

Chapter 2

Preventive Maintenance

Introduction

The optimum performance and useful life span of the system depends on routine preventive maintenance. Failure to perform these procedures could result in the warranty being voided.

This chapter contains a description of the recommended approach to system maintenance. The maintenance procedures described in this chapter should only be performed by a Teradyne field service engineer or trained personnel.

System maintenance is divided into two categories: preventive maintenance and demand maintenance. Periodic preventive maintenance ensures maximum operating efficiency, prolonged useful life, and maximum mean-time-between-failure of the system. Demand maintenance, which is resorted to only if a system malfunction occurs, involves trouble analysis and troubleshooting to locate the cause of the malfunction.



WARNING: These service instructions are for use by qualified service personnel only. To prevent the risk of electric shock, do not perform any maintenance or servicing described in this manual unless you have appropriate technical training and experience to perform tasks in service areas of the equipment, and you are aware of hazards involved and how to minimize danger to yourself or other persons. Examples of such personnel are electricians and Teradyne's or customer's factory-trained personnel. Maintenance procedures that do not involve the use of tools for access inside the equipment may be performed by an operator. Also, see the WARNINGS pages at the front of this manual.

Operational verification and diagnostic programs will, in most cases, isolate problems to a single circuit board or module. By using these test programs, and the content of this and other related manuals, trained personnel should be able to quickly isolate malfunctions.

System Warranty

The system warranty attests to the quality of materials and workmanship in Teradyne products. If difficulties occur and they can not be eliminated by using the service material provided, contact the Teradyne Technical Support Center and provide complete information about the problem and the actions you have taken to remedy it and the system's serial number. For contract maintenance beyond the warranty period, contact Teradyne.

Equipment Return

When returning a system module to Teradyne call the number provided in the *Using This Manual* section of this document. For systems not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay. For return shipment, use packaging that protects the module from static-sensitive and in-transit damage.



WARNING: Before performing any maintenance inside of the system, shutdown the system according to normal procedures. Failure to shut down your system using normal shutdown procedures may result in personal harm or file corruption.

Cleaning the System

The following procedures describe how and when system maintenance and periodic cleaning of the system is performed.

Cleaning the Exterior of the System

Operating personnel should keep the system exterior clean. The system exterior can be cleaned with a mild detergent solution and a soft cloth. Be sure the cloth is only slightly moist or water may get into the system, causing electrical problems. Be especially careful in the area of the control panel's switches to prevent moisture from getting between these switches.

CAUTION

Do not clean the system with solvents such as acetone or methylethylketone. These solvents can damage the system paint or plastic.

Do not use any harsh abrasive, acidic or caustic cleaners on the system. These products can etch, corrode, and discolor the paint.

Cleaning the Monitor

Clean the face of the monitor using a small amount of glass cleaner on a soft cloth.

CAUTION

Make certain that system power is OFF before cleaning the monitor. Do not spray cleaner directly onto the monitor.

Cleaning the Receiver

The receiver should be cleaned whenever it is visually observed to be dirty. Inspect it daily and clean it weekly at a minimum. Clean the receiver using a dry, stiff, non-conductive bristle brush and a vacuum with a plastic nozzle. The recommended non-metallic cleaning brush is a toothbrush with a small, firm-bristled, tapered head or equivalent.

CAUTION

Do not use a solvent or lubricant on the receiver pins.

- ▶ To clean the receiver:
 - 1 Power down the system according to normal shutdown procedures.
 - 2 Switch the system's main power switch **CB22** to its **OFF** (down) position.
 - 3 Disconnect the system's AC line cord plug from its receptacle.
 - 4 Vacuum the receiver to remove any dust and debris. Make certain that the receiver's diaphragm surface is free of dust and foreign particles.
 - 5 Clean the receiver with the toothbrush to loosen any debris. Repeat Step 4.
 - 6 Replace the fixture-to-receiver gasket seal if any vacuum leakage or visual material breakdown occurs.

