National Optronics

4T Troubleshooting Guide

REF-4T-11

Release
09/06/00

Rev.	EC No.	Section	Description	Approval	Date
--	1809	All	Initial release	MDW	09/06/00
A	1906	2, ¶6	-18 was –20	DEA	12/13/00
		3, ¶1	"Divot" was "Bump", add "Update code…"		
		¶7	Add "Implement thicker LMB…"		
		¶8	Add "Lens bevel may have…", add "May be due to…"		
		4, ¶2	Add paragraph		
		6.1, ¶4	Add text regarding "newer Bevel mechanism, version 2…"		
		6.3, ¶1	Change "…current with version 1.14." to "…current with version 1.17."		
B	2072	3, ¶2	Under "General shape distortion," added the third bulleted item: "Nose piece not holding frame . . .." In the "Messages" subsection, added a subheading "Messages—Numbering for Software Prior to Version 1.22" and on Page 18, added a new section titled, "Messages—Numbering for Software Version 1.22 and Later."	Pending	7/16/01
		6.3			

Table of Contents

Format: Description of symptom followed by possible solutions given in order of probability.
         Note that less likely solutions may sometimes be easier to eliminate first.

1. Display / Keypad Related Problems

Unit will not boot-up. No display or servo movement.
- Blown +5 volt fuse (refer to SRM for location).
- Bad crimp on red wires on power switch.
- Bad Power supply.
- Bad Power cord to power supply (or bad wall outlet).
- Bad Processor board.

Display is bright blue, but no lettering is visible. Servos move normally on boot up.
- Adjust contrast within 3 seconds of boot-up (use top soft key to lighten screen).
- Blown -12 volt fuse (refer to SRM for location).
- Broken blue wire (-12 volt) on DIN connector.
- Bad display ribbon cable.
- Bad display.
- Bad processor board.
- Bad power supply.

Display is bright white, but no lettering is visible. Servos move normally on boot up.
- Adjust contrast within 3 seconds of boot-up. (use second soft key from top to darken screen).

Display contrast flickers.
- Intermittent DIN connector if old style connector on power supply.
- Intermittent connection on blue wire (-12 volt) on DIN connector.
- Intermittent Backlight: - Connection on 2-wire plug from processor board to inverter.
                              - Bad crimps on power switch terminal (red).
                              - Connection into or out of display inverter.

Display is dark (no backlight), but faint lettering is visible.
- Bad inverter.
- Bad connection on 2-wire plug from processor board to inverter.
- Bad display.

Display is sometimes normal, but flickers with thin white vertical or horizontal lines.
- Bad display ribbon cable.
- Connector on display cutting into foil tape on backlight assembly (field tech repair only)
- Bad display.

Display characters are "grainy"
- Bad display

Multiple or missing numbers when Keys are pressed.
- Bad Keypad. Check to see if entire row or column are out.
- Bad keypad cable – intermittent connection of ribbon cable / connectors
- Problem with processor board (original programming of Xilinx chip).

2.   Servo Movement Related Problems

Display is normal, but none of the servos move on boot up.
- 50 pin connector (old style wiring) or adapter board (new style wiring) not seated properly in Processor board.
- Blown +12 volt fuse (refer to SRM for location).
- Loose or broken 28 conductor flex cable (at adapter board which is plugged into Processor board (52222) or Carriage interface board (52223)).

Display is normal, R/L and AXIS motors work, but SIZE and BEVEL do not.
- Loose or broken 14 conductor flex cable (at Carriage interface board (52223) or Theta interface board (52224)).

Stylus comes out normally, but misses the frame bevel and gives error "Insufficient Data".
- Calibrate frame bevel.
- Bevel may have to be trained individually for unusual frames.
- Broken, loose, or bent stylus tip.

Servo buzz when the stylus moves out or down. (See Appendix 1)
- This is almost always excessive backlash in the AXIS motor! Verify by applying drag with your finger on the front plate to see if it stops.
- Excessive backlash in BEVEL motor (See Appendix 1).

