TM 11-6625-3056-12

TECHNICAL MANUAL
OPERATOR'S AND
ORGANIZATIONAL MAINTENANCE
TEST SET ERROR
DETECTOR
TS-3981/P

NSN 6625-01-126-4016
RAYTHEON COMPANY
CONTRACT NO. DAAB07-82-R-J100

SEPTEMBER 1982

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER
3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL
4. SEND FOR HELP AS SOON AS POSSIBLE
5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

ERRATA
OPERATOR'S AND ORGANIZATIONAL MAINTENANCE
TEST SET ERROR DETECTOR
TS-3981/P
13 December 1982

Page	Para	Change
2-1	2-1.	Figure of front panel, under FUSE: Change legend from "1/2 AMP" to "2 AMP".
2-4	2-1.	Item 17 FUSE: Change text to read "2 ampere fuse protects TS-3981 and power line against overloads". Delete incomplete sentence.
2-4	2-1.	Item 18 SPARE FUSE: Change "0.5" to "2".
3-3	3-2.	Figure of setup, at top under INTERFACE ASSEMBLY: Change legend from "1-5-7" to "1-5-9".
C-4	---	Item No. 3: Change National Stock Number from "5920-00-280-8344" to "5920-00-280-4960" and change Part Number from "AGC ½" to "AGC 2".

Technical Manual HEADQUARTERS

DEPARTMENT OF THE ARMY

TM-11-6625-3056-12 Washington, D.C., September 24, 1982

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

TEST SET ERROR DETECTOR TS-3981/P
NSN 6625-01-126-4016

REPORTING ERRORS AND RECOMMENDING IMPROVEMENT

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Communications Electronics Command and Fort Monmouth, Attn: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. A reply will be furnished to you.

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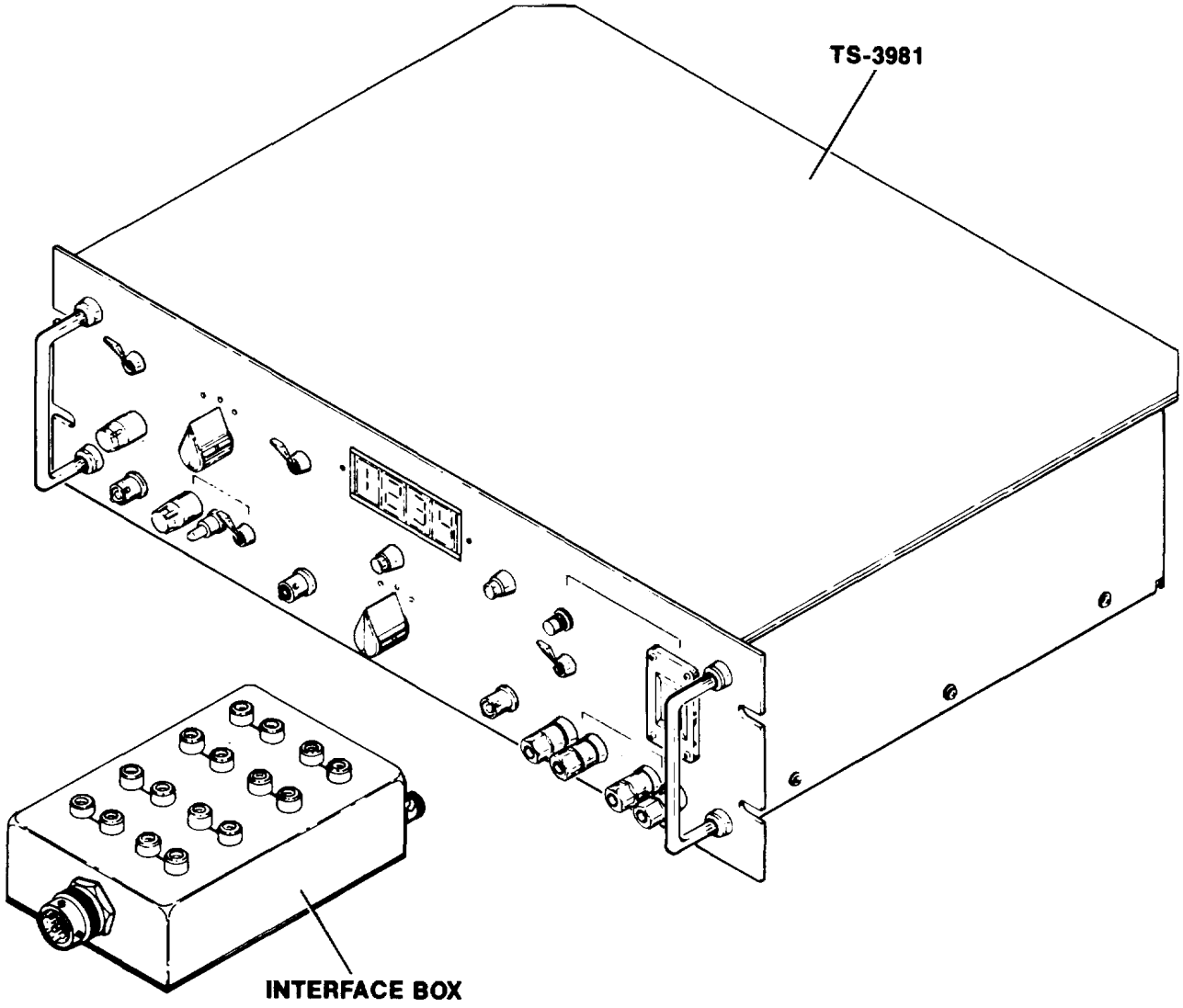
CHAPTER 4 ORGANIZATIONAL MAINTENANCE

APPENDIXES

Chapter 1
INTRODUCTION



1-1. SCOPE

This manual is for your use in operating and maintaining the Test Set Error Detector TS-3981/P (common name TS-3981). It contains descriptive, operation, application, and maintenance information.

1-2. **CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS**

Refer to the latest issue of DA PAM 310-1 to determine whether there are new editions, changes, forms, or additional publications pertaining to the equipment.

1-3. **MAINTENANCE FORMS, RECORDS, AND REPORTS**

Reports of Maintenance and Unsatisfactory Equipment: Department of the Army forms and procedures used for equipment maintenance will be those prescribed *by* TM 38-750, The Army Maintenance Management System.

Report of Packaging and Handling Deficiencies: Fill out and forward SF-364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2.

Discrepancy in Shipment Report (DISREP): Fill out and forward SF-361,
Discrepancy in Shipment Report (DISREP), as prescribed in AR 55-38.

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

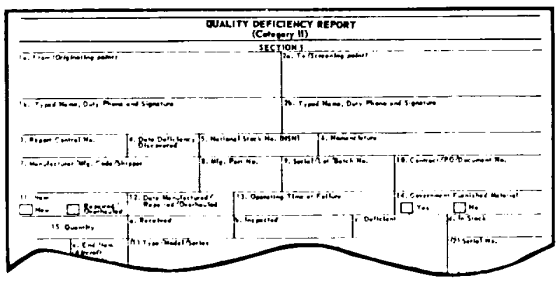
Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2, Procedures for Destruction of Electronic Materiel to Prevent Enemy Use (Electronics Command).

1-5. **ADMINISTRATIVE STORAGE**

Administrative Storage of Equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your Test Set Error Detector TS-3981/P needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF-368, Quality Deficiency Report. Mail it to: Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, Attn: DRSEL-ME-MP, Fort Monmouth , New Jersey 07703. We'll send you a reply.


QUALITY DEFICIENCY REPORT
(Category II)
SECTION I

1-7. **EQUIPMENT DATA**

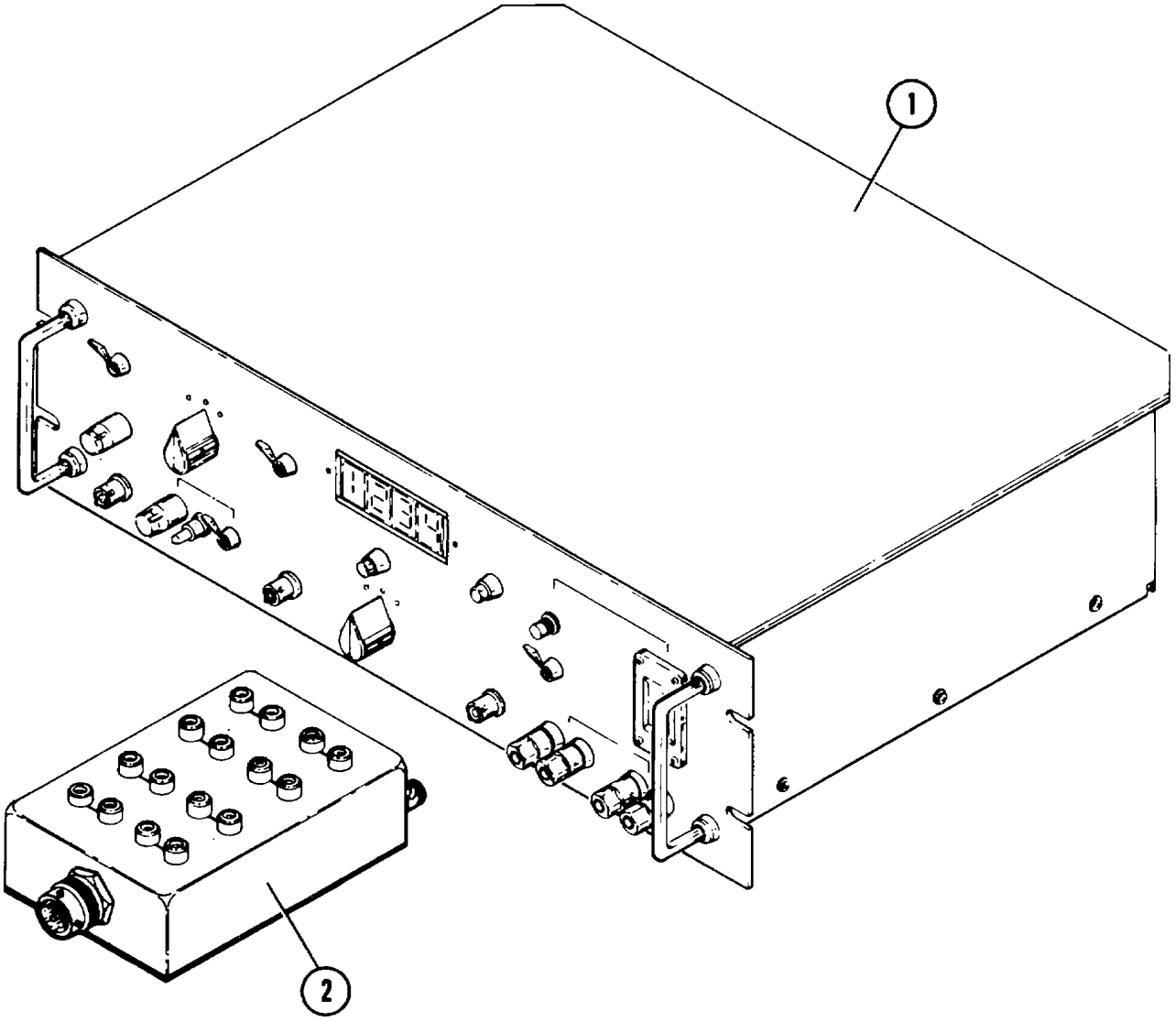
The Test Set Error Detector TS-3981/P tests digital transmission paths and is specially designed to test the Data Buffer TD-1065/G. It includes a transmitter that produces a diphase output and a receiver that accepts a diphase input, detects and counts errors, and measures synchronization time.