Cleaning the Receiver's Vacuum Inlet Filter Screens

The vacuum inlet filter ports mate with the test fixture and are located on the right and left sides of the receiver. The screen is inside the port's opening. Use a vacuum cleaner to remove any dust or particles from the two vacuum port filter screens. Clean these filter screens weekly.

Cleaning the Linear ZIF Connectors in the Pin Cage

The linear ZIF connectors are located at the top of the pin cage. They should be cleaned whenever they are observed to be dirty. The boards in this cage electrically interface to the receiver through these connectors. The linear ZIF connectors should be cleaned with canned clean air (70 PSI or equivalent).

CAUTION

- **Do not use any solvent as it can remove lubricants from the connector cam rails.**
- **To prevent equipment damage shut down your system using normal shutdown procedures. Failure to do this may result in file corruption.**

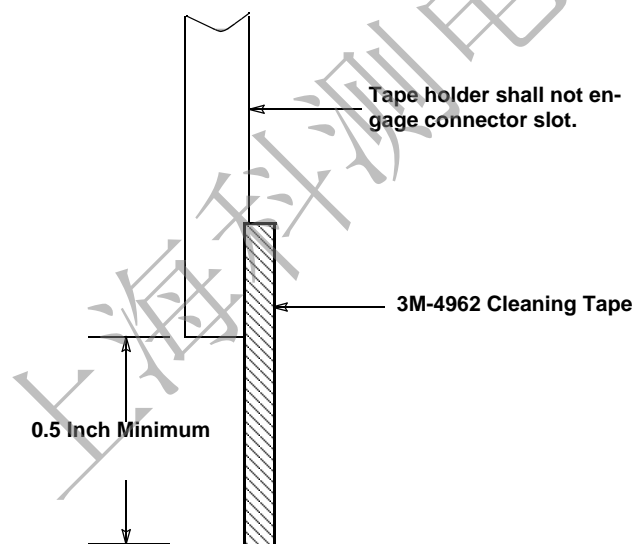
- ▶ To clean the linear ZIF connectors:
 - 1 Power down the system according to normal shutdown procedures.
 - 2 Switch the system's main circuit breaker **CB22** to its **OFF** (down) position.
 - 3 Disconnect the system's power cord plug from its input power receptacle so there is no system connection to the AC input line voltage.
 - 4 Access the inside of the pin cage.

- 5 Remove the number of pin cage boards from the cage that are required to perform this cleaning.
- 6 With the connector(s) open, use a vacuum with a plastic nozzle to vacuum the connector to remove any loose debris.
- 7 Blow each connector slot with canned air to remove all loose debris.
- 8 Visually check each connector to observe if any debris is still present in the connector.

If any debris is present, perform the following steps using 3M[®] 4962 cleaning tape. As shown in Figure 2-1, the tape can be mounted on a piece of heavy stiff card/cover-type paper with a smooth finish such as a piece of a file folder or equivalent cut to the size of 4 in. (10.16 cm) square. The tape should not be used for more than 10 cycles.

- 9 Open the receiver connector and position the tape in the connector.
- 10 Close and open the connector.
- 11 Remove the tape.

Figure 2-1 Cleaning Tape Affixed to a Tape Holder



Cleaning Pin Cage Circuit Board Edge Fingers

Clean the pin cage boards with a non-metallic cleaning brush and canned air. A toothbrush with a small, firm-bristled, tapered head or equivalent is the recommended cleaning brush. Canned clean air is used for drying the edge fingers after alcohol is applied.