Servo buzz when the carriage moves to the left or right. (See Appendix 1)
- R/L motor Kp value too high. Should be between 7-12 on old style R/L Mechanism. Should be between 10-15 on new style R/L Mechanism, but not above 20.
- Excessive backlash in R/L pinion (should only exist on old style R/L mechanism with rollers).

Unit operates normally, but carriage slams hard to the left or right when moving between eyes.
- Decrease Right or Left Final Speed Offset on the R/L Movement Calibration Screen. These numbers were typically 5 to15 on the old style R/L Mechanism, but may be as low as –18 on the new style R/L mechanism.

Stylus moves down, but does not come out from home position at beginning of cycle and gives error: "No Frame Detected".
- Bevel Position Bias is set to zero (zero was legal value before version 1.09).
- Pinion fell off BEVEL motor (check for encoder counts in diagnostics).
- BEVEL pinion and rack backlash adjustment too tight in home position.
- Problem with BEVEL motor wiring. (check for encoder counts in diagnostics).

Stylus moves down, but does not come out from home position at beginning of cycle and cycle pauses.
- If servo buzz is associated with problem, then excess backlash in AXIS.

Stylus comes out, but does not move down at beginning of cycle but cycle continues.
- Arc gear may be rubbing on AXIS motor mount bracket. Rotate motor mount bracket.
- Problem with SIZE motor wiring (check for encoder counts in diagnostics).
- Pinion fell off SIZE motor (check for encoder counts in diagnostics).

Stylus falls backward part way through the trace.
- Ensure correct frame selection on Job Screen.
- Increase Z-Bias for that particular frame selection (try increments of 10).
- Increase R-Bias for that particular frame selection (try increments of 10).
- Broken, loose, or bent stylus tip.

Stylus falls forward part way through the trace.
- Ensure correct frame selection on Job Screen.
- Decrease Z-Bias for that particular frame selection (try decrements of 10).
- Increase R-Bias for that particular frame selection (try increments of 10).
- Broken, loose, or bent stylus tip.

One of the servo motors becomes energized when a serial cable is connected from the 4T to a computer.
- Shorted power leads on the offending motor. (See Appendix 2)

The stylus extends fully outward and down. The mechanism rotates fully CCW, and shifts to the right (all motions hard); The screen is bright blue or rolling with no lettering. (usually after software upgrade).
- Problem with FLASH memory:
  - Not installed.
  - Not seated correctly or bent pin.
  - Installed transposed (U2 in U5 socket, U5 in U2 socket).
  - Installed backwards (pin 1 orientation).
  - Program chips installed in Job storage space (program chips should be in U2 & U5).
  - Bad or Blank chip in U2 and/or U5.

3. Problems with edged shapes

Divot on bottom of lens
- Calibrate Bevel Bias Position (stylus not completely seated into bottom of bevel at trace start). Depending on the shape, edger dynamics may cause this bump to be worse on the left eye than the right (from the same trace).
- Update code to version 1.14 or later.

General shape distortion
- Broken, loose, or bent stylus tip.
- Frame not held securely in clamp bars; clamp bars possibly not parallel, binding on their respective pivots, or the springs not performing adequately.
- Nose piece not holding frame properly, or with too much force. May also affect size. Ensure proper loading.

Erratic Shapes
- Calibration Size Bias (R & Z) are too large. Can be caused by calibrating with plate installed backwards (with software versions prior to 1.14). Manually set Size Offset1 (R) and Size Offset2 (Z) to zero. Then recalibrate frame size. (Note: Pattern and Lens must then be rechecked and possibly recalibrated.)
- Problem with old style wiring or motor encoder wiring (check encoder counts in diagnostics).

Small shapes are coming out too big or small.
- Adjust slope for either the frame or pattern.