Physical	19 in. wide x 5.25 in. high x 14 in. deep overall; 11.5 lb.
Power	105 to 125 volts, 48 to 420 Hz, single-phase, 00 watts maximum. Five-foot, 3-wire power cable permanently attached to rear panel. Spare fuse supplied.
Measurements	Errors and synchronization time.
Data Rate	0.6, 1.2, 2.4, 4.8, 9.6, 16, 32, 32 and 38.4k bits per second; set by front-panel control.
Pattern	Long with length of 215-1 (32,727) bits or short with length of 15 bits; set by front-panel control.
Error Injection	Front-panel pushbutton injects a single error in output pattern each time it is pressed.
Data Output	Unframed, nonconditioned diphase; 4.5 to 5.5 volts peak-to- peak into 600 ohms, balanced. Available at two front-panel binding posts.
Data Input	Unframed, nonconditioned diphase; 5 volts peak-to-peak nominal, down to 5 volts peak-to-peak attenuated by over 3 miles of WF-16 field wire; balanced, 600 ohms input impedance. Applied to two front-panel binding posts. Green front-panel indicator lamp lights when data is being received.
Input/Output Switching	Front-panel control sets input/output for 4-wire operation output connectors wired to output (circuits and input connectors wired to input circuits), 2-wire transmit (output connectors wired to output circuits and input connectors open), and 2-wire receive (output connectors wired to input circuits and input connectors open).
Sync	Front-panel control allows receiver to be operated in one of two modes. Open: received data is loaded continuously into the register and simultaneously compared to the output of the register to detect differences (errors). Closed: the register is first synchronized to the received data, then allowed to run independently and compared to the received data to detect differences (errors).

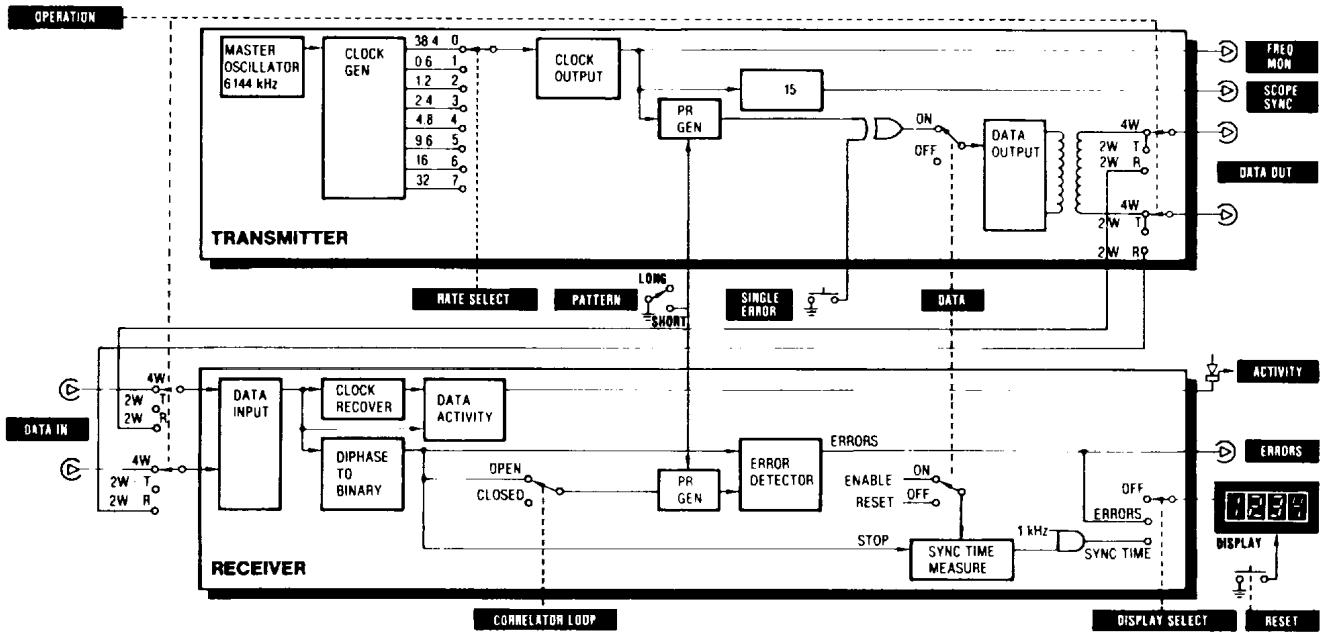
1-7. **EQUIPMENT DATA (cont)**

Display	Four-digit, seven segment, light-emitting diode. Front-panel control turns display off, sets it to measure errors, or sets it to measure synchronization time in milliseconds.
Monitor Outputs	Three front-panel BNC connectors provide 2.5 to 5.5 volt peak-to-peak signals for errors (one output pulse per error detected), frequency (same rate as data output), and scope sync (1/15 the rate of data output).
Interface Box	An Interface Box is supplied as an accessory. This box allows access to the inputs and outputs of four channels wired to multipin connectors. The wires are brought out to banana jacks on top of the box.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



(1)	TS-3981	Error Detector Test Set TS-3981/P.
(2)	Interface Box	Provides interface between multipin connectors and banana jacks.



Transmitter/ Receiver

The TS-3981 consists of two functional sections, a transmitter and a receiver. The transmitter generates a test pattern that is applied to the input of the path under test. The receiver accepts the test pattern from the path and detects and counts any errors that may have occurred. The receiver can also be set to measure the time it takes for the path to acquire synchronization.

The transmitter and receiver are both contained on a single circuit card assembly. A smaller circuit card assembly, mounted on the transmit/receive assembly, contains the master oscillator.

A power supply is contained in a separate assembly and provides regulated +5-volt power.

Rate Select

The RATE SELECT switch selects the output rate of the Clock Generator and therefore selects the rate at which both the transmitter and receiver will operate.

PR Gen

Data output from the transmitter is produced *by* a PR (pseudo-random) Generator. This type of generator produces a signal that is random enough to approximate real data (real data is totally random; that is, it is never known whether the next bit will be a logic 1 or a logic 0) yet repeats itself in such a manner that a test circuit can determine whether the received bit is supposed to be logic 1 or a logic 0.

1-9. **TECHNICAL PRINCIPLES OF OPERATION (cont)**

In the TS-3981 the pattern repeats ever 32,767 bits (LONG position of PATTERN switch) or every 15 bits (SHORT position). A SINGLE ERROR pushbutton introduces a single error in the output data pattern each time it is pressed.

Error Detection — A second PR Generator is used in the receiver. It is identical to the one used in the transmitter and its output is applied to one input of the Error Detector. The second input is the data from the path under test via the receiver input circuits. A circuit in the detector compares the data it is supposed to have (from the second PR Generator) to that which it is actually receiving from the input circuits. Any difference is an error.

In the ERRORS position of the DISPLAY SELECT switch, the errors are counted *by,* and indicated on, the 4-digit display. This display can be reset to zero by the RESET pushbutton.

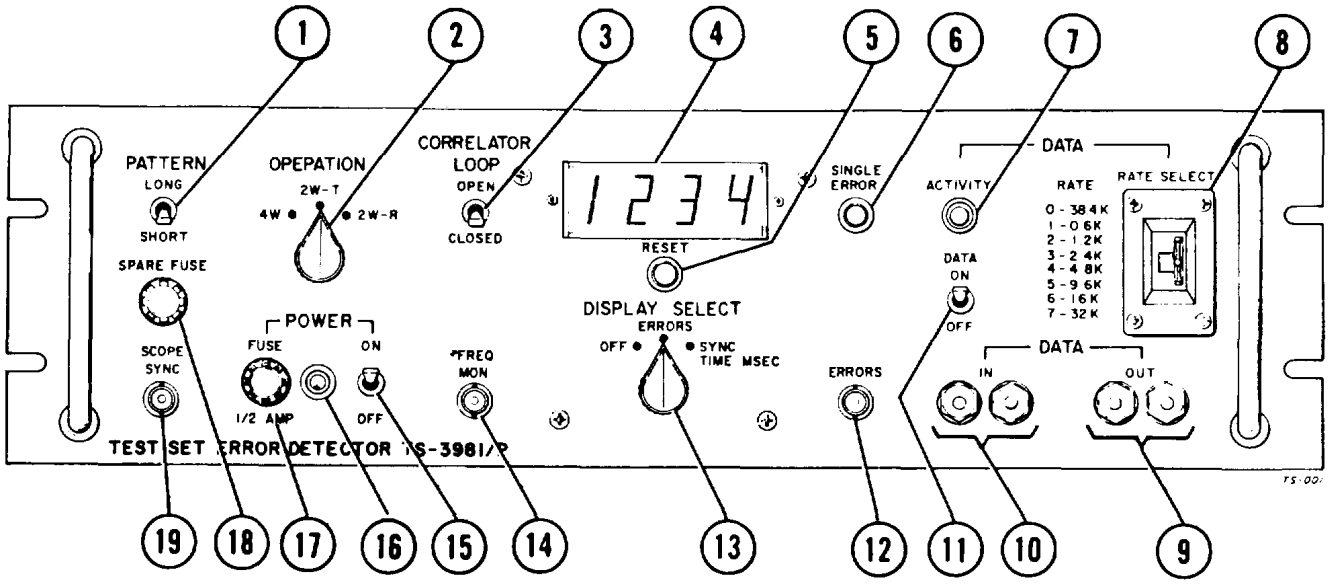
Sync Time — When the DISPLAY SELECT switch is set to SYNC TIME, the display measures the time, in milliseconds, required for the path to acquire synchronization. This time is determined by first setting the DATA switch to OFF which resets the Sync Time Measure circuit. The DATA switch is then set to ON, which enables the Sync Time Measure circuit and allows 1 kHz (1 millisecond) pulses to be counted by the display.