CAUTION

- **Do not use an eraser to clean the edge fingers on the interface board, any type of solvent except alcohol on the edge fingers or any type of wipe pad for cleaning because any remaining fibers can result in a lack of continuity.**
- **Use proper static sensitive precautions when handling pin cage boards.**

- ▶ To clean the pin cage circuit board edge fingers:
 - 1 Power down the system according to normal shutdown procedures.
 - 2 Switch the system's main circuit breaker **CB22** to its **OFF** (down) position.
 - 3 Disconnect the system's power cord plug from its input power receptacle so there is no system connection to the AC input line voltage.
 - 4 Access the inside of the pin cage and remove the circuit boards to be cleaned.
 - 5 With the board laying on a flat work bench surface, brush the board's edge fingers with a toothbrush and a small quantity of methyl or isopropyl alcohol.
 - 6 Dry the board's edge fingers with canned, clean air and avoid touching the edge fingers after cleaning.
 - 7 Visually inspect the edge fingers on each cleaned board to ensure that no contamination remains. Inspect for fiberglass burrs, dust, and material fibers. Reclean the boards if any of these materials are still present.

Air Filters

The section describes the content of the filter kit and cleaning system air filters.

Cleaning Non-Disposable Air Filters

Clean these foam-type air filters whenever they are dirty enough to impede air flow. Since the amount of airborne contaminants varies from one site to another, it is difficult to specify how often cleaning should occur. In general, if little clusters of dust are starting to form on the filters, cleaning is necessary. In any event, all filters should be inspected weekly and washed at least monthly.

- ▶ To wash a non-disposable foam filter:
 - 1 Pull the filter off the velcro being careful not to let any dirt and dust particles fall away.
 - 2 Take the filter away from the system area. Remove any dirt and dust large enough to fall free by its own weight. If an air gun is available, blow air in the opposite direction of air flow through the filter.
 - 3 Drop the filter into a sink containing warm, soapy water. Squeeze this solution through the filter several times until it is clean. Rinse well and squeeze out as much moisture as possible with paper towels. The filter is then dry enough to prevent water drops from getting into the system. An air gun can also be used to dry the filter after washing.
 - 4 Hang the filter onto its velcro holder.

System Air Filter Kit

An optional system air filter kit (P/N 093-068) contains replacement air filters. Table 2-1 lists filter PNs, filter description, and the number of filters contained in this kit. The nine air filters are non-disposable air filters.

Table 2-1 System Air Filter Kit Contents

PN	Filter Description	Quantity
095-011-00	FILTER AIR 5.625X21.8X.5	1
095-012-00	FILTER AIR 5.625X20.0X.5	2
095-013-00	FILTER AIR 5.625X25.5X.5	4
095-014-00	FILTER AIR 5.625X7.6X.5	1
095-015-00	FILTER AIR 5.625X13.0X.5	1

Cleaning the Pin Bay Fan Screen

This air exhaust screen is located on the bottom center of the pin bay and can be checked for dirt accumulation by using a flashlight. Clean when dirty. Check the screen quarterly or more frequently if the environment dictates.

- ▶ To access and clean the pin bay fan screen:
 - 1 Power down the system according to normal shutdown procedures.
 - 2 Switch the system's main power switch **CB22** to its **OFF** (down) position.
 - 3 Remove the front cover panel from the pin bay.
 - 4 Disconnect the fan assembly's power-cord connector from the fan box at the front of the bay.
 - 5 Loosen the two captive screws on the fan assembly's panel. Pull the fan assembly out the front of the bay.
 - 6 Turn over the fan assembly and vacuum the fan screen to remove dust and particles.
 - 7 Reassemble by performing the above steps in reverse order.

Compressed Air Filter and Water Drain Cock

Compressed air, that drives the vacuum valves, is filtered in the pin bay's compressed air line to collect contamination and water with a replaceable 50-micron filter.

Compressed Air Filter Replacement

The cartridge containing the compressed air filter (PN 361-476-00) is located at the center left side of the pin bay above the compressed air inlet port and behind the vertical rail. Figure 2-2 shows this assembly. Replace the filter at least once a year.