All frames (or patterns or lenses) edge too big (or too small) by the same amount.
- Recalibrate frame, pattern and lens sizes.
- Adjust circumference offsets for frames, patterns or lenses, as needed. Note: the circumference offsets are intended primarily to correct size problems in remote tracing situations.

Traced Rimless lenses or Patterns sometime come out oversized (especially on high base lenses)
- Nylon part of stylus may be slipping past lens or pattern at beginning of cycle, or stylus is not staying firm against the edge of shape being traced.
  - Increase R Bias (Caution: too much force may deflect thin lenses).
  - Decrease Z Bias.
  - Decrease Trace speed.

Traced Rimless lenses or Patterns seem rounded or small.
- Nylon part of stylus may not be staying firm against the front of the shape being traced (especially sharp nasals).
  - Implement thicker LMB and/or radiused nylon bumper.
  - Increase Z Bias (Caution: too much force may deflect thin lenses).
  - Decrease R Bias.
  - Decrease Trace speed.

Beveled lenses come out small or distorted.
- May be tracing in saddle of stylus rather than the groove. Decrease Beveled Lens Position so that the lens bevel is seated in the bevel notch at trace start.
- Lens bevel may have skipped over the bevel notch at the apex of the pyramid at trace start and be caught in back of stylus screw hole. May be due to missing edge breaks or radii on the bevel groove edges at the top of the pyramid. If these edges are sharp, they may be eased with a small abrasive tool such as a jeweler's file. Radii should be near .020" on both edges.

Bumps on shapes edged from Patterns.
- Nylon part of stylus may be bumping over embossed lettering on the pattern. Flip the pattern over.

Edged shapes are sometimes off-axis from traced frames.
- Ensure frame is centered properly with nose piece firmly engaged between the bridge This problem is most sensitive to aviator shapes. Look for bent guard arms on the frame causing the frame to be shifted right or left.
- Ensure the theta mechanism is rotating from the home position to a near vertical position at the beginning of the cycle (in versions prior to 1.14). This can be intermittent if there is a divot on the theta gear at the home position.

4.   Problems with serial communications

Tracer does not communicate with Host: (See Appendix 2)
- Host port parameters are not set correctly. Verify host port is set to 9600 baud, 8 data bits, no parity and 1 stop bit.
- 4T communication is setup incorrectly. Verify that protocol options match host requirements.
- Attempting to use barcode port for host communications. Use port closest to the back corner of the 4T (female port, labeled "Host Com1").
- Missing or redundant null modem. If a null modem is in use, try removing it. If a null modem is not in use, try adding one. (The 4T Comm 1 port has a built-in null modem.)
- Cable ground is wired to the wrong pin on connector. The ground pin on a 25-pin connector is generally pin 7. The ground pin on the 9-pin connector on the 4T is pin 5.
- Cable run is too long. Distances up to 100' generally work unless the environment is very electrically "noisy." Use higher quality shielded cable. The 4T and the computer should be plugged into AC outlets with a common ground if possible.
- A bad communication cable:
  - Change communication cable.
- A bad Com1 cable from the controller board to the connector on the back of the case:
  - Change Com 1 cable.
- Com port jumpers set improperly on the controller board:
  - These jumpers are located on the controller board to the left of each of the Com port connectors. The jumpers for Com1 must be aligned so that the two left pins are connected and the two right pins are connected. The jumpers for Com2 (barcode) must be aligned so that the two rear pins are connected and the two front pins are connected. If they do not have this alignment pull them off from the pins and realign.
- A bad controller board:
  - If a bad controller board is the conclusion by virtue of ruling out all other possibilities, then it will have to be replaced and the bad board sent back to the factory.
- A short somewhere in the mechanism:
  - Check for shorts between the carriage and all motor leads. If found, remove the short or if necessary replace the motor. (See Appendix 2)

OMA Host reports communications timeout
- Problem may arise from the large amount of data sent when tracing both eyes and also sending Z-data for both eyes. Upgrade to software version 1.16 or later.

