SERVICE MANUAL 6219

Description and Maintenance

TS-301 TEST SET

N451400-2401

for

MICRO-700 Controller PCB

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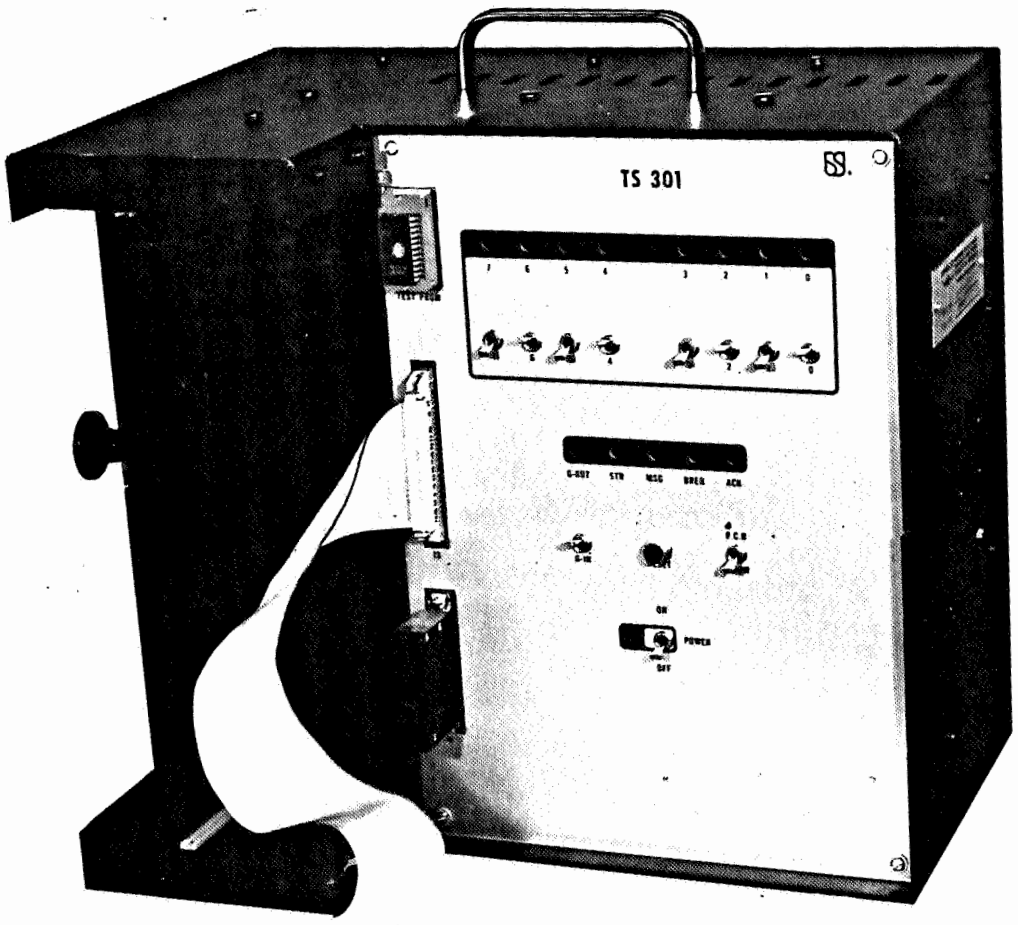
TS 301

SECTION 1
GENERAL INFORMATION

1.1 INTRODUCTION

The TS-301 Test Set (N451400-2401) is used exclusively for testing the Controller PCB (N451082-0208) of the Micro-700 System, and the individual PROM's of this PCB. The TS-301 sets up Controller PCB tests which, in turn, are executed by a diagnostic PROM inserted in place of IC8 of the PCB. When not in service, this test PROM is stored on the front panel of the set. Controller PCB PROM's removed during board testing may be independently checked in the TS-301, as well as the test PROM itself. Results of all test programs are displayed with LED's. The TS-301 also incorporates jumper circuits which put selected Controller PCB inputs and outputs in closed loops to satisfy basic operating requirements of the board. The TS-301 is equipped with a manually operated mechanism for opening and closing the PCB "J1" and "J2" connector edge contacts. This mechanism permits the board to be inserted with minimal force and reduced chances of card material damage. A 120 Vac power source is required to power up the test set and the board under test.

This manual only provides general reference information on the TS-301. For the specific operation of the set's controls and indicators during Micro-700 Controller PCB testing, refer to service manual 6173.

1.2 COMPONENTS

1.2.1 Basic Assembly

The TS-301 test set is housed in an assembled steel enclosure with an aluminum front control panel. A carrying handle is attached to the top of the unit. To the left of the control panel is one set of zero insertion force (ZIF) PCB edge connectors. There are 72 contacts on the connectors in two rows of 36 contacts. Some test signals are sent through these contacts. A draw-knob latching mechanism opens and closes the connectors. When the knob is pulled out the opposed contacts close on the PCB, and open up when the knob is pushed inward. The PCB under test is mechanically supported by plastic guides on upper and lower steel braces.