- ▶ To replace the compressed air filter:
 - 1 Power down the system according to normal shutdown procedures.
 - 2 Switch the system's main power switch **CB22** to its **OFF** (down) position.
 - 3 Shutdown the compressed air source to the system. Disconnect the compressed air hose from the system's compressed air port at the left rear of the pin bay.
 - 4 Shutdown the vacuum source to the system. Disconnect the vacuum hose from the system's vacuum port at the rear of the left side bay.
 - 5 Remove the pin bay's rear cover panel.
 - 6 Place a suitable container below the drain cock and press in the drain cock valve pin until all collected water has been discharged. See Figure 2-2 for location of the drain cock.
 - 7 Unscrew the threaded cartridge bowl to access the filter.

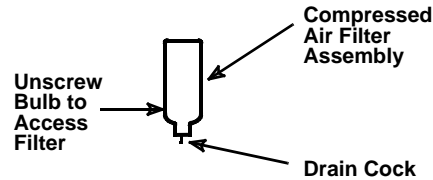
Removal of Water from the Compressed Air Line

As shown in Figure 2-2, the base of the cartridge has a manually-operated drain cock that, when opened (pressed in), discharges any collected water. Perform this procedure once a month.

- ▶ To remove water from the compressed air line:
 - 1 Power down the system according to normal shutdown procedures.
 - 2 Switch the system's main power switch **CB22** to its **OFF** (down) position.
 - 3 Shutdown the compressed air source to the system. Disconnect the compressed air hose from the system's compressed air port at the left rear of the pin bay.
 - 4 Shutdown the vacuum source to the system. Disconnect the vacuum hose from the system's vacuum port at the rear of the left side bay.
 - 5 Remove the pin bay's rear cover panel.
 - 6 Place a suitable container below the drain cock and press in the drain cock valve pin until all collected water has been discharged.
 - 7 Install the pin bay's rear cover panel.
 - 8 Reconnect the compressed air and vacuum lines to their system ports. Turn on the compressed air and vacuum sources to the system.

- 9 Power up the system according to normal procedures.
- 10 Remove the water container from the system area.

Figure 2-2 Compressed Air Filter and Water Drain Cock



Fixture Preventive Maintenance

The interval for cleaning a fixture depends on how clean the circuit boards (UUTs) are as well as the environment in which fixtures are stored. When storing a fixture, protect its receiver interface contacts and probes (nails) to prevent possible damage as well as corrosion and contamination from airborne contaminants.

CAUTION

Do not use a solvent or lubricant on the probe (nail) pins. Solvents can carry dirt into the probe's socket and remove lubricants that provide for a smooth, low-resistance mating between the probe's plunger and socket.

Probe (nail) heads, particularly those with a flat or serrated contact surface, are prone to a build-up of compacted flux and dirt particles after continuous board testing. Remove this residue with a brush, and vacuum away the dislodged particles. The brush should be a non-conductive, non-metallic cleaning brush that is small, dry, stiff and firm-bristled with a tapered head. Brush the probes after approximately every 2000 fixture actuations.

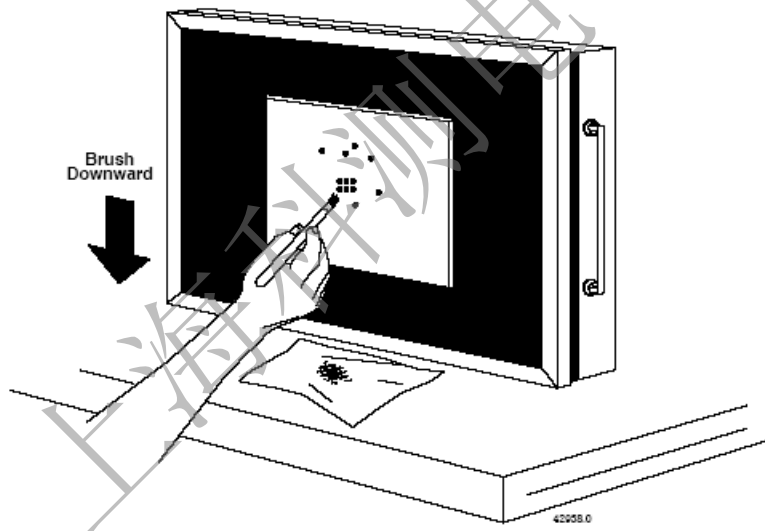
- To clean the top of the fixture:



WARNING: Support the fixture so that it does not fall on your hands or arms during cleaning.

