replacing components having many wires connected, such as switches, relays, etc. the wires should be tagged and marked for accurate identification when replacing. When replacing components, refer to the parts list in section 7 of the applicable instruction manual for exact or equivalent replacement. Use of schematic diagrams is advisable when replacing or disconnecting components.

See figures 6-2 and 6-3 for tape reel assembly adjustment and lubrication points and parts breakdown.

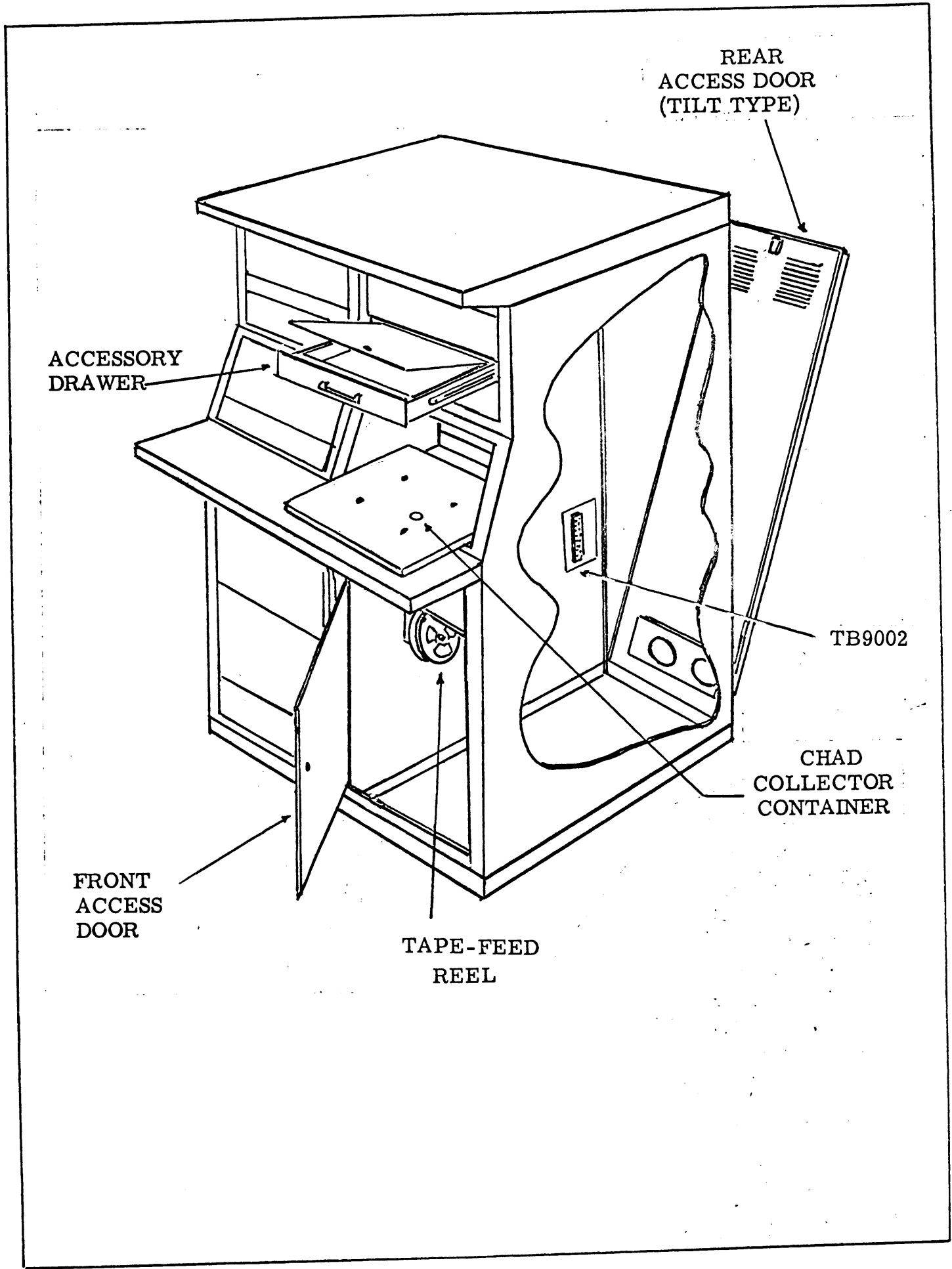


Figure 6-1. Operating Console COPA-2

**LUBRICATION:**

Lubricate sparingly the points indicated.