When the path acquires synchronization it produces a data output, which is detected by the receiver and applied (via the Diphase-to-Binary circuit) to the Sync Time Measure circuit. This stops the Sync Time Measure circuit and stops the 1 kHz pulses from being applied to the display. The display reading at the time it was stopped is the number of 1 kHz pulses it counted (i.e., time in milliseconds).

Chapter 2

OPERATING INSTRUCTIONS

2-1. FRONT PANEL CONTROLS, INDICATORS, AND CONNECTORS (cont)



	Name	Type	Function	
(1)	PATTERN	Two-position toggle switch	Selects output and input pattern length:	
			LONG	Pseudorandom; 32,727 bits.
			SHORT	Pseudorandom; 15 bits.
(2)	OPERATION	Three-position rotary switch	Selects output and input connections:	
			4W	4-wire (duplex). DATA OUT connectors wired to output circuits and DATA IN connectors wired to input circuits.
			2W-T	2-wire transmit (simplex). DATA OUT connectors wired to output circuits and DATA IN connectors open.
			2W-R	2-wire receive (simplex). DATA OUT connectors wired to input circuits and DATA IN connectors open.

2-1. **FRONT PANEL CONTROLS, INDICATORS, AND CONNECTORS (cont)**

	Name	Type	Function
(3)	CORRELATOR LOOP	Two-position toggle switch	Sets receiver to synchronization mode or error-detection mode: OPEN — Received data is loaded continuously into receiver PR Generator. CLOSED — Receiver PR Generator operates independently.
(4)	DISPLAY	Four-digit LED display	Displays measurement data (errors or sync time) as determined *by* (12) DISPLAY SELECT control.
(5)	RESET	Momentary pushbutton switch	Resets display to 0 each time it is pressed.
(6)	SINGLE ERROR	Momentary pushbutton switch	Injects a single error into the output data pattern each time it is pressed.
(7)	ACTIVITY	Green indicator	Indicates presence of data signal to DATA IN circuits, when lit.
(8)	RATE SELECT	Eight-position thumbwheel switch	Selects rate of DATA OUT and DATA IN circuits: O — 38.4 kb/s 1 — .6 kb/s 2 — 1.2 kb/s 3 — 2.4 kb/s 4 — 4.8 kb/s 5 — 9.6 kb/s 6 — 16 kb/s 7 — 32 kb/s
(9)	DATA OUT	Dual binding posts/banana jacks	Accept field wire or banana plugs. Internal connections depend on setting of OPERATION control: OPERATION Control — DATA OUT Connections 4W, 2W-T — Connected to output circuits to provide balanced data output. 2W-R — Connected to input circuits to provide balanced data input.

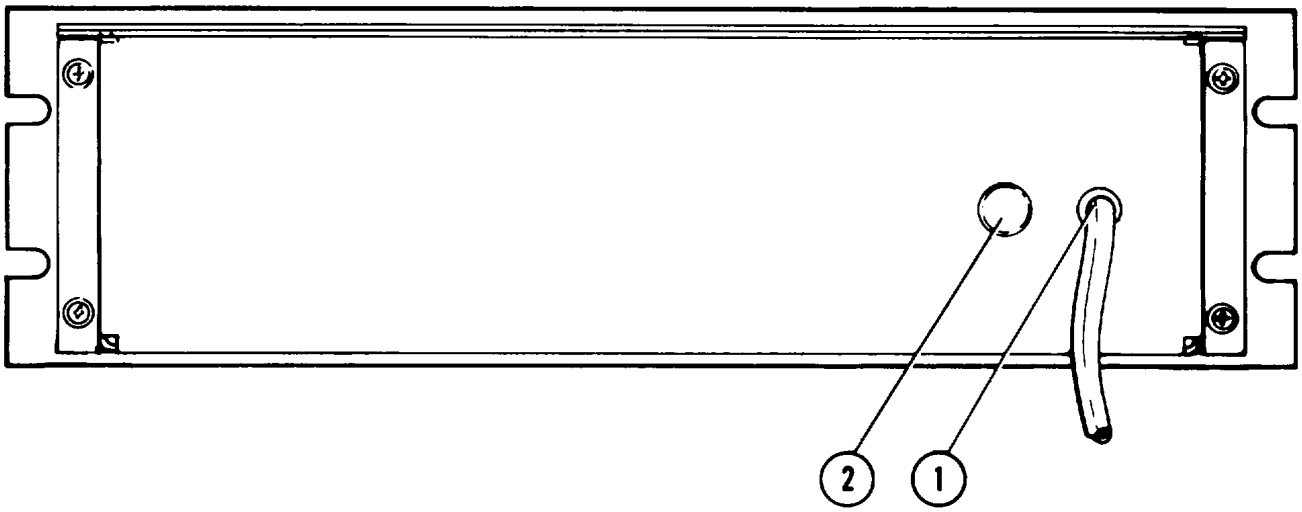
2- 1. **FRONT PANEL CONTROLS, INDICATORS, AND CONNECTORS (cont)**

	Name	Type	Function
10	DATA IN	Dual binding posts/banana jacks	Accept field wire or banana plugs. Internal connections depend on setting of OPERATION control:
			OPERATION Control: 4W — Connected to input circuits to provide balanced data input.
			2W-T — Open
			2W-R — Open
11	DATA ON/OFF	Two-position toggle switch	Controls signal to data output circuits:
			ON — Signal is connected to data output circuits. If OPERATION control is set to 4W or 2W-T, data is available at DATA OUT connectors.
			OFF — Signal is not connected to data output circuits and is not available at DATA OUT connectors.
	ERRORS	BNC connector	Provides output pulse for each error detected.
13	DISPLAY SELECT	Three-position rotary switch	Selects operation of display
			OFF — Display is blank.
			ERRORS — Display is number of errors detected.
			SYNC TIME MSEC — Display is length of time, in milliseconds, from time DATA ON/OFF control is set to ON to time a data.
14	FREQ MON	BNC connector	Provides output pulse at same rate as data output (as set by RATE SELECT control). Independent of DATA ON/OFF and OPERATION controls.

2- 1. FRONT PANEL CONTROLS, INDICATORS, AND CONNECTORS (cont)

	Name	Type	Function
15	POWER ON/OFF	Two-position toggle switch	Turns TS-3981 on or off.
16	POWER	Green indicator	Lights when POWER ON/OFF switch is set to ON and power is available to TS-3981.
17	FUSE	Fuse holder and fuse	0.5 ampere fuse protects TS-3981 and power line against overloads. Spare fuse is located
18	SPARE FUSE	Fuse holder and fuse	0.5 ampere spare fuse.
19	SCOPE SYNC	BNC connector	Provides output pulse at 1/15 the rate as data output (as set by RATE SELECT control).

2-2. **REAR PANEL CONNECTORS**



	Name	Type	Function
1	Power cable	Three-wire cable with plug	Connects line power to TS-3981.
2	Ground lug	Spring-loaded connector	Provides connection for heavy-gage copper ground wire (not supplied.

2-3. SYNCHRONIZATION

CORRELATOR LOOP

The TS-3981 must be synchronized to the input data for proper operation. The CORRELATOR LOOP control provides two modes of operation:

OPEN — Synchronization is automatic and requires no operator attention.

Input data bits are continuously loaded into the receiver PR Generator and compared to the generator output. Any difference is an error.

The error count will be incorrect if more than one error occurs every 15 bits.

CLOSED — Synchronization is manual and is achieved by momentarily setting the CORRELATOR LOOP to OPEN and then to CLOSED.

After 15 input data bits are loaded into the receiver PR Generator, the CLOSED mode allows the generator to operate independently. The input data bits are compared to the generator output. Any difference is an error.

Loading the 15-stage PR Generator requires only 15 data bits. Even at the lowest data rate of 600 bits per second, the loading operation (CORRELATOR LOOP OPEN) requires less than 0.03 seconds.

The receiver generally requires resynchronization whenever the PATTERN, DATA ON/OFF, or RATE SELECT controls are changed. A nonsynchronized condition is indicated by a very rapidly changing ERRORS display.

2-4. PREPARATION FOR USE

1. **Ground Connection**
   - On rear panel, press in cap on ground lug to expose internal slot.
   - Place heavy-gage ground wire not supplied) in slot and release pressure on cap.
   - Connect other end to suitable ground. In the shelter this ground can be an equipment rack. Outside the shelter this ground can be a ground rod.

2. **Power Connection**
   - Connect power cable to a 115-volt power source.

2-5. SELF-TEST

	Purpose	To ensure proper operation of the TS-3981 at the start of each day's testing.
	Coverage	All circuits are checked except the monitor outputs (SCOPE, SYNC, FREQ MON, and ERRORS).
	Equipment Required	Banana patch cords (2 ea), 6 in. minimum length patch cords terminated in banana plugs (field wire may be substituted).

1. Power

- Connect TS-3981 to a source of power and set POWER to ON:

  Green POWER indicator must light.

2. Long Pattern

- Set controls as follows:

PATTERN	LONG
OPERATION	4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	OFF
RATE SELECT	7 (32 kb/s)
DISPLAY SELECT	ERRORS

q

- Use a banana patch cord to connect red (left) DATA OUT to red (left) DATA IN. Use a banana patch cord to connect black (right) DATA OUT to black (right) DATA IN:

  ACTIVITY indicator must not be lit.

- Set DATA ON/OFF to ON:

  ACTIVITY indicator must light.

- Set RATE SELECT to positions 6 thru 1:

  ACTIVITY indicator must remain lit at each position of RATE SELECT (except 0).

2-5. **SELF-TEST (cont)**

3. Short Pattern

- Set controls as follows:

PATTERN	SHORT
OPERATION	Keep at 4W
CORRELATOR LOOP	Keep at OPEN
DATA ON/OFF	OFF
RATE SELECT	Keep at 1 (0.6 kb/s)
DISPLAY SELECT	Keep at ERRORS

- Keep DATA OUT connected to DATA IN.

  ACTIVITY indicator must not be lit.

- Set DATA ON/OFF to ON:

  ACTIVITY indicator must light.

- Set RATE SELECT to positions 2 thru 7.

  ACTIVITY indicator must remain lit at each position of RATE SELECT (except 0).

4. Short Pattern Correlator Loop

- Set controls as follows:

PATTERN	Keep at SHORT
OPERATION	Keep at 4W
CORRELATOR LOOP	Keep at OPEN
DATA ON/OFF	Keep at ON
RATE SELECT	Keep at 7 (32 kb/s)
DISPLAY SELECT	Keep at ERRORS

  Keep DATA OUT connected to DATA IN.

- Press RESET:

  Display must read 0.

- Press SINGLE ERROR several times:

  Display must advance one count each time SINGLE ERROR is pressed.

