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UNCLASSIFIED

TECHNICAL MANUAL

for

KEYER-MONITOR CONTROL UNIT

MODEL KMCU-1

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THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y.

OTTAWA, ONTARIO

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THE TECHNICAL MATERIEL CORPORATION
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CHANGE NO. 1 KMCU.



INSTRUCTION BOOK CHANGE NOTICE

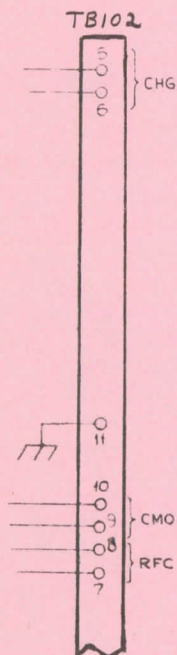
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Manual affected: Keyer-Monitor Control Unit IN -4028
Model KMCU (issue date: 15 July 1966)

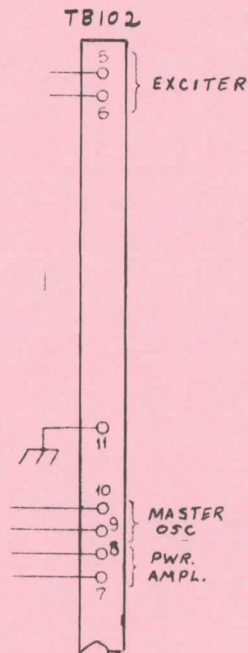
Page 7-3/7-4. Figure 7-1.

Change designations for TB102 in accordance with information given below

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

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Figure 1-1. Keyer Monitor Control Unit, Model KMCU-1

SECTION 1
GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

Keyer-Monitor Control Unit, Model KMCU-1 (figure 1-1), controls the various sections of an associated transmitter, and provides indications of transmitter operation, and audio, r-f, and plate voltage failure. The KMCU consists of a keyer-control circuit, and a monitor circuit; the two sections are linked during d-c keying to prevent a false alarm, since there is no audio under these conditions. The KMCU operates in conjunction with a transmitter, as shown in the block diagram, figure 1-2.

1-2. PHYSICAL DESCRIPTION.

The KMCU is provided with a front panel for installation in a 19-inch wide equipment rack. All controls (switches), indicators, and fuses necessary for operation of the KMCU are located on the front panel; additional controls are located inside the unit. Tilt-lock slide mechanisms, provided with the KMCU, facilitate troubleshooting and maintenance; top and bottom dust covers are removable.

1-3. TECHNICAL SPECIFICATIONS.

Keyer

Input: 50 or 100 volts dc;
20 or 60 milliamperes dc;
Tone, 600 or 5000 ohms impedance.

Output: Reed relays.

Monitor

Inputs: Audio, 400 to 7000 cps (bridged across 600-ohm transmitter input lines).

RF, 0.5 volts rms, 75 ohms.

24 volts d-c.

230 volts a-c.

Outputs: 24 volts d-c for ON AIR, READY, and FAILURE condition; relay contact closure for ALARM condition.

Power Requirements

115 or 230 volts a-c.

10 watts.

Environmental Conditions

From 0°C (32°F) to 50°C (122°F), and up to 90% relative humidity.

Dimensions

19 inches wide
10-3/8 inches deep
5-1/4 inches high

Weight

Approximately 13.5 pounds.