- 1 Position the fixture on a work bench as shown in Figure 2-3.
- 2 Starting from the top, clean the probe (nail) heads using a dry toothbrush. Always brush downward.
- 3 Using a vacuum with a plastic nozzle, remove the dislodged particles from the fixture.
- 4 Keep the fixture's rubber diaphragm surface free of dust and foreign particles by vacuuming as necessary.
- 5 Replace the fixture's edge-sealing rubber if any leakage occurs.

Figure 2-3 Cleaning the Top of a Fixture



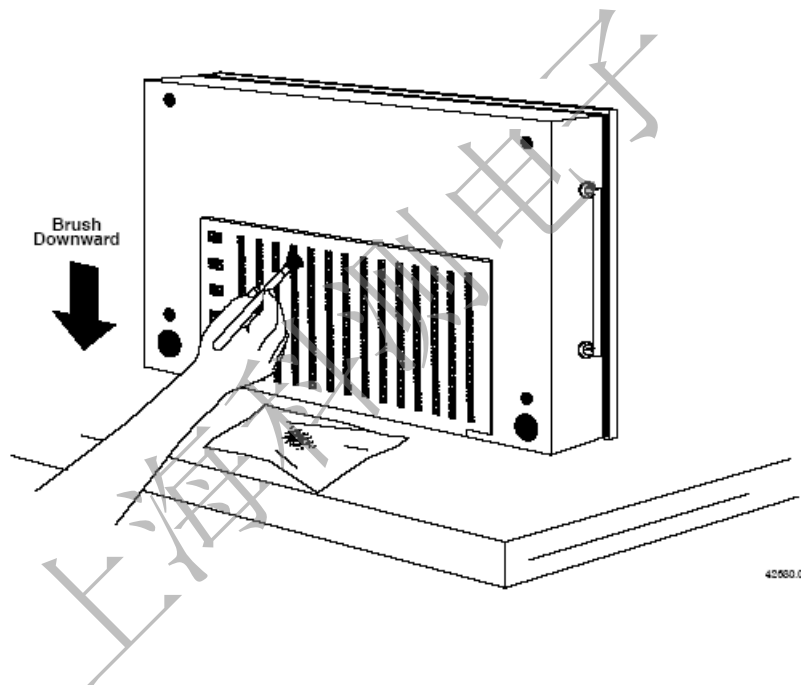
- 6 Clean the interface panel on the bottom of the fixture that mates to the receiver before using it and whenever necessary.

- ▶ To clean the interface panel:

CAUTION Do not use any type of wipe pads for cleaning because their fibers left behind can result in a lack of continuity.

- 1 Position the fixture on a work bench as shown in Figure 2-4.
- 2 Starting from the top, brush the interface panel's contacts with a toothbrush and a small quantity of methyl or isopropyl alcohol. Always brush downward.
- 3 Using a vacuum with a plastic nozzle, vacuum the dislodged particles from the fixture. Avoid touching the interface panel's contacts after cleaning.

Figure 2-4 Cleaning the Bottom of a Fixture



Preventive Maintenance Schedule

This schedule is based on 40-hour-per-week usage and is meant as a general guideline. More frequent maintenance may be necessary for increased usage and/or areas with excessive contaminant and dust levels. Qualified site personnel are expected to perform only the daily and weekly scheduled preventive maintenance (PM) procedures if the system is under warranty, or if a service contract has been purchased.