5.   Other Problems

4T "forgets" calibration values and stored jobs when power is turned off.
- Verify that the two data storage EPROMS (sockets U4 and U7) are installed properly. If software is earlier than version 1.04, upgrade software.

4T spontaneously restarts (reboots).
- Verify all crimp connections and wires connecting the DIN connector, the power switch and the Molex board connector.

The frame shifts side to side when it is being traced.
- Ensure frame is seated correctly with nose piece firmly engaged.
- Ensure the proper frame selection.
- Decrease R Bias for particular frame selection.
- Customer may be a candidate for new style frame holder.

Frame stays stationary, but frame deflection is detected during trace cycle.
- Minimal deflection may not cause a frame fit problem. Decrease either or both the R and Z bias numbers if necessary.

The screen stays on the Trace Frame screen when the pattern holder is installed
- The switch vane needs adjustment. Verify the switch operation by pushing the arms down further to see if the Lens/Pattern screen activates. If adjustment of the vane is not practical, use the top soft key labeled SCREEN to toggle the screen.

The screen stays on the Trace Lens/Pattern screen regardless of the position of the arms.
- The switch is unplugged from the processor board.
- Broken wire or bad connection from switch to Processor board.
- Bad switch. Use the top soft key labeled SCREEN to toggle the screen until the switch can be replaced.

6. Appendix

1. Servo Buzz / Backlash

Buzzing or "Servo Buzz" is caused by having too much play in the gear teeth between a gear (round or a straight rack) and its pinion (driving gear). This play is commonly referred to as "Backlash". If the servo parameters used in the control code for a particular mechanism are set to values that cannot accommodate the amount of backlash that is present then buzzing will occur. There are two methods to alleviate this condition. One is to alter the servo parameters so that the backlash can be accommodated. This is only a viable alternative on rare occasions because the servo parameters are usually set up in order to get the mechanism to move in a desirable manner. If they were altered the desirable motion would not be achieved. The second method, and most appropriate, is to minimize the backlash between the gears. Depending on the particular mechanism, this may be accomplished by different means, however the desired goal regardless of mechanism is to move the pinion closer to the gear or the gear closer to the pinion. Caution should be exercised not to get them too close such that an interference could result because this will cause binding and although the buzzing will no longer be present, the mechanism will not function properly. The first requirement is to determine which drive is causing the buzzing. If one places a finger on the pinion the backlash can be felt (and usually observed) by moving the pinion back and forth while holding the gear or rack still. The number of encoder counts can be read while on the diagnostic screen. Similarly, if this is done (carefully) while the mechanism is moving (and possibly buzzing), one can usually stop the buzzing or at least feel that it is occurring at that particular pinion. Having identified the offending pinion the following steps can be followed to eliminate the problem.

Right/Left Mechanism (backlash range: ≥ 5, but ≤ 35 encoder counts):
On the R/L mechanism, (version 1, original design only), adjustment is accomplished by loosening the two screws that hold the Rack and slightly adjusting its position closer to the pinion while maintaining parallelism to the travel motion. Note, this is a very delicate adjustment and not easily done. It is often more easily done by leaving the screws loosened but still finger tight so that the Rack can be moved with some amount of resistance and then adjusting by forcing a shim (feeler gage) between the back of the Rack and the back of the Rack slot. Doing each end of the rack independently also may aid in making this adjustment. The pinion backlash should be checked several times during the adjustment process. When the backlash is barely perceptible with the finger across the entire distance of travel, it is set correctly. (Note: The newer, version 2, design makes all of this unnecessary as the motor is spring loaded therefore keeping the pinion in intimate contact with the rack at all times - the rack should never need adjustment unless the free travel distance of the pivoting motor mount is exceeded.)