- Set CORRELATOR LOOP to CLOSED and press RESET:

  Display must read 0.

- Press SINGLE ERROR several times:

  Display must advance one count each time SINGLE ERROR is pressed.

2-5. **SELF-TEST (cont)**

5. Long Pattern Correlator Loop

- Set controls as follows:

PATTERN	LONG
OPERATION	Keep at 4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	Keep at ON
RATE SELECT	Keep at 7 (32 kb/s)
DISPLAY SELECT	Keep at ERRORS

Keep DATA OUT connected to DATA IN.

- Press RESET:

Display must read 0.

If display does not stay at 0 and increases count rapidly, polarity of DATA OUT and/or DATA IN connections may be wrong. Reconnect with opposite polarity and repeat test.

- Press SINGLE ERROR several times:

Display must advance one count each time SINGLE ERROR is pressed.

- Set CORRELATOR LOOP to CLOSED and press RESET:

Display must read 0.

- Press SINGLE ERROR several times:

Display must advance one count each time SINGLE ERROR is pressed.

2-5. **SELF-TEST (cont)**

6 Sync Time

- Set controls as follows:

PATTERN	Keep at LONG
OPERATION	2W-R
CORRELATOR LOOP	OPEN
DATA ON/OFF	OFF
RATE SELECT	Keep at 7 (32 kb/s)

DISPLAY SELECT .... SYNC TIME MSEC

Keep DATA OUT connected to DATA IN.

- Press RESET:

Display must read 0.

- Set DATA ON/OFF to ON:

Display must rapidly advance count (1000 counts per second).

- Set OPERATION to 4W:

Display must stop advancing count and must display some number (representing the length of time, in milliseconds, from the time DATA ON/OFF control was set to ON and the time OPERATION control was set to 4W).

- Press RESET:

Display must read 0.

7. Two-Wire Operation

- Set controls as follows:

PATTERN	Keep at LONG
OPERATION	Keep at 4W
CORRELATOR LOOP	Keep at OPEN
DATA ON/OFF	Keep at ON
RATE SELECT	Keep at 7 (32 kb/s)
DISPLAY SELECT	Keep at SYNC TIME MSEC

Keep DATA OUT connected to DATA IN.

- Set OPERATION to 2W-T:

ACTIVITY indicator must extinguish.

- Set OPERATION to 2W-R:

ACTIVITY indicator must remain unlit.

END

2-6. PATRIOT VOICE LINK OVERVIEW OF TESTING

Requirements

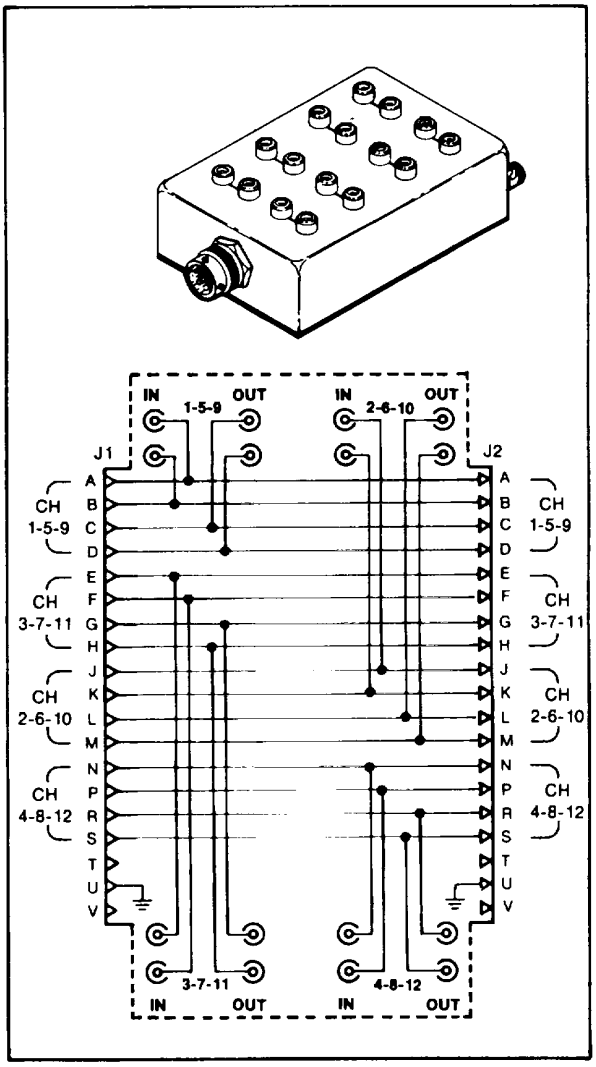
The input data rate to the TS-3981 receiver must be the same as that from the transmitter.

The input signal must be unframed (must contain only data bits and must not contain overhead bits such as for synchronization, parity, etc.)

All testing must be done off-line (the path must be taken out of service).

Interface Box

An interface box is supplied as an accessory. This box allows access to both sides of the inputs and outputs of four channels wired to multipin connectors. Each side is brought out to a banana jack on top of the box. These banana jacks are spaced on ¾-inch centers, the same as the combination binding post/banana jacks used on the front panel.

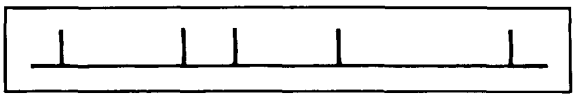


2-6. PATRIOT VOICE LINK OVERVIEW OF TESTING (cont)

Errors

Errors fall into three general categories:

Random: Errors that occur infrequently and at random intervals.

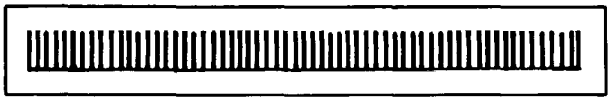


Random errors usually are caused *by* events external to the equipment such as power-line transients, shock, or vibration. In some cases they may be due to poor connections in or to the equipment.

Burst: Errors that occur in groups.

Burst errors usually are caused by events external to the equipment such as sunspots or over-flying aircraft.

Continuous: Errors that occur continuously.



Continuous errors usually are caused by equipment malfunctions including bad or missing connections or improper antenna alignment.

Path Quality

An acceptable path is indicated by a zero, or near-zero, count on the display Random errors are indicated by a count that increases by only one or two at infrequent intervals.

A marginal path is indicated *by* a low count on the display. Burst errors are indicated by a count that may change at a high rate one moment and not at all the next.

A defective path is indicated by a high count on the display. Continuous errors are indicated by a count that increases rapidly and constantly.

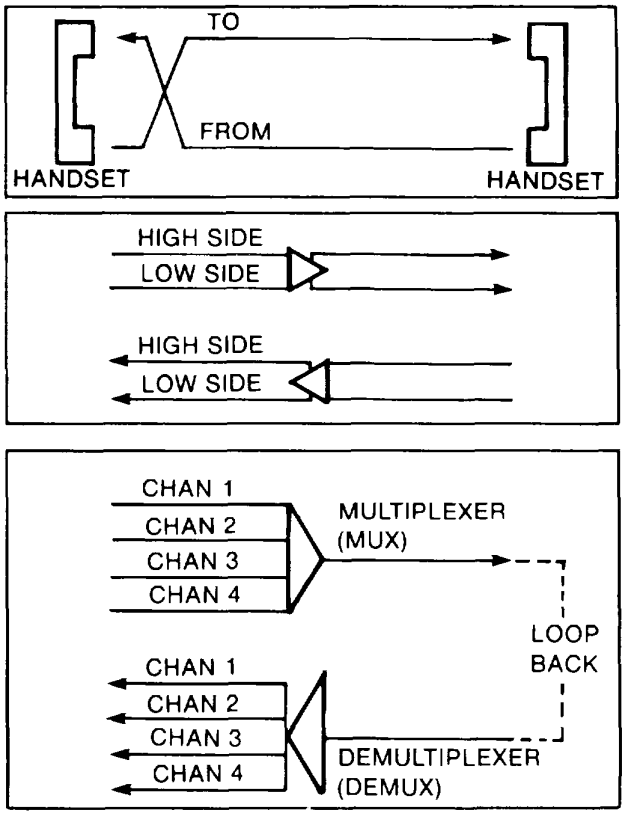
2-6. PATRIOT VOICE LINK OVERVIEW OF TESTING (cont)

Typical Paths

Channel: Channels in the PATRIOT voice link. are full duplex (they can talk and listen or send and receive at the same time).

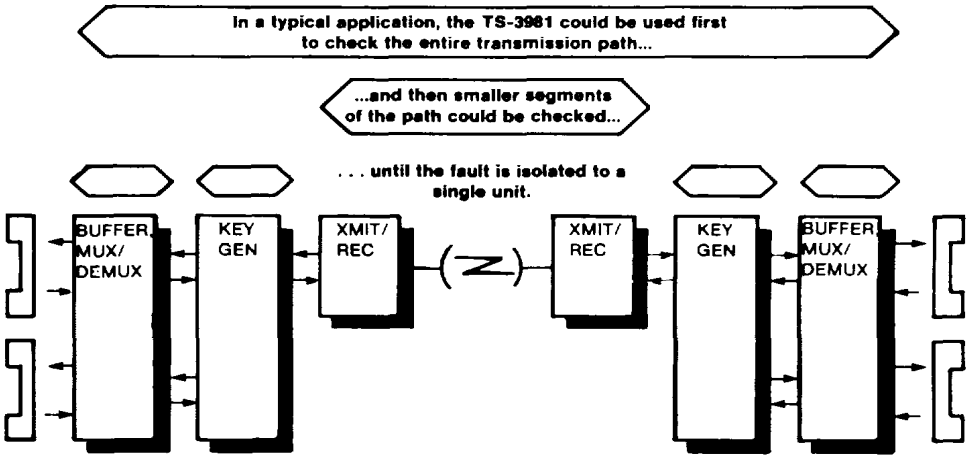
Balanced: Most channel circuitry uses balanced inputs and outputs (two wires, with the signal referenced or measured from one wire or side to the other).

Group: For transmission over longer distances, channels are multiplexed (combined together, usually in groups of 4, 6, or 12, to provide a signal of a higher rate) From the other side, the multiplexed (group) signal is demultiplexed down to the individual channel rate.