Additional test signals are sent through a 50-conductor ribbon cable which attaches to a 50-pin (male) on the test set control panel. This cable interfaces connector J3 (microprocessor bus) of the Controller PCB. A 37-pin (male) "D" connector on the front panel allows access to selected Controller PCB circuits for miscellaneous tests. The plug attached to this connector contains jumpers which loop some Controller PCB I/O circuits. A 24-pin ZIF PROM holder on the front panel is used to store the TS-301 test PROM (N451575-0314) when not in use. This holder is electrically connected to the set to permit tests of the stored PROM. The set can be operated with the PROM absent.

The test set is equipped with a 3-conductor cord for input of standard 110 Vac power. A 110 Vac/5 Vdc power supply converter is mounted internally on a separate bracket and provides operating power for internal components and the board under test.

The test set contains one printed circuit board which serves as the mechanical and electrical mounting for all controls and indicators. ZIF connectors J1 and J2 are also mounted on this board. A notch in the PCB between the connectors accomodates placement and operation of the draw-knob mechanism.

1.2.2 Controller Test PCB N451605-1101

The Controller Test PCB inside the TS-301 contains all testing-related electronics. These include circuits which mimic or loop Micro-700 motherboard signals and signals from external devices, all front panel switch and LED circuits, and digital components which support the operation of the front panel test PROM. Digital components include four 4-bit binary counters, one 8-bit register, two octal transparent latches, a 555 timer and various line buffer and/or inverting devices. For functional descriptions of the switches and LED's on this board, refer to section 11.

1.3 SPECIFICATIONS

Dimensions:	H = 14", W = 15.5", D = 11"
Weight:	30 lbs. (13.6 kg.)
Access to internal components:	Box disassembly
Connections:	- One 3-pin plug w/cord (power input) - One 50-pin (male) connector w/ribbon cable - One 37 pin (male) connector w/"D" plug
Temperature environment:	0 to 50°C
Power input:	110 Vac, nominal @ 60 Hz
Fuse:	1.0 amp, 250 volt, 3AG type
Internal power supply converter:	110 Vac to 5 Vdc @ 3 amps
Test EPROM Part No.:	N451575-0314
Related Literature:	SM-6173 (Micro-700 System)

SECTION II
CONTROLS AND INDICATORS (See Figure 1)

The following tabulation describes the devices on the TS-301 front panel that are used during Controller PCB and PROM testing:

Item	Device	Description
1	LED's 0 - 7	Monitors Controller PCB data lines D0 through D7.
2	Toggle Switches 0 - 7	2-position switches: Sets up test data bytes on Controller PCB data lines D0 through D7. When switch is in the up position, the corresponding line is in a high logic state (1).
3	G-OUT, STR, MSG, BREQ, ACK	LED's: Monitor Grant-Out, Strobe, Message, Bus Request and Acknowledge lines, respectively, of the Controller PCB (system bus signals).
4	G-IN	2-position toggle switch: Allows user control of the Grant-In line to the Controller PCB. When switch is in the up position, the corresponding line is in a high logic state (1).
5	RESET	Momentary-action pushbutton: Provides general reset of the Controller board (no TS-301 reset).
6	PCB/PROM	2-position toggle switch: Configures TS-301 for test of Controller PCB (PCB position), or PROM installed in front panel (PROM position).
7	POWER	LED. Indicates presence of converted 5 Vdc power.
8	ON/OFF	SPDT toggle switch for 110 Vac power.