Axis Mechanism (backlash range: ≥ 5, but ≤ 15 encoder counts):
On the Axis mechanism adjustment is accomplished by loosening the pinch clamp screw on the side of the back carriage plate and rotating the eccentric bushing in a direction so that the pinion is moved closer to the gear. The direction to rotate can be determined by observing the back edge of the eccentric bushing where it comes through the back side of the plate and determining what rotation will place a thinner portion of the eccentric nearer the gear/pinion interface. Once again, moving and checking the backlash while rotating the axis through its entire travel is necessary to ensure no binding. If there is a point found where no backlash is perceptible by feeling with the finger, it is too tight.

"Z" or Bevel Mechanism (backlash range: ≥ 0, but ≤ 5 encoder counts):
On the "Z" or Bevel mechanism, (version 1, original design only), adjustment is accomplished by loosening one or both of the screws holding the motor clamp to the pivot arm and moving the pinion closer to the Stylus rack. The newer Bevel mechanism, version 2, utilizes an adjustable motor mount to

facilitate backlash adjustment. On this motor mount there are two set screws located on the top edge of the bracket. The front-most screw raises the motor while the rear-most screw lowers the motor. More importantly, the two screws operate against each other – so-called jam-screws. In other words the front screw must be loosened in order to move the motor downward using the rear screw **or** the rear screw must be loosened in order to move the motor upward using the front screw. Once the backlash is set properly, the screws should be tightened against each other in order to lock into position. This is done by alternately turning each screw clockwise by a very small amount (1/32 – 1/16 turn) until both are reasonably tight.

Making this adjustment is relatively easy however getting it right is very critical and may be tedious as the backlash on this pinion needs to be nearly non-existent. The test for proper adjustment is to have the backlash be barely perceptible over its entire range of motion while having the stylus able to fall back unaided fully against its stop at the back end of the pivot arm under its own weight (gravity). If it can do this repeatedly and there is almost no backlash then the adjustment is probably OK.

"R" or Size Mechanism (backlash range: ≥ 0, but ≤ 50 encoder counts):

On the "R" or Size mechanism there is currently no convenient backlash adjustment. Luckily however the mechanism is somewhat forgiving as to servo buzz. That is not to say it does not happen. If it does the only available means to alter the backlash is to tilt the motor in its clamp to bring the pinion a little closer to the arc gear. Admittedly this is not very scientific but it has helped on numerous machines. Another thing that may be observed is that the backlash does not stay constant as the arc gear is moved from one end to the other and is usually greater near the upper end of the gear. This has not been shown to be a significant problem and there is no adjustment for it short of bending something which is not advised.

2. Communications

It is understandable that communication problems could be caused by a multitude of problems. There are, however, a couple of things that can be done to help diagnose the problem. If the host is operating in a Windows environment, there is most likely a program available called Hyper terminal. It will likely be found under Programs/Accessories. Close down Visual Lab and start Hyper terminal. When it opens, you will be prompted to name a new connection. Enter an arbitrary name like "4T" and press OK. You'll then be prompted what to connect to. Here you'll need to use the drop-down box or enter the port to which the 4T is connected on the back of the PC, such as "Com1" or "Com2" - then press OK. You'll then be prompted to enter the port properties. These should be set at "9600", "8", "none", "1", "none" - then press OK. You now should be connected to that port. The left-most field in the status bar at the bottom of the window should say "Connected" (with the counting elapsed time). This window will now display any data that is transmitted on the Transmit line of the Com1 (Host) port of the 4T. The Tracer should have the communication setup configured to "Host". If a trace is done and sent the trace data should appear as a column of four adjacent ASCII digits (numbers) along the left side of the window. If there are any extraneous characters or if the data appears to be random gibberish, then the communication is corrupted and the communication problem lies with what the Tracer is transmitting. This would include the Tracer itself and the cable to the PC Com port.