EXT 24VDC req to all 24VDC

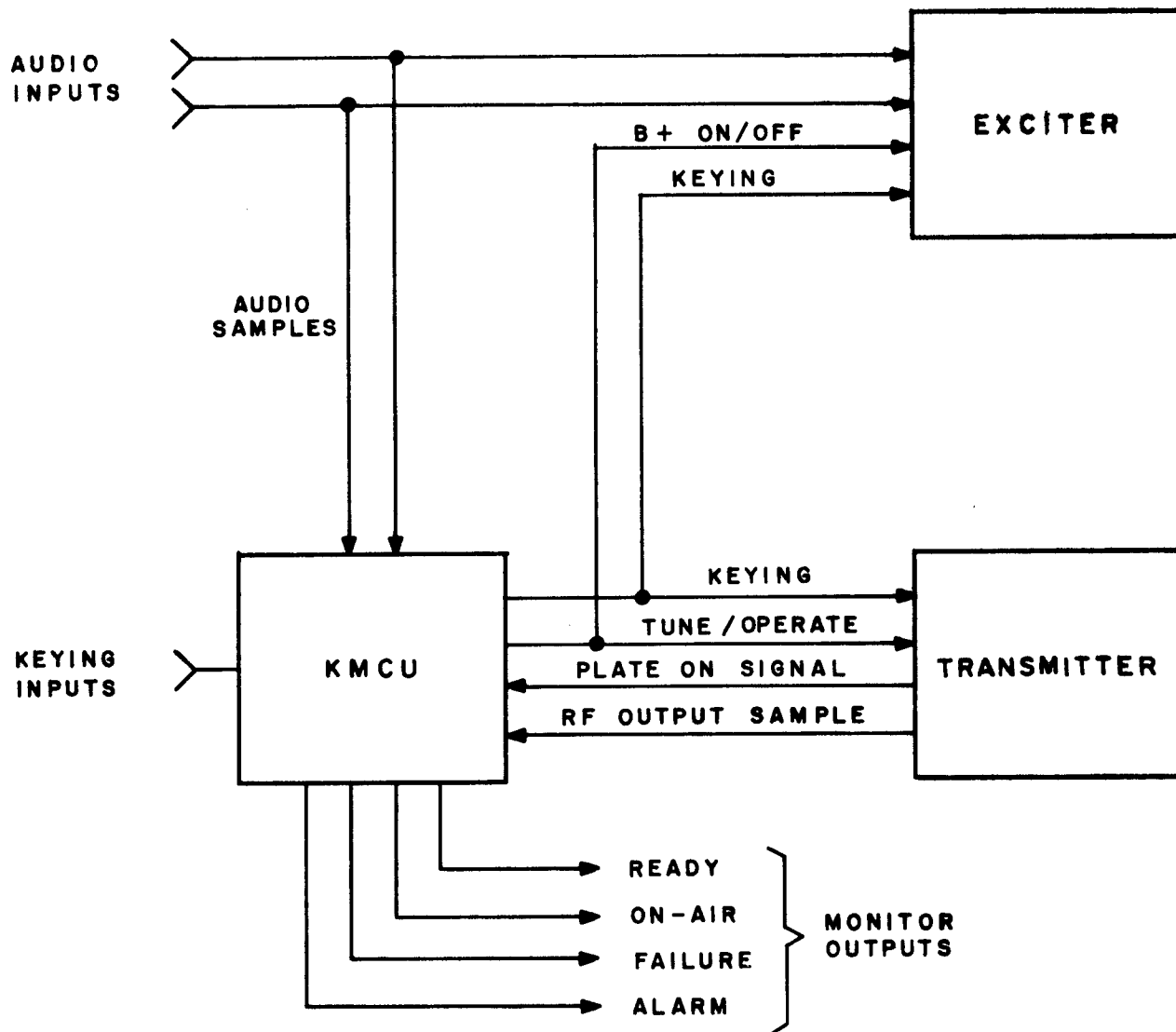


Figure 1-2. Simplified Block Diagram, KMCU

SECTION 2
INSTALLATION

2-1. GENERAL.

The KMCU is tested at the factory and is carefully packaged to prevent damage during shipment. When it is delivered at the operating site, inspect the packing case and its content for damage that might have occurred during transit. Unpack the equipment carefully and inspect all packaging material for parts that 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 furnishing of replacement parts.

2-2. MECHANICAL INSTALLATION.

The KMCU is equipped with a standard 19-inch wide front panel and is designed for installation in an equipment cabinet. Refer to figure 2-1 and install the unit in the rack as follows:

- a. Pull out center sections of tracks, located in equipment rack, until they lock in extended position.
- b. Position slide mechanisms of KMCU in tracks, and ease the unit into the rack until release buttons engage holes in tracks.
- c. Depress release buttons and slide KMCU completely into rack; secure front panel of KMCU to rack with screws and washers.
- d. Make necessary electrical connections, as described in paragraph 2-3.

NOTE

To prevent the cables from snagging, attach cable retractors (located inside rack) to the cables before sliding the unit into the rack.