Daily

The following steps describe how to perform daily system maintenance.

- ▶ To perform daily preventive maintenance:
 - 1 Check all fans for proper operation.
 - 2 Inspect the receiver for any foreign particles. Clean, if necessary, using a dry, stiff, non-conductive bristle brush and a vacuum.
 - 3 Check the oil level in the vacuum pump and replenish it to the $\frac{3}{4}$ mark if it drops below the $\frac{1}{4}$ mark on the oil sight glass. The vacuum pump must be shut off before adding oil. See the manufacturer's vacuum pump manual.

Weekly

The following steps describe how to perform weekly system maintenance.

- ▶ To perform weekly PM:
 - 1 Perform the daily preventive maintenance.
 - 2 Verify system operation using the Test tab of the SYSTEST dialog box, run SYSTEST with Test Resolution mode set to STANDARD and RUNALL.
 - 3 Check all system air filters for cleanliness. Clean as required. Replace any filter, if required.
 - 4 Clean the face of the monitor using a small amount of glass cleaner and a soft cloth.
 - 5 Clean the receiver using a dry, stiff, non-conductive bristle brush and a vacuum.
 - 6 Vacuum the two vacuum port inlet screens adjacent to the receiver.
 - 7 Clean fixtures, if necessary.
 - 8 Check the vacuum pump oil for contamination. See the manufacturer's vacuum pump manual.
 - 9 Inspect the strip printer and/or line printer for paper dust and vacuum when necessary.

Monthly

The following steps describe how to perform monthly system maintenance.

- ▶ To perform monthly preventive maintenance:
 - 1 Perform all weekly preventive maintenance.
 - 2 Before opening the compressed air filter cartridge's drain cock to remove water from the line, place a suitable container below the drain cock.
 - 3 Wash all foam-type air filters.
 - 4 Replace any filter, if required.

Quarterly

The following steps describe how to perform quarterly system maintenance.

- ▶ To perform quarterly preventive maintenance:
 - 1 Perform all monthly preventive maintenance.
 - 2 Perform line printer preventive maintenance, especially cleaning, as outlined in the manufacturer's manual.
 - 3 Clean or replace the vacuum pump's inlet filter as outlined in the manufacturer's manual. This filter is included in the vacuum pump air filter kit.
 - 4 Check all fans and the fan screen (grill) for dust accumulation; clean if necessary. Using a flashlight, check the fan screen on the bottom center of the pin bay for dust accumulation.
 - 5 From the Calibrate tab of the SYSTEST dialog box, calibrate the D/S, CST, ICA, and AFTM boards. If you have an SFTM that is licensed, calibrate it also.



Note: If there is an average ambient temperature change of 5°C, calibrate the ICA board to maintain measurement accuracy.

Semi-Annually

The following steps describe how to perform semi-annual system maintenance. If required, see the manufacturer's manual.

- ▶ To perform semi-annual preventive maintenance:
 - 1 Perform all quarterly preventive maintenance.
 - 2 Clean the vacuum pump and motor air intake grills.
 - 3 Remove the receiver's vacuum inlet filter caps and screens. Inspect the screens to make sure the space between the coarse and fine screens is clean and that airflow is not blocked.

Annually

The following steps describe how to perform annual system maintenance.

- ▶ To perform annual preventive maintenance:
 - 1 Perform all semi-annual preventive maintenance.
 - 2 Replace the compressed air filter in its cartridge.
 - 3 Replace the vacuum pump's disposable automotive-type oil filter (Fram PH966 or equivalent), the ceramic exhaust filter inserts, and the charcoal filter canister. Replace the oil with SAE 30W (Society of Automotive Engineers) non-detergent oil. See the manufacturer's vacuum pump manual.
 - 4 Perform the Accuracy Verification Program (AVP) to maintain system certification and traceability.

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