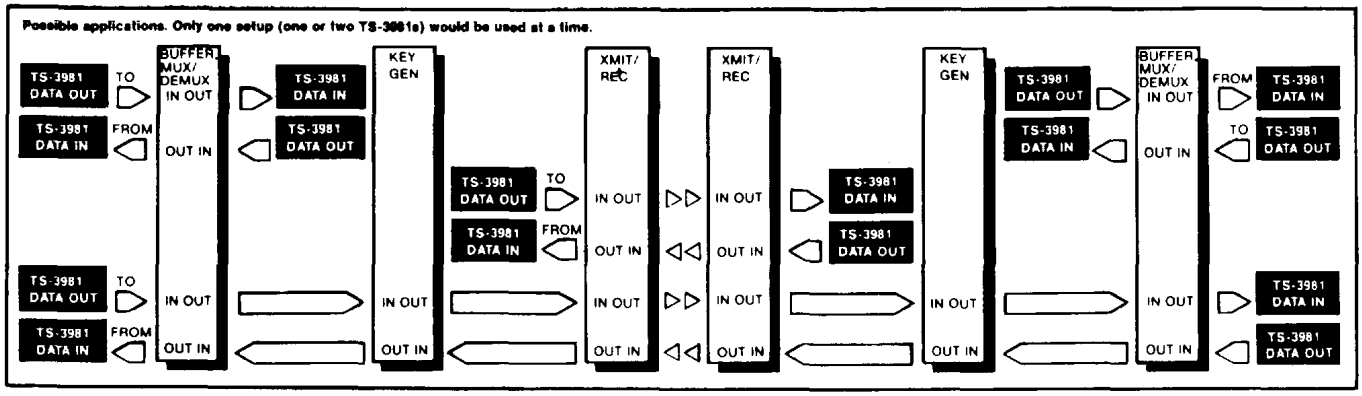


Note that because the TS-3981 must transmit and receive at the same rate, it cannot check the input (channel rate) and output (group rate) of a multiplexer directly. However, if the output of the multiplexer is connected to the input of the demultiplexer (looped back), the combination of mux/demux can be checked.

Fault Isolation



2-7. PATRIOT VOICE LINK END-TO-END TSTING



General

Use: Tests one-half of a path (to or from) at a time.

Advantages: Fault can be isolated to one-half of a path or the other (to or from).

Disadvantages: (1) Multiplexers/demultiplexers cannot be end-to-end tested because their input/output date rates are different. (2) For some system on nonlocal testing, the path may be so long that two TS-3981s would be required. Both of these disadvantages can be overcome *by* loopback testing (para 2-8).

Procedure

- Select input and output points of path under test.
- On one end, connect DATA OUT from TS-3981 to data input of path under test. Use Interface Box if necessary.
- On other end, connect data output from path under test to DATA IN of TS-3981. Use Interface Box if necessary.
- Set TS-3981 controls as follows:

POWER	ON
PATTERN	LONG
OPERATION	4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	ON
RATE SELECT	As required for path under test
DISPLAY SELECT	ERRORS

ACTIVITY indicator will be lit.

- Press SINGLE ERROR several times:

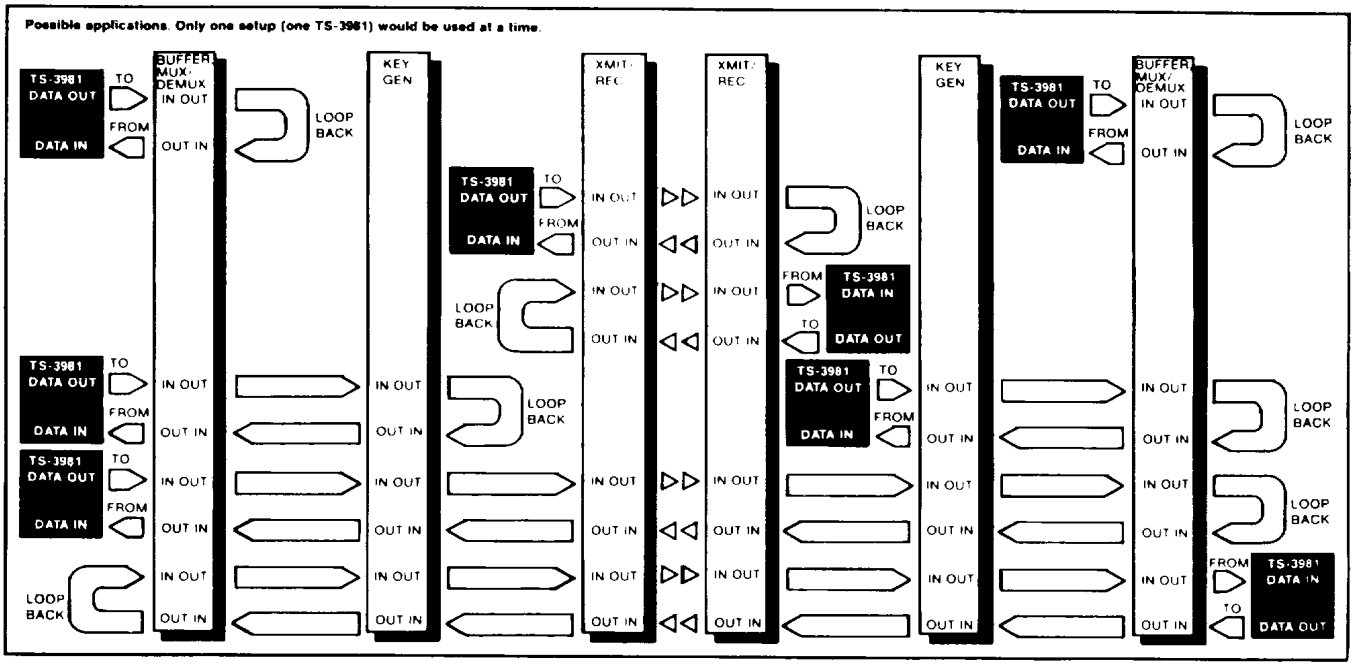
Display will advance one count each time SINGLE ERROR is pressed which indicates setup is proper.

2-7. **PATRIOT VOICE LINK END-TO-END TESTING (cont)**

- Press RESET:

  Display will read 0. Display will remain 0 or a very low count if path is operating properly. If display increases count rapidly, path is faulty.

2-8. PATRIOT VOICE LINK LOOPBACK TESTING



General

Use: Tests whole path (to and from).

Advantages: (1) Allows testing of multiplexers/demultiplexers. (2) Allows simple TS-3981 to test long paths.

Disadvantages: Cannot isolate fault to one-half a path or the other (to or from). This disadvantage can be overcome *by* end-to-end testing (para 2-7).

Procedure

- Select input and output points of path under test.
- On one end, connect DATA OUT from TS-3981 to data input of path under test. Use Interface Box if necessary.
- On same end, connect data output from path under test to DATA IN of TS-3981. Use Interface Box if necessary.
- On other end, connect data output from path under test back to data input.

2-7. **PATRIOT VOICE LINK LOOPBACK TESTING (cont)**

- Set TS-3981 controls as follows:

POWER	ON
PATTERN	LONG
OPERATION	4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	ON
RATE SELECT	As required for path under test.
DISPLAY SELECT	ERRORS

ACTIVITY indicator will be lit. If not, connections are improper or equipment is faulty.

- Press SINGLE ERROR several times:

  Display will advance one count each time SINGLE ERROR is pressed which indicates setup is proper.

- Press RESET:

  Display will read 0. Display will remain 0 or a very low count if path under test is operating properly. If display increases count rapidly, path is faulty.

Chapter 3

TD-1065 TESTING

3-1. INTRODUCTION

The TS-3981 can be used to test the Data Buffer TD-1065/G for errors, sync acquisition time, and alarm operation. The same setup is used for all tests.

Loopback testing is used. The TD-1065 must be operated with a Multiplexer TD-660A/G or TD-660B/G. The TD-660/G cannot be used.

3-2. **SETUP**

TD-1065
TD-660

All connections between the TD-1065 and TD-660 must be left in place except the following:

12-Channel Mode:

- At TD-660, disconnect cable from PCM IN. Place out of the way, it will not be used in testing.
- At Key Generator TSEC/KG-27, disconnect cable from XMIT PCM IN. Leave other end connected to TD-1065 XMIT PCM OUT. Connect end removed to TD-660 PCM IN.
- At TD-660, disconnect cable from TIM IN. Place out of the way, it will not be used in testing.
- At Key Generator TSEC/KG-27, disconnect cable from XMIT TIM IN. Leave other end connected to TD-1065 12 CH TIM OUT. Connect end removed to TD-660 TIM IN.

6-Channel Mode:

- At TD-660, disconnect cable from PCM IN. Place out of the way, it will not be used in testing.
- At Key Generator TSEC/KG-27, disconnect cable from XMIT PCM IN. Leave other end connected to TD-1065 XMIT PCM OUT. Connect end removed to TD-660 PCM IN.
- Connect a BNC cable from TD-1065 12 CH TIM IN to TD-660 12 CH TIM OUT.

Channel CCA

- On front of TD-1065 circuit card assembly for channel(s) to be tested, set 2W-4W switch up to 4W (32 kb/s full duplex).