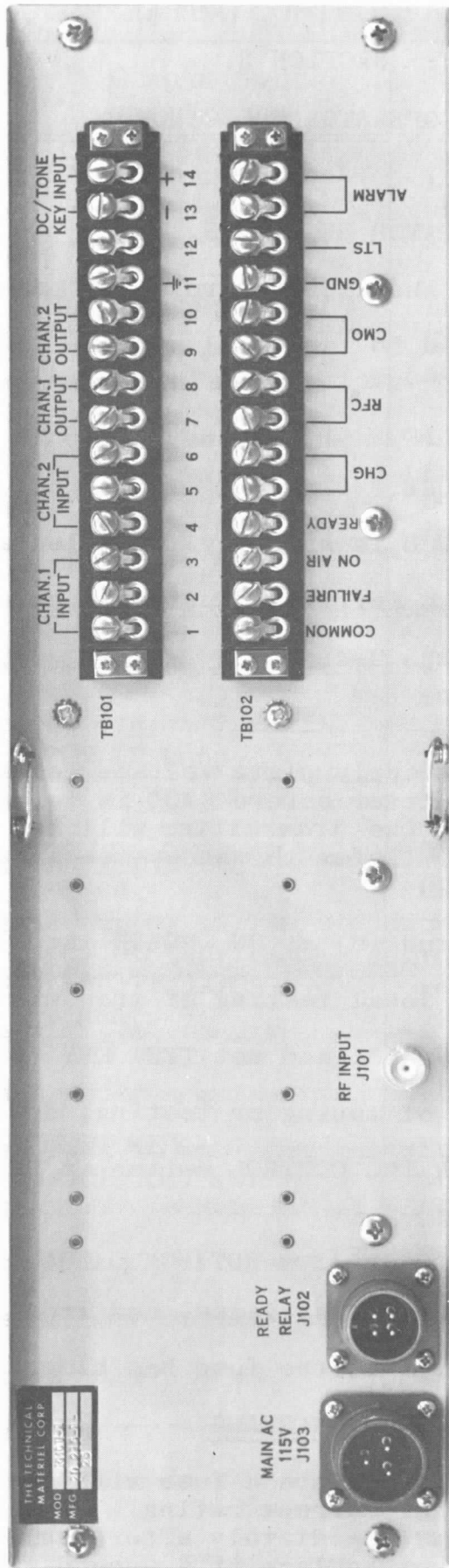


Figure 2-2. Rear Panel, KMCU

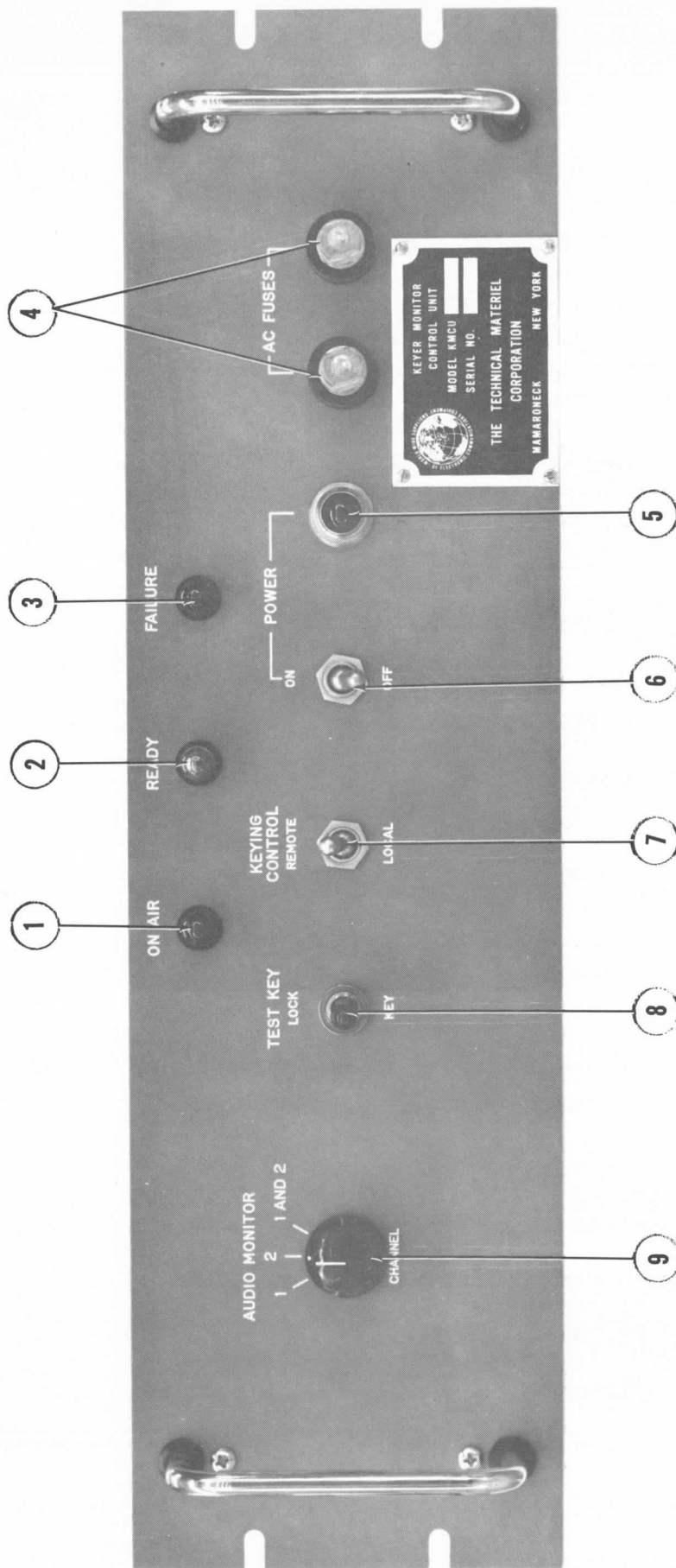


Figure 3-1. Front Panel Controls and Indicators, KMCU

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL.

The KMCU consists of a keyer-control circuit and a monitor circuit; these circuits control the various sections of a transmitter and provide indications of transmitter operation. The keyer-control and the monitor sections of the KMCU are linked during d-c keying to prevent a false alarm indication.

4-2. CIRCUIT ANALYSIS (REFER TO FIGURES 4-1 and 7-1).

a. Keyer Control Circuit. - The input from the key line enters the KMCU through TB101 and is filtered by chokes L1, L2, and capacitors C1 through C4. The KEYING SELECTOR switch S4 provides adjustment of KMCU for operation with the input in use. The THRESHOLD control R9 provides adjustment for level of keying signal. When tone keying is used, transistor Q2 acts as a tone amplifier, and the output of this stage is rectified by a voltage-doubler consisting of diodes CR4, CR5, and capacitors C7 and C8. DC amplifier Q1 provides required voltage to operate the driver for the relays. The input to the delay-relay K2 is isolated by resistor R17 and diode CR6. Capacitor C9 and resistors R21 and R22 form a parallel circuit and store voltage from Q1 when it conducts; R21 provides adjustment of hold-in time.

b. MONITOR CIRCUIT. - The monitor circuit consists of an amplifier section and an alarm section, each on a separate circuit card, A4107 and A4108, respectively. The two push-pull stages (Q7, Q8, Q9, and Q10) of the amplifier section provide isolation

from and gain to the two audio channels. The outputs of the two amplifiers are rectified by a full wave bridge (CR7, CR8, CR23, and CR24) and applied to a common filter capacitor C12.

DC amplifier Q11 of the alarm section operates relay driver Q12 and multivibrator clamp Q14. Since Q11 conducts whenever traffic is present on either channel, the base of Q12 is driven negative through R48 and Q12 conducts, closing relay K3 to indicate the presence of traffic.

Q14 is a clamp on the multivibrator whenever traffic is present, since Q14 is also coupled to the collector circuit of Q11. When audio traffic fails, Q14 unclamps and thus permits the multivibrator, consisting of Q13 and Q15, to oscillate (provided transistor Q16 is conducting sufficiently to apply collector voltage on the multivibrator). Relay K4 operates (flashes the red FAILURE lamp) whenever the multivibrator is oscillating.

R-F enters the KMCU through connector J101 and is rectified by CR13 to operate Q18; whenever Q18 conducts, the base of Q17 is driven negative and thus Q17 conducts, closing relay K5. Conduction through the collector circuit of Q18 also drives Q16.

An external source of 24 volts d-c is required to light the front panel indicating lamps and the remote indicating lamps. The relays are wired to operate in the following sequence:

When plate voltage is applied to the transmitter, 230 volts a-c energizes relay K6 through pins A and B of connector J102. The amber READY lamp then receives voltage through the contacts of energized relay K6, contacts of de-energized relay K5, and contacts of de-energized relay K3. Whenever traffic is present (and the transmitter is operating correctly) relays K3 and K5 are closed

and the green ON AIR lamp is lit and the amber READY lamp is extinguished. Failure of r-f causes relay K5 to open, lighting the red FAILURE lamp and extinguishing the green ON AIR lamp. Failure of traffic and the presence of r-f causes relay K4 to flash the red FAILURE lamp (after approximately 8 seconds and at approximately a 1-second delay).

The delay capability of the circuit provides the following red FAILURE lamp indications:

No delay when r-f or plate voltage is applied; a 1/4-second delay when indicating application of traffic, and, for failure of traffic, a 1-second delay to extinguish the green ON AIR lamp and an 8-second delay before flashing the red FAILURE lamp; a 1 1/2-second delay to extinguish the green ON AIR lamp and 1 1/2-second delay before lighting the red FAILURE lamp to indicate failure of r-f.