**ADJUSTMENTS:**

Arm and Roller should have 1.5 ounces of tension, but not to exceed 2 ounces. Adjustment is made through its tension spring.

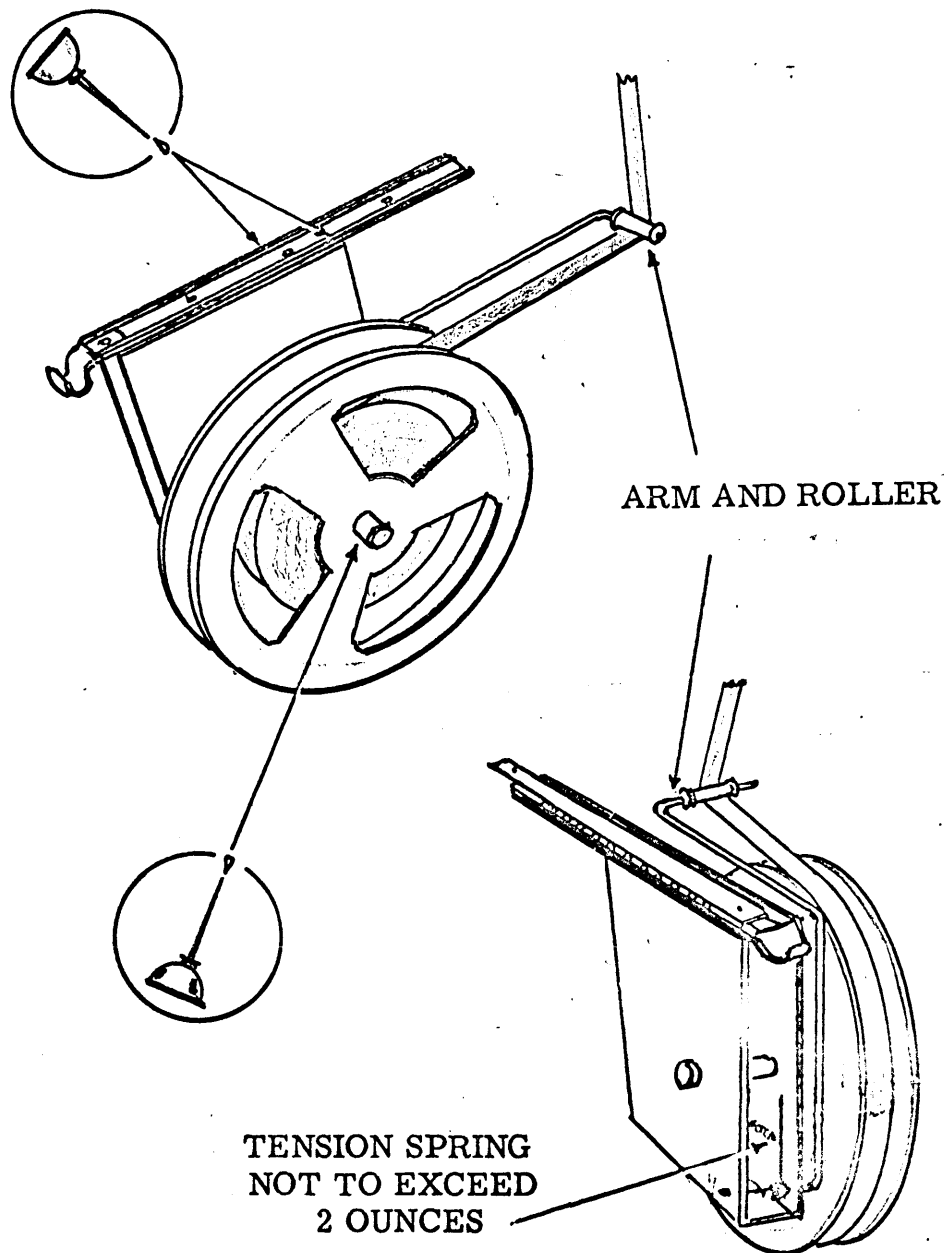
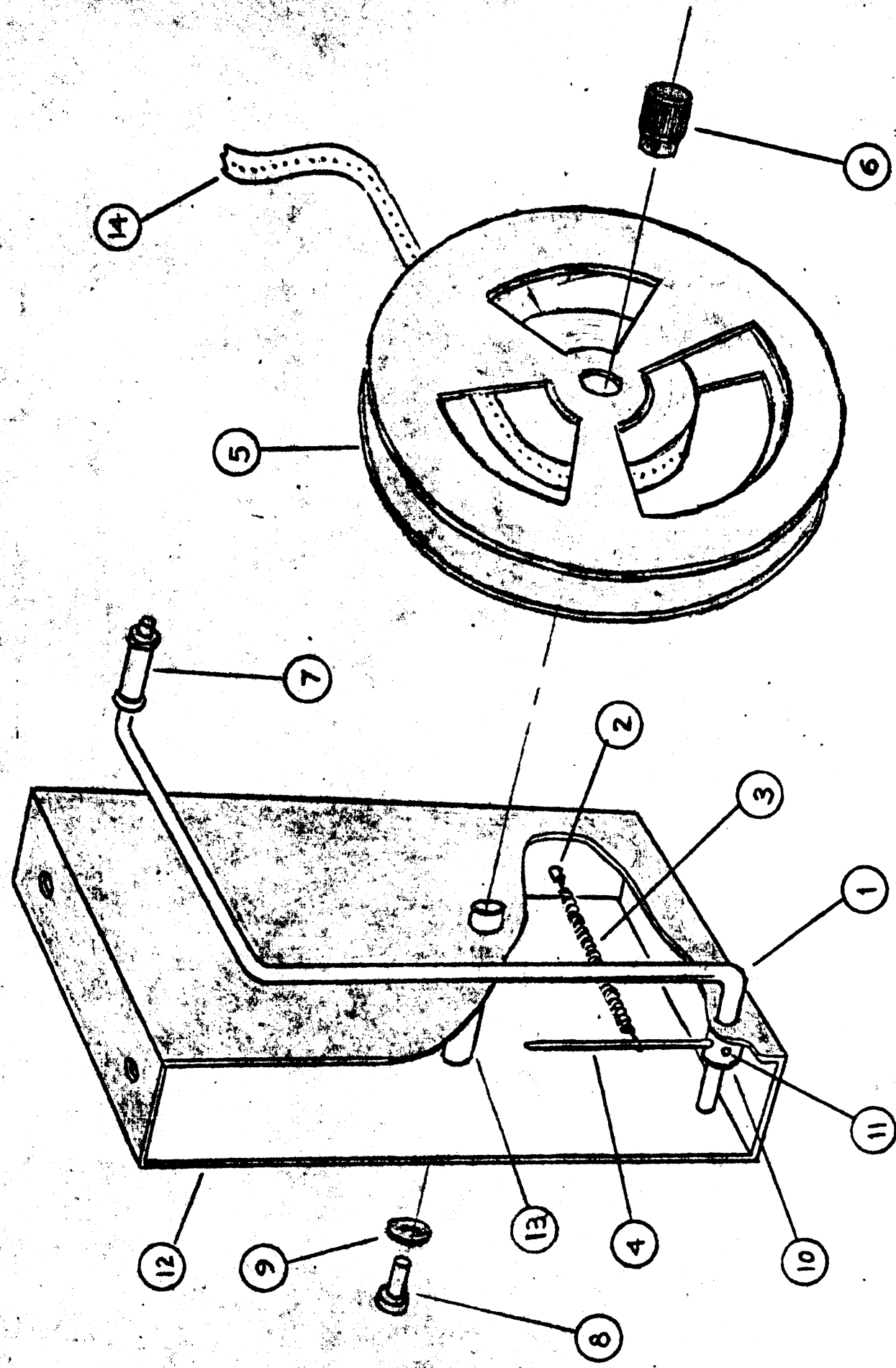


Figure 6-2. Lubrication and Adjustments.



**REEL ASSY, PAPER, PO312**

REF. DESIG.	NOMENCLATURE	TMC PART NO.
1	CONT ARM, TAPE TENSION	PO312-2
2	TENSION SPRING ANCHOR SCREW	PO312-4
3	TENSION SPRING	PO312-5
4	ROD, SW TRIP	PO312-6
5	REEL, PAPER	PO312-7
6	SCREW, REEL HOLDER	PO312-9
7	ROLLER, TAPE	PO312-10

REF. DESIG.	NOMENCLATURE	TMC PART NO.
8	REEL HOLDER, TAPE SUPPORT	PO312-14
9	WASHER, NYLATRON	PO312-15
10	SW, ROD COLLAR	PO312-16
11	SCREW, SET	PO312-17
12	MOUNTING BRACKET, PAPER REEL	PO312-18
13	SHAFT HUB, PAPER REEL	PO312-19
14	TAPE, PERFORATED PAPER	TA116-1

Figure 6-3. Reel Assembly Parts Breakdown