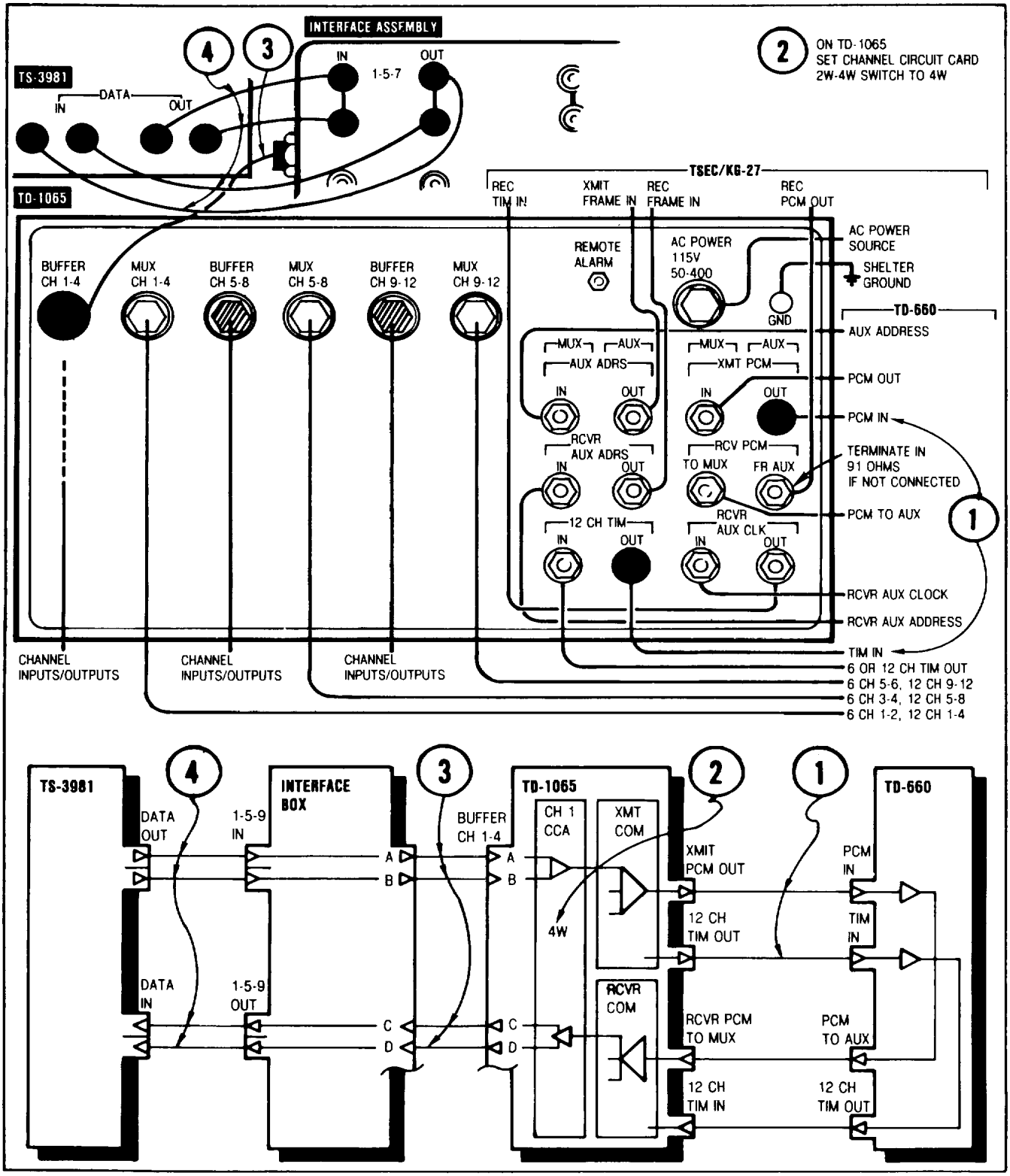
Input/Output

- At TD-1065, disconnect cable from BUFFER channels to be tested (1-4, 5-8, or 9-12).
- Use a cable terminated in multipin connectors to connect BUFFER to Interface Box.

TS-3981

- Use banana jumpers to connect TS-3981 red (left) DATA OUT connector to Interface Box upper IN connector and black (right) connector to lower IN connector (channels 1-5-9, 2-6-10, 3-7-11, or 4-8-12, as required).
- Use banana jumpers to connect TS-3981 red (left) DATA IN connectors to Interface Box upper OUT connector and black (right) connector to lower OUT connector (same channel as above).

3-2. **SETUP (Cont)**



3-2. **SETUP (cont)**

5 TD-660

- Set front-panel screwdriver-operated controls as follows:

POWER	ON (toggle switch)
MODE	12 CH (or 6 CH)
AUX	OUT
2 WIRE/4 WIRE	4 WIRE
MASTER SLAVE	MASTER

6 TD-1065

- Set POWER to ON.

3-3. **ERROR MEASUREMENTS**

General — To measure errors, if any, introduced by the TD-1065, proceed as follows:

Setup — Refer to paragraph 3-2.

Procedure

- Set TS-3981 controls as follows:

POWER	ON
PATTERN	LONG
OPERATION	4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	ON
RATE SELECT	7 (32 kb/s)
DISPLAY SELECT	ERRORS

ACTIVITY indicator will be lit.

- Press RESET:

Display will read 0.

If display does not stay at 0 and increases count rapidly, turn DATA ON/OFF back and forth between ON and OFF several times. If display still increases count rapidly, polarity of DATA OUT and/or DATA IN connections may be reversed. Reconnect with opposite polarity and repeat procedure.

- Press SINGLE ERROR several times.

Display will advance 1 count each time SINGLE ERROR is pressed.

- Press RESET:

Display will read 0. Display will remain 0 or a very low count if channel under test is operating properly. If display increases count rapidly, channel is faulty.

3-4. ALARM TEST

General — To test the alarm circuit on the TD-1065 channel circuit card, proceed as follows:

Setup — Refer to paragraph 3-2.

Procedure

- Set TS-3981 controls as follows:

POWER	ON
PATTERN	LONG
OPERATION	4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	ON
RATE SELECT	7 (32 kb/s)
DISPLAY SELECT	ERRORS

  ACTIVITY indicator will be lit.

- Press RESET:

  Display will read 0.

  If display does not stay at 0 and increases count rapidly, turn DATA ON/OFF back and forth between ON and OFF several times. If display still increases count rapidly, polarity of DATA OUT and/or DATA IN connectors may be reversed. Reconnect with opposite polarity and repeat procedure.

- Press SINGLE ERROR several times.

  Display will advance 1 count each time SINGLE ERROR is pressed. This ensures setup is operating properly.

- Set RATE SELECT to 0 (38.4 kb/s):

  TD-1065 alarm indicator will light. Audible buzzer will sound. FAULT indicator on circuit card for channel being tested will light (if test function control is set to CHAN).

  If a remote alarm is connected to the TD-1065 it also will actuate.

3-5. SYNC-TIME MEASUREMENTS

General — To measure the length of time it takes the TD-1065 to acquire sync after an input signal is applied, proceed as follows:

NOTE: This test is normally not performed in the field. Erroneous results are possible with noisy signals.

Setup — Refer to paragraph 3-2.

At TD-1065, disconnect cable from MUX channel to be tested (1-4, 5-8, or 9-12). Under some conditions with these cables connected, noise is introduced in the channel and is misinterpreted *by* the TS-3981 as a signal. The result is a sync time reading much shorter (O to 4 ms) than the actual sync time (5 to 20 ms).

Procedure

- Set TS-3981 controls as follows:

POWER	ON
PATTERN	LONG
OPERATION	4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	ON
RATE SELECT	7 (32 kb/s)
DISPLAY SELECT	ERRORS

ACTIVITY indicator will be lit.

- Press RESET:

Display will read 0.

If display does not stay at 0 and increases count rapidly, turn DATA ON/OFF back and forth between ON and OFF several times. If display still increases count rapidly, polarity of DATA OUT and/or DATA IN connectors may be reversed. Reconnect with opposite polarity and repeat procedure.

- Press SINGLE ERROR several times.

Display will advance 1 count each time SINGLE ERROR is pressed. This ensures setup is operating properly.

- Set DATA ON/OFF to OFF and DISPLAY SELECT to SYNC TIME MSEC.

Press RESET:

Display will read O.

3-5. **SYNC-TIME MEASUREMENTS (cont)**

- Set DATA ON/OFF to ON:

  Display will rapidly (almost instantly) advance count (1000 counts per second).

  When TD-1065 has acquired sync, it will output data to the TS-3981. The TS-3981 ACTIVITY indicator will light, and display count will stop advancing.

  The display, at the time it stops advancing, is the number of milliseconds it took the TD-1065 to acquire sync, typically 5 to 20 milliseconds. Readings of 0 to 4 milliseconds are due to noise and are erroneous.

Chapter 4

OPERATOR MAINTENANCE

4-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

4-2. SPECIAL TOOLS, TDME, AND SUPPORT EQUIPMENT

For Repair Parts and Special Tools List (RPSTL), refer to Appendix C.

Maintenance tools and equipment as authorized by the Maintenance Allocation Chart (refer to Appendix A, MAC)

4-3. REPAIR PARTS

Repair parts are listed and illustrated in Appendix C, RPSTL.

4-4. RACKMOUNT INSTALLATIONS

To mount the TS-3981 in a standard 19-inch rack inside a shelter:

1.	Ground Wire	• On rear panel, press in cap on ground lug to expose internal slot. • Place heavy-gage ground wire (not supplied) in slot and release pressure on cap.
2.	Mounting	• Place TS-3981 in position in rack and secure to rack with four 10-32 UNF-2B x 1/2 in. screws through No. 10 flat washers.
3.	Ground	• Connect other end of ground wire to equipment rack. Connection
4.	Power Connection	• Connect power cable to a 115-volt power source.

4-5 . PORTABLE INSTALLATIONS

The TS-3981 can be used as a portable test set inside a shelter:

1.	Ground Connection	• On rear panel, press in cap on ground lug to expose internal slot. • Place heavy-gage ground wire (not supplied) in slot and release pressure on cap. • Connect the other end to suitable ground. In the shelter this ground can be an equipment rack. Outside the shelter this ground can be a ground rod.
2.	Power Connection	• Connect power cable to a 115-volt power source.

4-6. MONTHLY PREVENTIVE MAINTENANCE

Introduction

Item No: Order in which check or service is performed. The number in this column shall also be used as a source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, when recording results of PMCs.

Item To Be Inspected: The portion of the TS-3981 to which the check or service applies.

Procedure: Procedure to be followed for the check or service.

Equipment Required

a. Cleaning compound, trichlorotrifluoroethane.

b. Cheesecloth.

c. Banana patch cords (2 ea), 6 in. minimum length patch cords terminated in banana plugs. Field wire may be substituted.

Trouble-shooting Procedure

Items 4 thru 10 (end) are also troubleshooting procedures. Each item serves as a foundation for the next. Therefore, items 4 thru 10 must be performed in the order given. If
t hey are not, the probable cause information is invalid.

Item No.	Item To Be Inspected	Procedure
1.	MWO	• Compare the Modification Work Order in DA PAM 310-1 for the TS-3981, if any, to that on the TS-3981. If latest modification(s) has (have) not been installed: Perform or request the modification.

4-6. **MONTHLY PREVENTIVE MAINTENANCE (cont)**

Item No	Item To Be Inspected	Procedure
2.	Accessories Inventory	• Check the accessories supplied: 1 ea Interface Box 1 ea Technical Manual If any accessory is missing: Replace or requisition.
3.	Case	• Inspect for loose parts. Tighten if necessary. • Inspect for missing or damaged parts. Replace if necessary. **CLEANING SOLVENT**  Trichlorotrifluoroethane used for cleaning this equipment can cause severe irritation or injury. Use in well ventilated areas. Do not breath the fumes. Do not Smoke or use near open flame. Use gloves. L4ash hands after use. Do not take internally. • Use cheesecloth to remove dirt and grease from case, including front panel. If necessary, use trichlorotrifluoroethane.
4.	Power	• Connect TS-3981 to a source of power and turn POWER ON: Green POWER indicator must light. If POWER indicator does not light: a. Probable causes are (operator correctable): b. Blown FUSE. Replace. c. Power missing from 115-volt outlet. Throw breaker on or use another outlet.