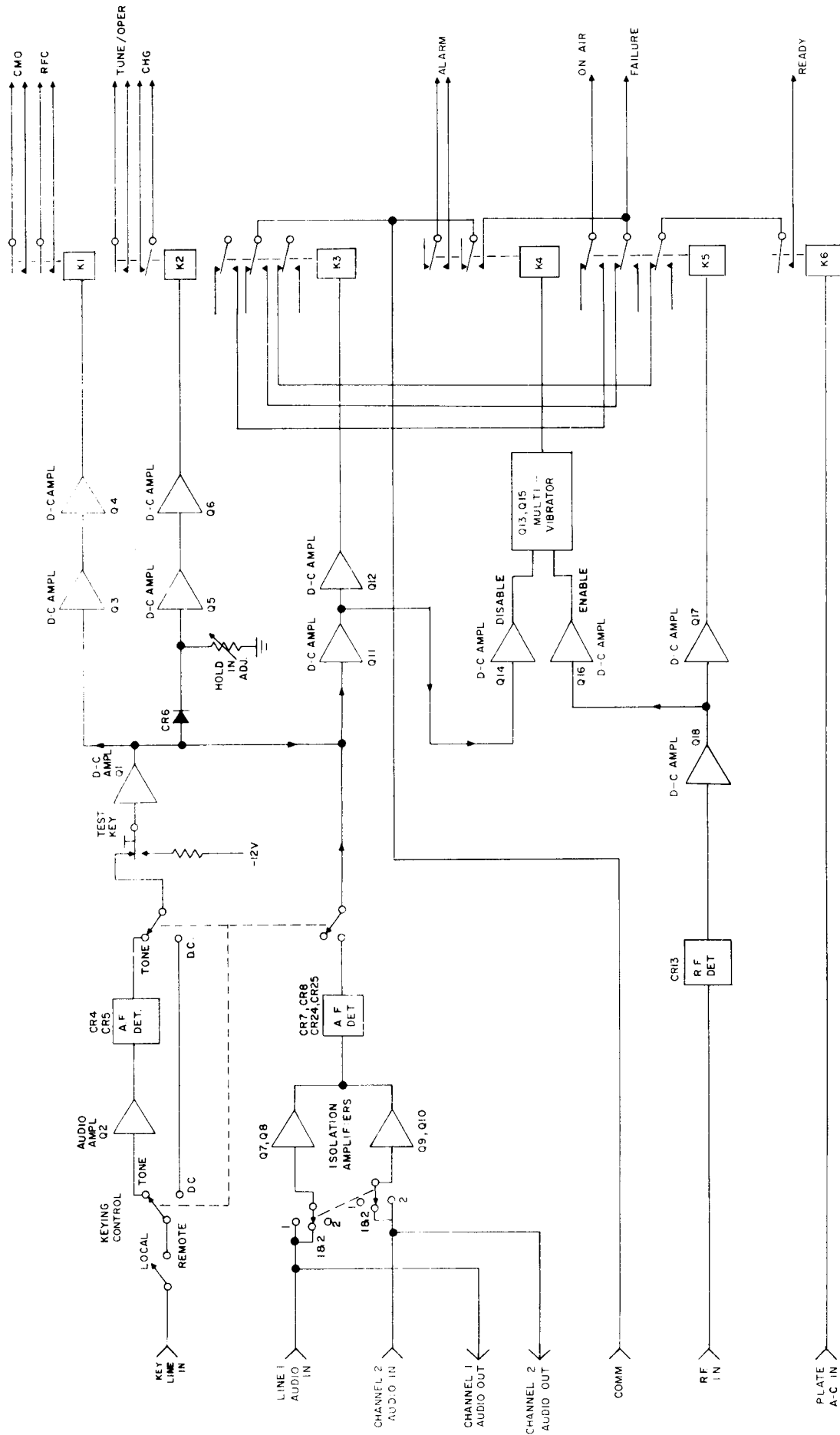


Figure 4-1. Block Diagram, KMCU.

SECTION 5
MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

Periodically, remove the KMCU from the rack and inspect for general cleanliness and condition of connections at the rear of the unit. Remove all covers, and check all components for discoloration, damaged wiring, broken or loose solder connections, and corrosion. Clean the components with a soft brush, vacuum cleaner, or clean, dry, filtered, compressed air. Check all hardware for tightness.

WARNING

Electrical parts may be cleaned with any good dry-cleaning fluid, or with trichlorethylene. When using trichlorethylene or carbon tetrachloride, be sure that adequate ventilation exists in the area, and avoid prolonged skin contact with the fluid. Use caution when applying trichlorethylene near painted surfaces, as the fluid may act as a paint remover.

5-2. TROUBLESHOOTING (REFER TO FIGURE 7-1)

When the KMCU has been working satisfactorily and suddenly fails, the cause of failure may be apparent either because of circumstances occurring at the time of failure or because of symptoms analogous to past failures. It is unnecessary, under such conditions, to follow a lengthy and systematic course of troubleshooting in order to isolate the faulty part.

Ascertain that the KMCU is receiving proper supply voltages, that the fuses have not blown (a lit fuse cap indicates a blown fuse), and that the switches are properly set. Also check each printed circuit board for placement and contact.

Equipment performance check is as follows (the required test equipment is listed in table 5-1):

TABLE 5-1. TEST EQUIPMENT

ITEM	TO CHECK
Audio Generator, Model 200 DC, Hewlett-Packard	Tone Keying, and Monitoring
Square Wave Generator, Model 71, Measurement Corp.	Remote Keying
Signal Generator, Model 82, Measurement Corp.	Monitor
Multimeter, Model 260, Simpson	Manual Keying, Tone Keying (Resistance measurements)
Teletype Loop Battery, (50-100 V, 30-60 ma)	Remote Keying
Battery (6 volt)	Remote Keying
Isolation Keyer, Model 1SK, TMC	Loop Keying Remote Keying

a. MANUAL KEYING CHECK. - Figure 5-1 illustrates the interconnections between test equipment and TB-101 of the KMCU; also refer to figures 2-2, 2-3, and 3-1. Set KEYING CONTROL (on front panel) at LOCAL, KEYING SELECTOR (located inside the unit) at 50 V, HOLD IN ADJ fully counter-clockwise, and THRESHOLD at mid-range. With multimeter set at RX-1, connect it to terminals 5 and 6 (CHG) of terminal board (on rear panel) TB102. Press TEST KEY (on front panel). Multi-meter should indicate "short." When TEST KEY is released, meter should indicate "open."