If the Tracer is at fault, the following things could be contributing to the problem. A bad communication cable, a bad Com1 cable from the controller board to the back of the case, Com port jumpers set improperly on the controller board, a bad controller board, or a short somewhere in the mechanism.

A bad communication cable:

The most straight forward way to diagnose the cable is to swap it with another known good cable. Short of doing this, one could check the continuity of the cable pin-to-pin for shorts or opens.

A bad Com1 cable from the controller board to the connector on the back of the case:

Diagnosing this would be the same as above. This cable uses IDC connectors on ribbon cable and it has been known to have shorts at one of the connectors. This can easily be discovered with an Ohmmeter or continuity checker. Note: The 9 pin D-sub connector does not correlate one-to-one with the 10 pin IDC connector.

Com port jumpers set improperly on the controller board:

These jumpers are located on the controller board adjacent to the left of each of the Com port connectors. The jumpers for Com1 must be aligned so that the two left pins are connected and the two right pins are connected. The jumpers for Com2 (barcode) must be aligned so that the two rear pins are connected and the two front pins are connected. If they do not have this alignment pull them off from the pins and realign.

A bad controller board:

This could be caused by a variety of problems and cannot be completely diagnosed in the field. If a bad controller board is the conclusion by virtue of ruling out all other possibilities, then it will have to be replaced and the bad board sent back to the factory.

A short somewhere in the mechanism:

This problem has been known to manifest itself in a variety of ways, one of which has been communication problems. Shorts in the mechanism have almost always been found as one of the motor leads touching the case of the motor or the motor mounting bracket. This can be diagnosed by checking

for unwanted continuity between some part of the R/L carriage and one of the motor leads on each motor. Motor leads are easily accessible on the two interface boards - one mounted to the axis assembly (52224) and the other mounted to the side of the R/L carriage (52223). With the unit turned off, check for continuity by placing one meter probe on a metal part of the carriage and place the other probe on one of the 4 outside corner pins of each of the motor connectors, (pins 1, 2, 9 or 10). These are accessible on the back side (solder side) of the boards. No continuity can exist when measured in this manner. If continuity does exist then that motor is shorted to the case and should be repaired or replaced.

3. Messages

The following list contains the exact text of all messages displayed by the 4T, describes the circumstances under which each message occurs, and suggests remedies. Beginning with version 1.14, each message is identified by the letter "E" (for error) or "W" (for warning) followed by a message number. Error messages identify situations which require user action. Warning messages identify situations which may sometimes require action, depending on specific circumstances. These messages are current with version 1.17.

Messages—Numbering for Software Prior to Version 1.22

E005: An invalid entry has been made
> An attempt has been made to enter 0 (zero) as the job#. The job# must be 1 or greater.

E010: An entry must be made
> The user has not entered a required value, or has cleared the value in a field and then pressed ENTER before entering a new value.

E015: Out of range (xxxxx to xxxxx)
> The user has entered a numeric value which is either too large or too small. The allowed range is shown in parentheses.

E020: Job storage is full
> The user is attempting to store job data when the maximum 120 jobs are already stored. One or more stored jobs must be deleted, or the 4T should be set up to automatically delete the oldest job whenever there is an attempt to store a new job into a full job store space.

E025: Job# not found
> The user has requested display of a job which is not in the 4T job store. The job may never have been traced or it may have been deleted. If the 4T is configured to send jobs to a host, these jobs will not also be stored in the 4T. After they are sent to the host they can no longer be viewed on the 4T.

E030: No jobs in storage
> The user has attempted to display, edit or delete job data when no jobs are in the 4T job store. Repeated inability to store jobs may indicate that the data storage EPROM chips (positions U4 and U7) are not properly installed. If the 4T is configured to send jobs to a host, these jobs will not also be stored in the 4T. After they are sent to the host they can no longer be viewed on the 4T.

E035: Job# already exists
> The user is attempting to trace an object using a job# which already exists in the 4T job store.