4-6. **MONTHLY PREVENTIVE MAINTENANCE (cont)**

Item No.	Item To Be Inspected	Procedure
5.	Long Pattern	• Set controls as follows: PATTERN LONG OPERATION 4W CORRELATOR LOOP OPEN DATA ON/OFF OFF RATE SELECT 7 (32 kb/s) DISPLAY SELECT ERRORS Use a banana patch cord to connect red (left) DATA OUT to red (left) DATA IN. Use a banana patch cord to connect black (right) DATA OUT to black (right) DATA IN: ACTIVITY indicator must not be lit. • Set DATA ON/OFF to ON: ACTIVITY indicator must light. • Set RATE SELECT to positions 6 thru 1: ACTIVITY indicator must be lit at each setting of RATE SELECT (except 0). If ACTIVITY indicator does not light: Probable cause is (operator correctable): One or both patch cords defective. Replace.
6.	Short Pattern	• Set controls as follows: PATTERN SHORT OPERATION Keep at 4W CORRELATOR LOOP Keep at OPEN DATA ON/OFF OFF RATE SELECT Keep at 1 (0.6 kb/s) DISPLAY SELECT Keep at ERRORS Keep DATA OUT connected to DATA IN: ACTIVITY indicator must not be lit. • Set DATA ON/OFF to ON: ACTIVITY indicator must light.

4-6. **MONTHLY PREVENTIVE MAINTENANCE (cont)**

Item No.	Item To Be Inspected	Procedure
		• Set RATE SELECT to positions 2 thru 7: ACTIVITY indicator must remain lit at each position of RATE SELECT (except 0).
7.	Short Pattern Correlator Loop	• Control settings: PATTERN — Keep at SHORT OPERATION — Keep at 4W CORRELATOR LOOP — Keep at OPEN DATA ON/OFF — Keep at ON RATE SELECT — Keep at O (38.4 kb/s) DISPLAY SELECT — ERRORS Keep DATA OUT connected to DATA IN. • Press RESET: Display must read 0. • Press SINGLE ERROR several times: Display must advance one count each time SINGLE ERROR is pressed. • Set CORRELATOR LOOP to CLOSED and press RESET: Display must read 0. • Press SINGLE ERROR several times: Display must advance one count each time SINGLE ERROR is pressed.

4-6. **MONTHLY PREVENTIVE MAINTENANCE (cont)**

Item No.	Item To Be Inspected	Procedure
8.	Long Pattern Correlator Loop	• Set controls as follows:

PATTERN	LONG
OPERATION	Keep at 4W
CORRELATOR LOOP	OPEN
DATA ON/OFF	Keep at ON
RATE SELECT	Keep at 0 (38.4 kb/s)
DISPLAY SELECT	Keep at ERRORS

Keep DATA OUT connected to DATA IN.

- Press RESET:

  Display must read 0.

- Press SINGLE ERROR several times:

  Display must advance one count each time SINGLE ERROR is pressed.

- Set CORRELATOR LOOP to CLOSED and press RESET:

  Display must read 0.

- Press SINGLE ERROR several times:

  Display must advance one count each time SINGLE ERROR is pressed.

4-6. **MONTHLY PREVENTIVE MAINTENANCE (cont)**

Item No.	Item To Be Inspected	Procedure
9.	Sync Time	• Set controls as follows: PATTERN — Keep at SHORT OPERATION — 2W-R CORRELATOR LOOP — Keep at OPEN DATA ON/OFF — OFF RATE SELECT — Keep at O (38.4 kb/s) DISPLAY SELECT — Keep at OFF Keep DATA OUT connected to DATA IN: • Set DISPLAY SELECT to SYNC TIME MSEC and press RESET: Display must read 0. • Set DATA ON/OFF to ON: Display must rapidly advance count (1000 counts per second). • Set OPERATION to 4W: Display must stop advancing count and must display some number (representing length of time, in milliseconds, from the time DATA ON/OFF control was set to ON and the time OPERATION control was set to 4W). • Press RESET: Display must read 0.
10.	Two-Wire Operation	• Set controls as follows: PATTERN — Keep at LONG OPERATION — Keep at 4W CORRELATOR LOOP — Keep at CLOSED DATA ON/OFF — Keep at ON RATE SELECT — Keep at 0 (38.4 kb/s) DISPLAY SELECT — Keep at ERRORS Keep DATA OUT connected to DATA IN. • Set OPERATION to 2W-T: ACTIVITY indicator must extinguish. • Set OPERATION to 2W-R:
	END	ACTIVITY indicator must remain unlit.

4-7. TROUBLESHOOTING PROCEDURE

Troubleshooting procedures for the TS-3981 are contained in paragraph 4-6, Monthly Preventive Maintenance, items 4 thru 10.

4-8. FUSE REPLACEMENT

Tools Required: None.

1. Removal
   - Set POWER to OFF.
   - Turn FUSE cap counterclockwise and pull out to remove.
   - Pull out fuse.

2. Replacement
   - Insert new fuse Fl in FUSE holder.
   - Replace FUSE cap and turn clockwise to secure.

4-9. LAMP REPLACEMENT

Only the lamp for the POWER indicator is replaceable at Organizational level.

Tools Required: None.

1. Removal
   - Set POWER to OFF.
   - Turn POWER indicator lens assembly counterclockwise and pull out to remove.
   - Pull out lamp.

2. Replacement
   - Insert new lamp DS1 in POWER indicator socket.
   - Replace lens assembly and turn clockwise to secure.

4-10. **KNOB REPLACEMENT**

The knobs for the OPERATION and DISPLAY SELECT controls are the same and both are replaceable at Organizational level.

Tools Required: 3/64 in. Allen wrench.

1. Removal
   - Note position at which knob is set.
   - Use 3/64 in. Allen wrench to loosen the two set screws in the knob.
   - Pull knob out to remove.

---

2. Replacement
   - Use 3/64 in. Allen wrench to remove the two set screws from the new knob.
   - Apply a drop of primer (NSN 8030-00-963-0930) to each set screw.
   - Apply a drop of sealing compound (NSN 8030-00-081-2328) to each set screw.
   - Use 3/64 in. Allen wrench to reinstall the two set screws in the knob.
   - Install new knob on shaft in same position as knob that was removed.
   - Use 3/64 in. Allen wrench to tighten the two set screws that secure knob to shaft.

Appendix A

MAINTENANCE ALLOCATION CHART

SECTION I. INTRODUCTION

A-1 General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

A-2 Maintenance Functions

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item *by* comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

e. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

SECTION I. INTRODUCTION (cont)

f. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow proper functioning of an equipment or system.

g. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. Replace is authorized by the MAC and is shown as the 3d position code of the SMR code. h. Repair. The application of maintenance services including fault location/troubleshooting removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

i. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/ operational condition as required *by* maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

j. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

A-3 Explanation of Columns in the MAC, Section II

a. Column 1, Group Number. This column lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

b. Column 2, Component/Assembly. This column contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. This column lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph B-2.)

SECTION I. INTRODUCTION (cont)

d. Column 4, Maintenance Category. This column specifies, by the listing of a work time figure in the appropriate sub-column(s), the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), trouble-shooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C .....Operator or Crew
O .....Organizational Maintenance
F.....Direct Support Maintenance
H .....General Support Maintenance
D .....Depot Maintenance

e. Column 5, Tools and Equipment. This column specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

A-4 Explanation of Columns in Tool and Test Equipment Requirements, Section II

a. Column 1, Reference Code. The tool and test equipment code correlates with a code used in the MAC, Section II, column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

SECTION I. INTRODUCTION (cont)

A-5 Explanation of Columns in Remarks Section IV

a. Column 1, Reference Code. The code recorded in column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

SECTION II. MAINTENANCE ALLOCATION CHART FOR TS-3981/P-

(1) Group number	(2) Component/assembly	(3) Maint. function	(4) Maint. category C	O	F	H	D	(5) Tool/ equipment	(6) Remarks
00	Test Set Error Detector TS-3981	Inspect	0.1						
		Inspect		0.1					
		Service	0.1						
		Service		0.1					
		Replace		0.1					

SECTION III. TOOLS AND TEST EQUIPMENT REQUIREMENTS FOR TS-3981/P

None required.

SECTION IV. REMARKS

Code Reference	Remarks
A	he equipment will be replaced and returned to the contractor for repair under a BOA Repair Contract.

Appendix B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION I. INTRODUCTION

B-1. Scope — This appendix lists components of end item and basic issue items for the TS-3981/P to help you inventory items required for safe and efficient operation.

B-2. General — The components of End Item List is divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item that require packaging for transportation or shipment As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. An illustration is furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. Not Applicable

B-3. Explanation of Columns — The following provides an explanation of columns found in the tabular listings:

a. Column 1, Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

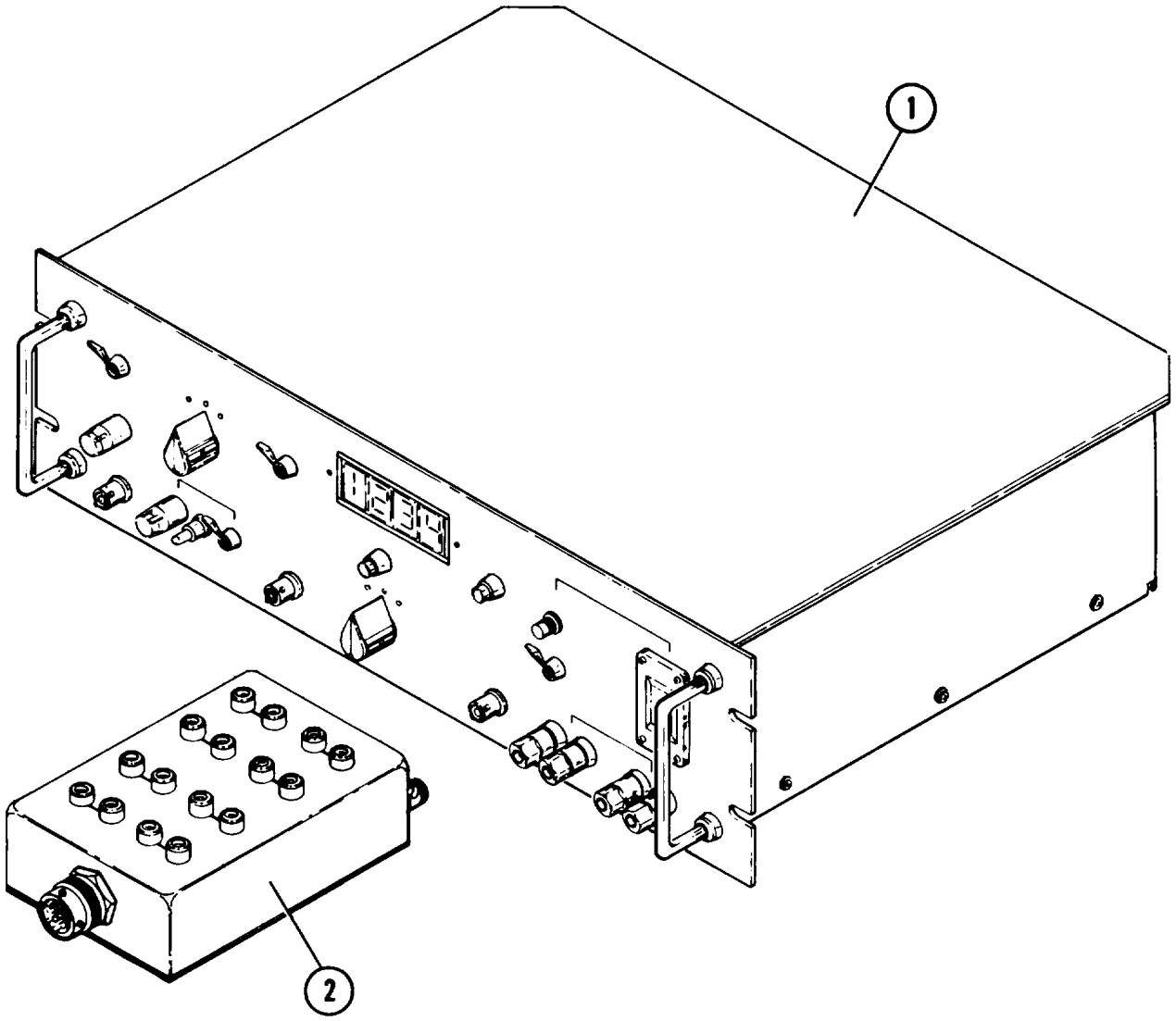
b. Column 2, National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column 3, Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parenthesis) followed by the part number.