Set HOLD IN ADJ at mid-range and press TEST KEY. Meter should indicate "short." When TEST KEY is released, the meter should indicate "short" for approximately 3 or 4 seconds, and then indicate "open."

Set multimeter at RX-1 and connect it to terminals 7 and 8 (RFC) of terminal board TB102. Meter should indicate "short" when TEST KEY is pressed, and "open" when TEST KEY is released.

b. REMOTE KEYING CHECK. - Set KEYING CONTROL at REMOTE, KEYING SELECTOR at 50 V, and set square wave generator for 50 volt output and frequency for 21 cps. Using teletype loop battery, adjust it for 50 volts peak at terminals 12 and 13 of TB101. Connect the 6-volt battery and 100-ohm resistor across terminals 7 and 8 of TB102. Using oscilloscope, observe signal across 100-ohm resistor; the wave form should be as illustrated in figure 5-2.

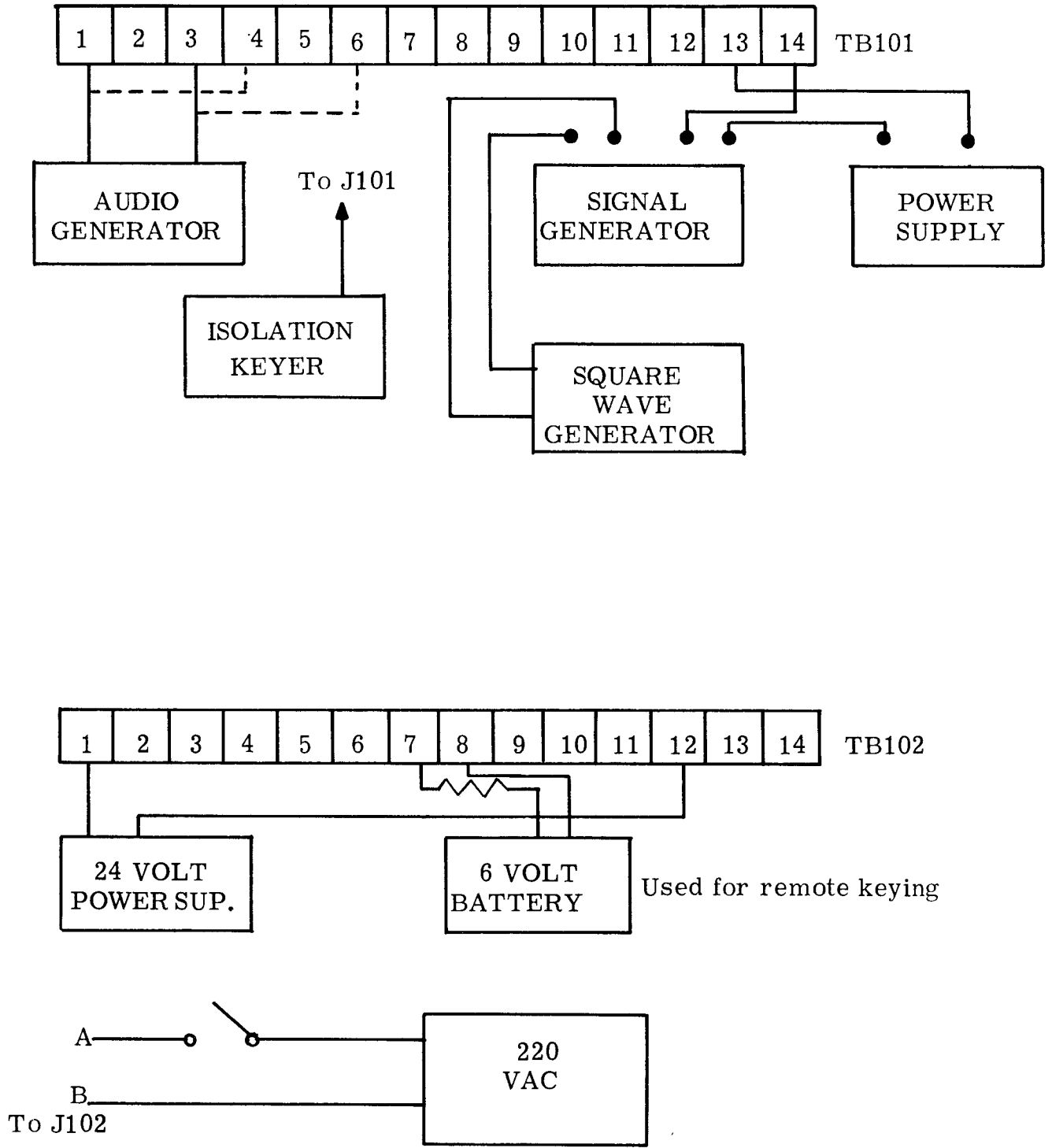


Figure 5-1. Interconnection Diagram, KMCU

Repeat same check, using terminals 9 and 10 of TB102, but change KEYING SELECTOR to 100 V and adjust teletype loop battery for 100 volts. The observed signal on the oscilloscope should be as illustrated in figure 5-2.

Change KEYING SELECTOR and teletype loop battery to 20 ma. The observed signal on the oscilloscope should be as illustrated in figure 5-2. Repeat this check, but set KEYING SELECTOR and teletype loop battery to 60 ma; the observed signal on the oscilloscope should be as in figure 5-2.

c. TONE KEYING CHECK. - Connect the audio generator to terminals 13 and 14 of terminal board TB101, and adjust generator output for 0.1 volts and at a frequency of 400 cps. Change KEYING SELECTOR to TONE BRIDGE. Connect multimeter across terminals 9 and 10 of TB102; the meter should indicate "short."

NOTE

The THRESHOLD control may require a slight adjustment.

As audio generator is tuned from 400 cps to 7000 cps the meter must continue to indicate "short." When the generator is turned off, the meter should indicate "open."

Change KEYING SELECTOR to TONE TERM and repeat the check described above.

d. AUDIO MONITOR CHECK. - With signal generator set for .7 volts and at 20 mc, connect it to jack J101. Set audio generator for .1 volt output, at 300 cps, and connect it to terminals 1 and 3 (CHANNEL 1) of terminal board TB101. Apply 220 vac to pins A and B of jack J102. The ON AIR green indicator lamp should light.