E040: Can not delete, Job protected
> The user is attempting to delete a protected job. The job must first be re-saved as unprotected before it can be deleted.

E045: Password is not correct
> The user has entered the incorrect password when accessing a password-protected function. Press CLEAR and carefully re-enter the password. Check with Lab Management whether the password has been changed. If the password has been forgotten, contact Optronics Technical Support.

E050: Radial change limit exceeded
> The 4T trace data is "too irregular" or does not form a continuous curve. This may be caused if the stylus loses contact with the object, or if the object or machine is jarred during the trace, or there is some interference with the stylus arm.

E055: Problem moving between eyes
> Internal sensors indicate that the carriage has not moved to the desired full-left or full-right position. Check any obstructions to carriage movement. Use the Diagnostic Screen to verify carriage motor, encoder, and sensor operation. Possible sensor problems: (1) Incorrect sensor alignment with magnet (2) Magnet missing (3) Incorrect magnet polarity (red dot out) (4) Broken sensor on board.

E060: Stylus dropout detected
> The stylus has lost contact with the trace object. Verify that trace object does not have any irregularities that are "kicking" the stylus away (such as an open eyewire in a frame or raised lettering on the face of a pattern.) Try a different frame setting. Adjust R and Z bias forces. Reduce trace speed.

E065: Insufficient data collected
> The AXIS has stopped rotating before the required 400 trace data points have been collected. This may be caused by a physical obstruction, misadjustment which causes the axis to bind, motor failure, encoder failure, or a wiring problem.

E070: No frame detected
> At the start of a frame trace, the stylus has moved too far without detecting a frame. Verify that a frame is properly mounted. The frame BEVEL may require calibration. If this message occurs when tracing a pattern or lens, the sensor detecting when the pattern holder is mounted may require adjustment. Use the SCREEN key to temporarily override this sensor.

E075: No pattern/lens detected
> At the start of a pattern/lens trace, the stylus arm has moved too far inward without detecting a pattern or lens. Verify that a pattern or lens is properly mounted. The minimum pattern/lens diameter is about the same as the mounting post on the pattern holder.

E080: Wrong pattern or bad orientation
> The calibration pattern required for pattern/lens axis calibration is not properly mounted. The calibration pattern has a semi-circle on one side and two flat edges meeting in a point on the other side. It must be mounted so that the point faces towards the right side of the 4T. This message occurs when the 4T does not detect the two flat edges and the point at the expected locations.

E085: Arcnet hardware failure
> The arcnet circuitry in the 4T failed to respond during the power-up sequence. This can occur if the arcnet happens to be in the process of a network reconfiguration while the 4T is initializing, or there may be a hardware problem in the 4T itself. Disconnect the 4T arcnet cable and cycle power off and then on again. If the message does not recur, then the problem originates elsewhere in the network, outside the 4T. If failure still occurs, replace processor board.

E090: Arcnet host busy
> The 4T has initiated arcnet communications with a host but has not received the expected response. The host may actually be busy or "off line" temporarily. The problem can be caused by

failure of any part of the network, including computers, optical machines, cables, taps, hubs, gateways, etc. It may be possible to isolate the problem by disconnecting other devices from the network, or by trying a separate cable between the 4T and the host.

E095: Arcnet duplicate ID

This message occurs when the 4T's arcnet ID is detected elsewhere on the network. Either the ID of the 4T must be changed, or the ID of the other offending device(s).

E100: Arcnet receive timeout

The 4T has initiated arcnet communications with another device but has not received any response within the allotted time. The problem can be caused by failure of any part of the network, including computers, optical machines, cables, taps, hubs, gateways, etc. It may be possible to isolate the problem by disconnecting other devices from the network, or by trying a separate cable between the 4T and the device with which it is trying to communicate.

E105: Undefined error occurred

The 4T has reached some unexpected state or performed an illegal action from unknown causes. Cycle power off and then on again.