d. Column 4, Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

e. Column 5, Quantity Required (Qty Rqd). Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEM



(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC and Part Number	(4) U/M	(5) QTY Reqd
1	6625-01-126-4016	Test Set Error Detector (80058) TS-3981/P	ea	1
2		Interface Assembly (56996) B4027047	ea	1

Appendix C

REPAIR PARTS AND SPECIAL TOOLS LIST

SECTION I. INTRODUCTION

C-1 Scope

This appendix lists repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required to perform organizational maintenance on the TS-3981/P. It authorizes the requisitioning and issue of spares and repair parts as indicated by the source and maintenance codes.

C-2 General

This Repair Parts and Special Tools List is divided into the following sections:

a. Section II - Repair Parts List. A list of authorized repair parts for performance of maintenance. Also included are parts which must be removed when replacing authorized parts. The list is composed of functional groups in numeric sequence. The parts in each group are listed in figure and item number sequence.

b. Section III - Special Tools List - Not applicable.

c. Section IV - National Stock Number and Part Number Index - Not applicable.

C-3 Explanation of Columns

a. Illustration. This column is divided as follows:

(1) Figure number. The number (used to identify the illustration on which the item is shown.

(2) Item number. The number used to identify item called out in the illustration.

b. Source, Maintenance, and Recoverability (SMR) Codes.

(1) Source code. Indicates the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	Definition
PA	Item procured and stocked for anticipated or known usage.

SECTION I. INTRODUCTION (cont)

NOTE Cannibalization or salvage may serve as a source of supply for any items source coded above except those coded XA and aircraft support items as restricted by AR 700-42.

(2) Maintenance code. Indicates levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The code entered in the third position indicates the lowest maintenance level authorized to remove, replace, and use the support item. The code entered in the third position indicates one of the following levels of maintenance:

Code	Application/Explanation
0	Support item is removed, replaced, used at the Organization level.

(b) The code entered in the fourth position indicates whether the item is to be repaired. It identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions).

Code	Application/Explanation
Z	Nonrepairable. No repair is authorized.

(3) Recoverability code. Assigned to support items to indicate disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Code	Definition
Z	Nonrepairable item. When unserviceable, condemn.

c. National Stock Number. Indicates the National stock number assigned to the item and is used for requisitioning purposes.

d. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity). This number controls the design and characteristics of the item by means of its engineering drawings, specification standards, and inspection requirements. It is used to identify an item or range of items.

SECTION I. INTRODUCTION (cont)

NOTE: When a stock numbered item is requisitioned, the repair part received may have a different number than the part being replaced.

e. Federal Supply Code for Manufacturer (FSCM). This is a five-digit numeric code listed in SB 708-42. It is used to identify the manufacturer, distributor, or Government agency, etc.

f. Description. Indicates the Federal item name, if required, a minimum description to identify the item.

g. Unit of Measure (U/M). Indicates the basic quantity standard of the listed item used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr, etc.). When U/M differs from unit of issue, the lowest unit of issue that will satisfy U/M requirements will be requisitioned.

h. Quantity Incorporated in Unit. Indicates quantity of the item used in breakout shown on the illustrated figure. This is prepared for a functional group, subfunctional group, or an assembly.

C-4 Special Information — Not applicable.

C-5 How to Locate Repair Parts — Not applicable.

C-6 Abbrevia-Tions — Not applicable.

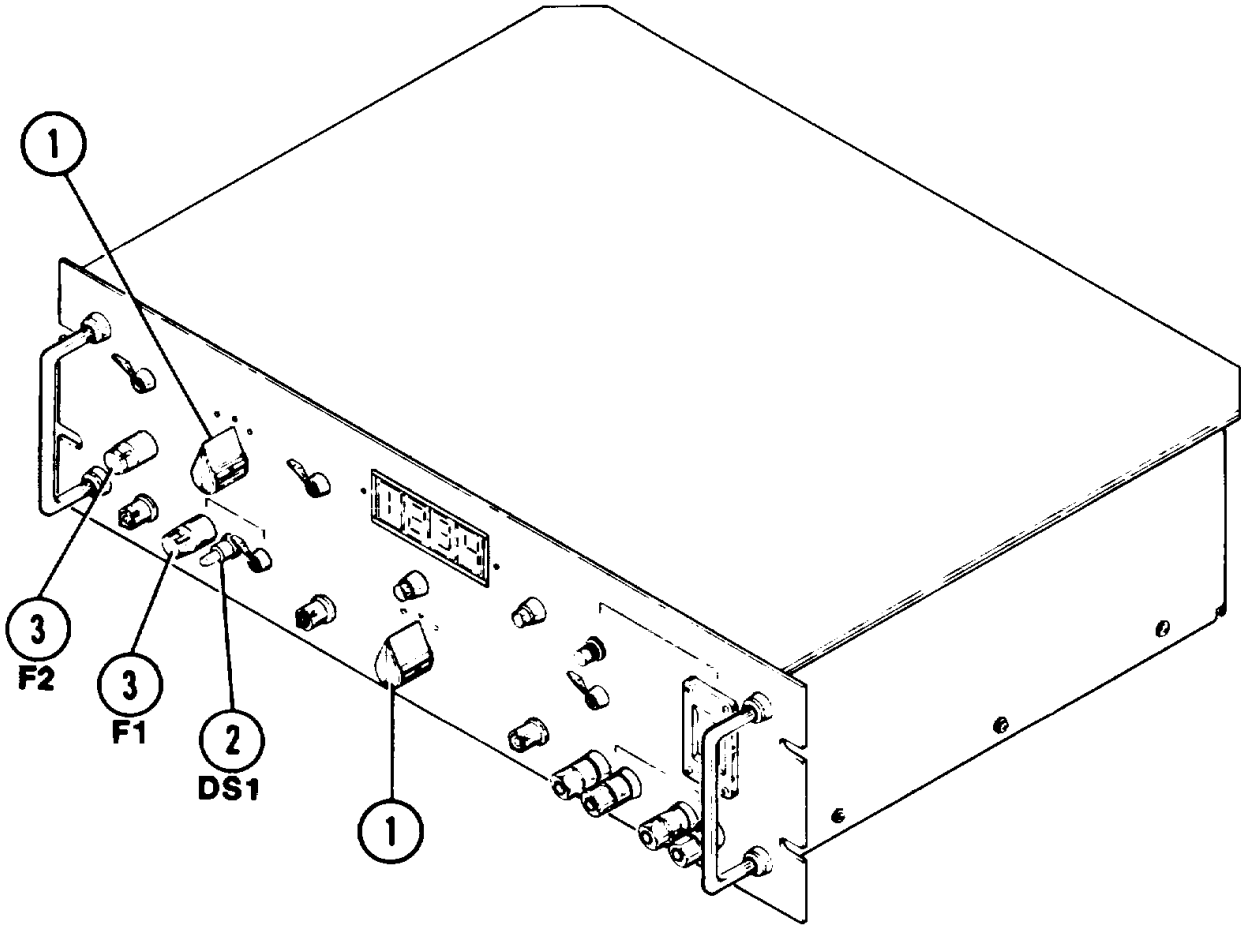


Figure C-1. Test Set Error Detector TS-3981/P

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP: 00 TEST SET ERROR DETECTOR TS-3981/P		
C-1	1	PAOZZ	5355-00-556-0145	MS91528-1K2B	96906	KNOB	ea	2
C-1	2	PAOZZ	6240-00-054-6540	507-4537-0931-640	72619	LAMP, cartridge	ea	1
C-1	3	PAOZZ	5920-00-280-8344	AGC ½	71400	FUSE, cartridqe	ea	2

By Order of the Secretary of the Army:

EDWARD C. MEYER
General, United States Army
Chief of Staff

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

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HIGH VOLTAGE

The high voltage used in this equipment can kill on contact.
Observe the following safety precautions:

- **Ground the Equipment** — Before connecting primary power or the signal cables, connect a heavy gage copper wire from the ground lug on the rear panel to earth ground. Do not remove this wire until the signal cables and primary power have been disconnected.
- **Avoid the Power Input** — Be careful not to contact the 115-volt ac input connections when installing or servicing the equipment.
- **Do Not Service Alone** — Never work o the equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who can administer first aid.
- **Use One Hand** — Where possible, use only one hand to service this equipment. Keep the other hand away to reduce the hazard of current flowing through the vital organs of the body.

CLEANING SOLVENT

The fumes of t used for cleaning this equipment can cause severe irritation or injury. Observe the following safety precautions.

- **Ventilate** — Use only outside or in well ventilated areas and avoid breathing the fumes.
- **No Smoking** — Do not smoke while using and do not use near an open flame or hot surface. Trichlorotrifluoroethane does not burn but heat converts the fumes to a toxic, irritating gas.
- **Use Gloves** — Use gloves that trichlorotrifluoroethane can penetrate. Because the solvent dissolves the natural oils, avoid long or repeated contact with your skin.
- **Wash** — Wash hands immediately after using.
- **Do Not Take Internally** — Do not drink. If taken internally, see a doctor immediately.,

PIN: 054066-000