The ON AIR green indicator lamp should remain lighted when the audio generator is changed from 300 cps to 6000 cps.

NOTE

Repeat above check on terminals 4 and 6 (CHANNEL 2) of terminal board TB101.

Reduce audio generator output to 0 volts. The ON AIR green indicator lamp should go out after approximately 2 seconds and the FAILURE red indicator lamp should begin flashing on and off. As the audio generator is advanced to .1 volt output, the FAILURE lamp should stop flashing and the ON AIR green lamp should light.

Reduce signal generator output to 0 volts. ON AIR green lamp should go out and the FAILURE red lamp should light.

Apply 220 vac to pins A and B of jack J102. The READY amber indicator lamp should light.

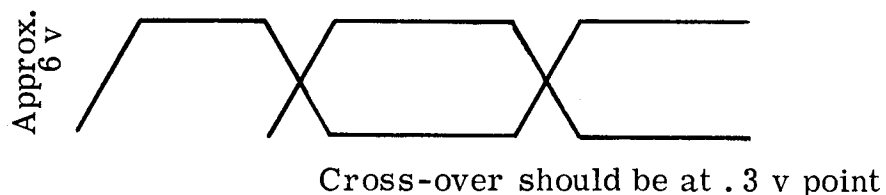


Figure 5-2. Keyer Circuit Output

5-3. REPAIR AND REPLACEMENT.

Maintenance of the KMCU will consist mainly of component replacement. 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 components, refer to the parts list in section 6 for exact or equivalent replacements. Use of the schematic diagram in section 7 is advisable when replacing or disconnecting components.

SECTION 6

PARTS LIST

6-1. GENERAL.

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. Generic name.
- b. Reference designation.
- 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

PARTS LIST

for

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, GMV; 500 WVDC.	CC100-9
C2 thru C4	Same as C1.	
C5	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100,000 uuf, +80% -20%; 500 WVDC.	CC100-28
C6	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-100-25
C7	Same as C5.	
C8	Same as C5.	
C9	CAPACITOR, FIXED, ELECTROLYTIC: 2 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-2-50
C10	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
C11	Same as C10.	
C12	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-50-25
C13	Same as C12.	
C14	NOT USED	
C15	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-20-25
C16	Same as C6.	
C17	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf, -10% +150% at 120 cps at 25°C; 25 WVDC; polarized; insulated tubular case.	CE105-10-25
C18	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, -10% +150% at 120 cps at 25°C; 100 WVDC; polarized; insulated tubular case.	CE105-20-100

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C19	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2,200 uuf, GMV; 500 WVDC.	CC100-11
C20 thru C22	Same as C1.	
C23	Same as C10.	
C24	Same as C10.	
C25	NOT USED	
C26	CAPACITOR, FIXED, ELECTROLYTIC: 2,000 uuf, 25 WVDC; polarized; hermetically sealed aluminum case with black vinyl sleeve.	CE116-5VN
C27	Same as C6.	
C28	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 50 uf, 60 WVDC; polarized; tubular case.	CE107-1
C29 thru C31	Same as C28.	
C32	Same as C10.	
C33	Same as C10.	
C34	Same as C5.	
C35	Same as C5.	
C36	Same as C10.	
C37	Same as C10.	
CR1	SEMICONDUCTOR DEVICE, DIODE: silicon junction; average forward current 20 ma; max. power dissipation 200 mw at 25°C; reverse working voltage 100 V; hermetically sealed glass case.	1N627
CR2 thru CR12	Same as CR1.	

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CR13	SEMICONDUCTOR DEVICE, DIODE: germanium; peak inverse voltage 80 V; max. reverse current 50 ua at 25°C; average forward rectified current 30 ma; max. power dissipation 80 mw at 25°C; operating temperature 90°C; two axial wire lead type terminals; hermetically sealed glass case.	1N100
CR14	SEMICONDUCTOR DEVICE, DIODE	1N2858
CR15 thru CR17	Same as CR14.	
CR18	Same as CR1.	
CR19	SEMICONDUCTOR DEVICE, DIODE: silicon; nom. voltage 24 volts, ±5%; max. power dissipation 10 watts at 25°C; current rating 105 ma; max. impedance 5 ohms; max. operating temperature 150°C; stud mounted; hermetically sealed metal case.	1N2986B
CR20	Same as CR1.	
CR21	NOT USED	
CR22	NOT USED	
CR23	Same as CR1.	
CR24	Same as CR1.	
DS1	LAMP, INCANDESCENT: 28 volts, 0.04 amp; miniature bayonet base T-3-1/4 bulb.	BI101-1819
DS2	LAMP, INCANDESCENT: 28 volts, AC/DC; 0.20 amp; single contact T-1-3/4 bulb.	BI110-7
DS3	Same as DS2.	
DS4	Same as DS2.	
DS5	Non-replaceable item. Part of XF1.	
DS6	Non-replaceable item. Part of XF2.	
F1	FUSE, CARTRIDGE: 1/4 amp; 1-1/4" long x 1/4" dia.; quick acting.	FU100-.250
F2	Same as F1.	