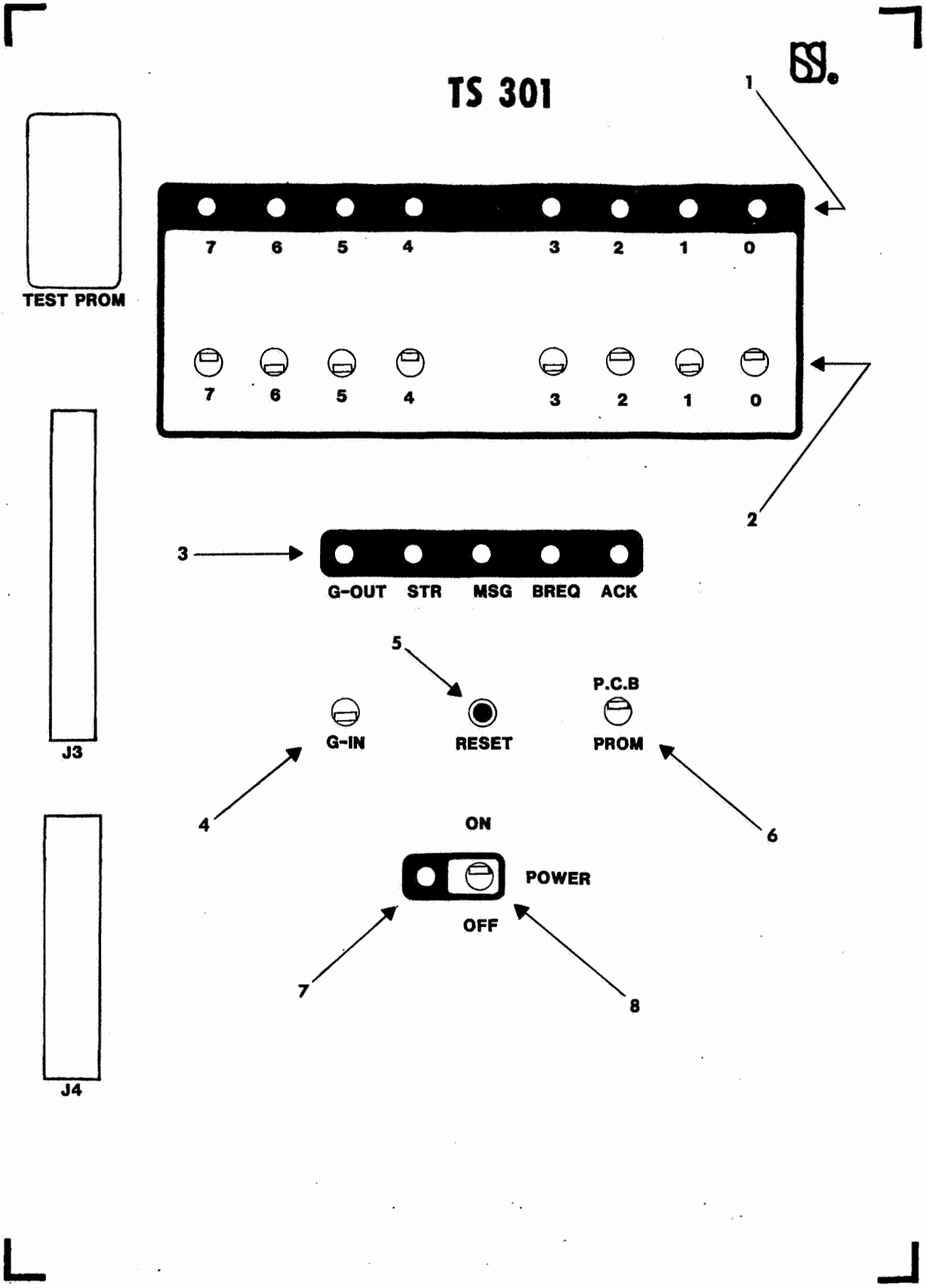

Figure 1. TS-301 Control Panel Layout

SECTION III
TEST PROM VALIDATION

The test PROM (N451575-0314) provided with the TS-301 may be checked prior to installation on the Controller board. The check-out procedure may also be used for the second test PROM which verifies Controller PCB PROM sockets IC1 through IC7 (refer to section 4.3.2.4 of SM-6173, steps 16-21). Standard service PROMS removed from the Controller may also be checked with the procedure. When the PROM check is executed, an 8-bit checksum of PROM data is calculated and displayed on LED's 1 through 7 at a rate of about two times per second. The checksum is calculated by adding, in binary, the contents of each of the 2,048 bit locations in the PROM, ignoring carries. No Controller PCB need be plugged into the set during the test.

1. Turn off test set POWER switch.

2. Insert the PROM to be tested in the front panel holder. The notch in the IC should be towards the lever end of the holder.

3. Move the PCB/PROM switch to the PROM position.

4. Turn test set power back on. The PROM check will commence at this time.

CAUTION

DO NOT REMOVE OR INSTALL THE PROM WITH TEST SET POWER TURNED ON, OTHERWISE THE PROM MAY BE DAMAGED.

SECTION IV
MAINTENANCE

4.1 GENERAL

If any part of the TS-301 is faulty, the complete test set should be returned to US&S for repair or replacement. No troubleshooting procedure for the Controller Test PCB is given; such a procedure is outside the scope of this manual. Extensive disassembly is required to access the PCB. The PCB must be removed from the test set to replace individual components; additional damage could occur to the PCB during the removal process. US&S also recommends that no attempt be made to repair or adjust the ZIF connector edge latching mechanism or the 5 volt power supply converter.

To obtain the proper Returned Material Report (RMR) form for test set components or the complete set, contact the district sales representative or the factory at the appropriate address listed on the back cover of this manual.

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