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J101	CONNECTOR, RECEPTACLE, ELECTRICAL: RF type; 1 round male contact, straight type; series BNC to BNC.	UG625*/U
J102	CONNECTOR, RECEPTACLE, ELECTRICAL: male.	MS3102A14S2P
J103	CONNECTOR, RECEPTACLE, ELECTRICAL: male.	MS3102A16S5P
J4	CONNECTOR, RECEPTACLE, ELECTRICAL: female.	JJ319-15SFE
J5 thru J8	Same as J4.	
K1	RELAY	<i>RL-173</i> RL170-2C <i>mlt</i>
K2	RELAY, ARMATURE: DPDT; 5,000 ohms, $\pm 10\%$ DC resistance; operating voltage 20.5 VDC; current rating 4.1 ma, 85 μ at 25°C; 8 contacts rated for 1 amp at 29 VDC; clear high impact styrene dust cover case.	RL156-4
K3	RELAY, ARMATURE: 4PDT; 700 ohms, $\pm 10\%$ DC resistance; operating voltage 24 VDC; current rating 35 ma, 700 μ at 25°C; 14 contacts rated for 5 amps at 25 VDC; clear high impact styrene dust cover case.	RL156-8
K4	RELAY, ARMATURE: DPDT; 700 ohms, $\pm 10\%$ DC resistance; operating voltage 24 VDC; current 35 ma, 700 μ at 25°C; 8 contacts rated for 5 amps at 29 VDC; clear high impact styrene dust cover case.	RL156-1
K5	Same as K3.	
K6	RELAY, ARMATURE: DPDT; 6,000 ohms, $\pm 10\%$ DC resistance; operating voltage 220 VAC; current rating 2,400 μ at 25°C; 8 contacts rated for 2 amps at 25 VDC; clear high impact styrene dust cover case.	RL156-11
L1	COIL, RADIO FREQUENCY: fixed; 2.5 mh, $\pm 10\%$; 26 ohms DC resistance; 100 ma current rating; molded case.	CL140-1
L2 thru L4	Same as L1.	
Q1	TRANSISTOR: germanium, PNP; collector to base voltage 40 V; collector to emitter voltage 35 V; emitter to base voltage 25 V; collector to emitter current 200 ma; power dissipation 150 mw at 25°C; junction temp-	2N404A

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
Q1 (cont)	erature range -65°C to +100°C; hermetically sealed metal case.	
Q2 thru Q10	Same as Q1.	
Q11	TRANSISTOR	2N3392
Q12	Same as Q1.	
Q13	Same as Q1.	
Q14	TRANSISTOR	2N3136
Q15 thru Q17	Same as Q1.	
Q18	Same as Q11.	
Q19	TRANSISTOR: germanium; PNP; collector-base, and emitter voltage 45 VDC at 300 ma, 30 VDC at 500 ma; emitter base voltage 25 V; collector current 3 amps; power dissipation 62.5 watts at 25°C; junction temperature range -65°C to +100°C.	2N2143
R1	RESISTOR, FIXED, WIREWOUND: 1,000 ohms, 10 watts; non-inductive.	RR116-1000W
R2	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 5\%$; 2 watts.	RC42GF222J
R3	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF104J
R4	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF473J
R5	RESISTOR, FIXED, WIREWOUND: 600 ohms, 10 watts; non-inductive.	RR116-600W
R6	RESISTOR, FIXED, COMPOSITION: 10 ohms, $\pm 5\%$; 1/2 watt.	RC20GF100J
R7	RESISTOR, FIXED, COMPOSITION: 27 ohms, $\pm 5\%$; 1/2 watt.	RC20GF270J

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R8	RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 5\%$; 1/2 watt.	RC20GF471J
R9	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms, $\pm 10\%$; 2 watts; taper A.	RV4LAYS A103A
R10	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF102J
R11	Same as R3.	
R12	Same as R6.	
R13	Same as R3.	
R14	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 5\%$; 1/2 watt.	RC20GF222J
R15	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF223J
R16	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF103J
R17	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 10\%$; 1/2 watt.	RC20GF101J
R18	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 5\%$; 1/2 watt.	RC20GF470J
R19	Same as R10.	
R20	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 5\%$; 1/2 watt.	RC20GF472J
R21	RESISTOR, VARIABLE, COMPOSITION: 1 megohm, $\pm 10\%$; 2 watts; taper A.	RV4LAYS A105A
R22	Same as R14.	
R23	Same as R18.	
R24	Same as R4.	
R25	NOT USED	
R26	Same as R4.	
R27	NOT USED	

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R28	RESISTOR, FIXED, COMPOSITION: 2,700 ohms, $\pm 5\%$; 1/2 watt.	RC20GF272J
R29 thru R31	Same as R28.	
R32	RESISTOR, FIXED, COMPOSITION: 2.7 ohms, $\pm 5\%$; 1 watt.	RC32GF2R7J
R33	Same as R17.	
R34	Same as R28.	
R35	Same as R32.	
R36	Same as R17.	
R37	Same as R28.	
R38	NOT USED	
R39	Same as R28.	
R40	Same as R20.	
R41	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF333J
R42	RESISTOR, FIXED, COMPOSITION: 82,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF823J
R43	Same as R41.	
R44	Same as R15.	
R45	NOT USED	
R46	Same as R20.	
R47	Same as R20.	
R48	Same as R15.	
R49	Same as R10.	
R50	RESISTOR, FIXED, COMPOSITION: 680 ohms, $\pm 5\%$; 1/2 watt.	RC20GF681J
R51	Same as R41.	

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R52	Same as R15.	
R53	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, $\pm 5\%$; 1/2 watt.	RC20GF682J
R54	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$; 1/2 watt.	RC20GF221J
R55	Same as R20.	
R56	Same as R20.	
R57	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, $\pm 5\%$; 1/2 watt.	RC20GF822J
R58	NOT USED	
R59	RESISTOR, FIXED, COMPOSITION: 120 ohms, $\pm 5\%$; 1/2 watt.	RC20GF121J
R60	Same as R42.	
R61	Same as R53.	
R62	RESISTOR, FIXED, COMPOSITION: 1,500 ohms, $\pm 5\%$; 1/2 watt.	RC20GF152J
R63	RESISTOR, FIXED, COMPOSITION: 270 ohms, $\pm 5\%$; 1/2 watt.	RC20GF271J
R64	NOT USED	
R65	RESISTOR, FIXED, COMPOSITION: 150 ohms, $\pm 5\%$; 2 watts.	RC42GF151J
R66	Same as R18.	
R67	RESISTOR, FIXED, COMPOSITION: 680 ohms, $\pm 5\%$; 1 watt.	RC32GF681J
R68	NOT USED	
R69	Same as R3.	
R70	Non-replaceable item. Part of XF1.	
R71	Non-replaceable item. Part of XF2.	
R72	RESISTOR, FIXED, COMPOSITION: 560,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF564J

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S1	SWITCH, TOGGLE: DPST; 6 amps rated at 250 VAC; bat type handle.	ST22K
S2	Same as S1.	
S3	SWITCH, LEVER	SW186-3
S4	SWITCH, ROTARY	SW400
S5	SWITCH, ROTARY	SW372
T1	TRANSFORMER: audio interstage.	TF267-2
T2 thru T4	Same as T1.	
T5	TRANSFORMER, POWER, ISOLATION, STEP-DOWN: primary input 105, 115, 125 or 210, 230, 250 V; frequency 50/60 cps, phase 1; secondary 28 volts, rated at 500 ma; hermetically sealed steel case.	TF269
TB101	TERMINAL BOARD, BARRIER: 14 terminals, solder lug type; phenolic black bakelite.	TM100-14
TB102	Same as TB101.	
XDS1	LIGHT, INDICATOR: with red frosted lens; for miniature bayonet base T-3-1/4 bulb.	TS106-1
XDS2	LIGHT, INDICATOR: with green lens, sub-miniature type.	TS153-2
XDS3	LIGHT, INDICATOR: with amber lens, sub-miniature type.	TS153-3
XDS4	LIGHT, INDICATOR: with red lens, sub-miniature type.	TS153-1
XF1	FUSEHOLDER, LAMP INDICATING: accommodates cartridge fuse 1-1/4" long x 1/4" dia.; 90 to 300 V, 20 amps; neon lamp type with 220K ohm lamp resistor; transparent clear flat sided knob; black body. (Consists of DS5, R70)	FH104-3
XF2	Same as XF1. (Consists of DS6, R71)	
XK1	SOCKET, ELECTRON TUBE: octal type.	TS101P01

PARTS LIST (CONT)

KEYER-MONITOR CONTROL UNIT, MODEL KMCU-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XK2	SOCKET, RELAY: with retainer; 6 contacts; solder type terminals; black phenolic socket.	TS171-1
XK3	SOCKET, RELAY: with retainer; 12 contacts; solder type terminals; black phenolic socket.	TS171-3
XK4	Same as XK2.	
XK5	Same as XK3.	
XK6	Same as XK2.	
XQ1 thru XQ18	NOT USED	
XQ19	SOCKET, TRANSISTOR: 7 pin contact accommodation; 0.040 or 0.050 dia.; polarized; 1 terminal lug grounding strap; o/a dim. 1-37/64" x 1" max.	TS166-1



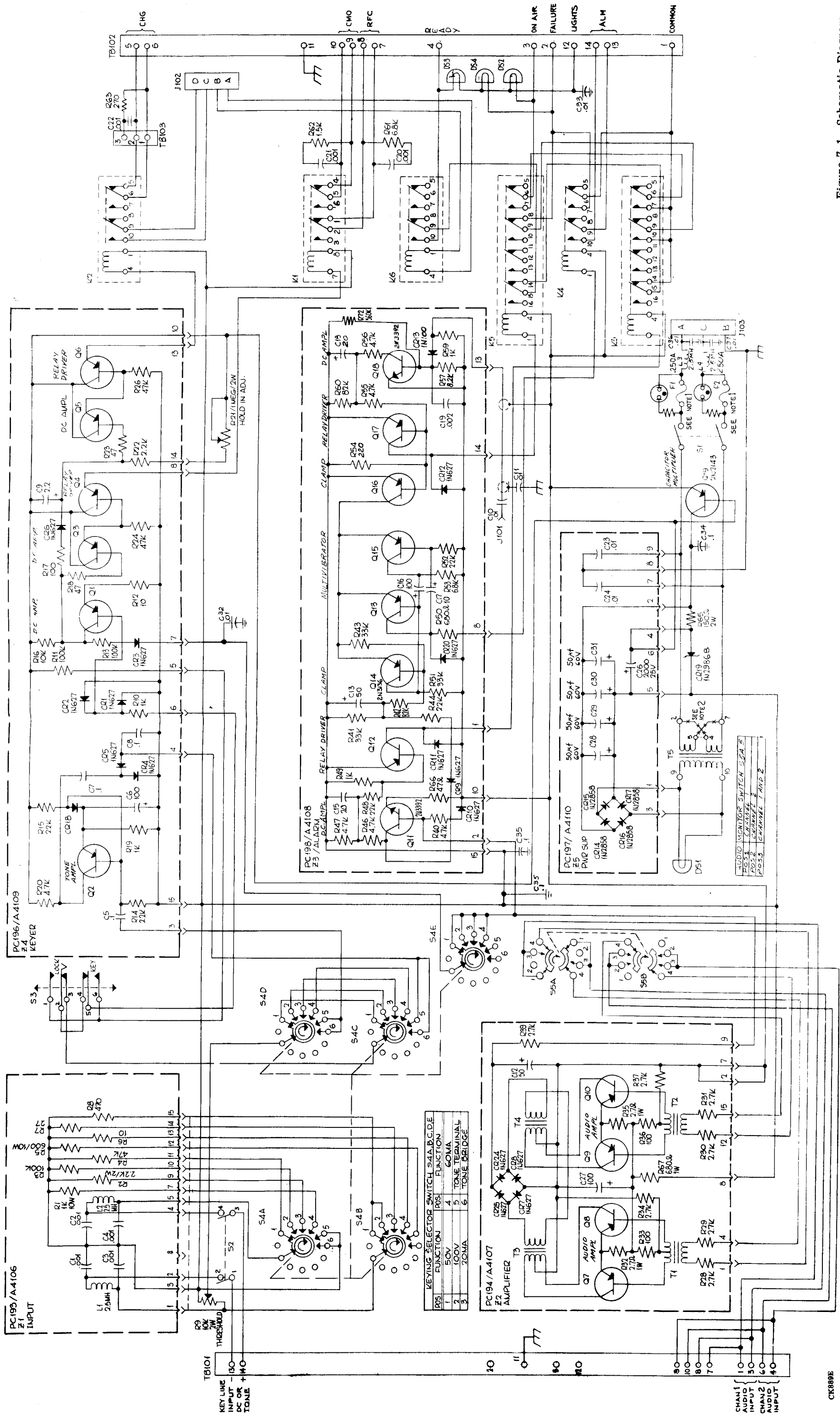


Figure 7-1. Schematic Diagram, KMCU