W110: Verify stylus is retracted

The user has pressed the STOP softkey interrupting a trace in progress. Manually home the stylus arm if required, then press CLEAR.

E115: OMA host requiring initialization

This message occurs when a host requires a level of initialization not supported by the 4T. This is a problem in the host; the 4T supports all initialization modes which the standard requires for a device of its type.

E120: OMA receive timeout

During an OMA communications session, the 4T has not received a response within the allotted time. The other device may be unavailable or (in the case of a computer) overloaded. There may be a cable system problem, or mis-matched communication parameters between the 4T and the other device.

E125: OMA NAK confirmation

An OMA device has received a message from the 4T which it did not "understand" or to which it is unable to respond. The problem may be temporary, i.e., the device may be temporarily too busy to respond. The 4T may be requesting a level of service which the other device can not supply. The OMA configuration of the other device should be checked. Because the OMA "standard" is not yet in its final form, it is possible that the OMA support in the 4T and in the other device conform to different versions of the "standard."

E130: An unknown OMA error occurred

The 4T is unable to interpret data received from another device and unable to reset both itself and the other device to a known state. The most likely causes for this problem are electrical "noise" in the cable system, poor grounding, defective cable, or mis-matched communications setup parameters.

E135: Problem reading Setup data
 See E160.

E140: Problem saving Setup data
 See E160.

E145: Problem reading Job data
 See E160.

E150: Problem saving Job data
 See E160.

E155: Problem reading Job Index Table
 See E160.

E160: Problem saving Job Index Table
 This message occurs when the 4T detects an error while attempting to read from or write to its data EPROM memory. Cycle power off and then on. If the problem persists, there is no user remedy other than changing EPROM's.

W165: Using default setup values
 During power-up, the 4T was unable to read setup data (calibration values and configuration parameters) from the data EPROMs. This message is expected when first turning on a unit that has just been upgraded from some version prior to 1.04. If this is not the situation, check that the data EPROM chips are properly installed at locations U4 and U7.

E170: Problem deleting Job data
 When deleting a job from its data EPROMs, the 4T overwrites the job data with zero's. This message occurs when the 4T detects that the data has not been overwritten. Check that the data EPROMs are properly installed at positions U4 and U7.

E175: Wrong calibration template
 The standard frame calibration plate has one round hole on the right side and a larger hole with a flat section on the left side. The flat section is at the bottom of the hole. At one time, a plate was used in which the flat section was not at the bottom of the left hole. This message is displayed if the 4T detects that one of these obsolete plates has been mounted.

W180: Axis was not auto calibrated
 For frames, patterns and rimless lenses, the 4T can be set so that when the size is calibrated, the axis is also calibrated automatically. In the MANUAL setting, only the size is calibrated. This message appears after a manual calibration to remind the user that the axis was not re-calibrated. This message does not indicate an "error" unless the user intended to calibrate both size and axis and the use of MANUAL mode was unintended.

W185: Changes have not been saved
 This message appears if there have been changes to setup data and the user is about to leave the setup menu without saving these changes. Press the SAVE softkey if it is desired that the changes be saved. Otherwise, press the EXIT key to leave the setup menu without saving the changes.

E190: System Error. Call Optronics.
> The 4T has failed its diagnostic self-test during power-on initialization because its program has become corrupted. The program EPROMS in positions U2 and U5 need to be replaced.

E195: Stylus not positioned properly
> In calibrating the BEVEL position, the stylus has not been properly pulled out and placed in the calibration position. The user must manually place the stylus for this calibration.

E200: Rotation fault – trace aborted
> At the start of each trace, the stylus rotates to a near vertical position. This message indicates that this rotation has not taken place. Axis movement may be obstructed or require adjustment.

W205: Data bump at start of trace
> The 4T traces several extra points at the end of a trace which overlap the first several points. This message is issued if the radius and Z values in this overlap region do not match the corresponding values from the start of the trace. The usual cause is that the stylus is not fully seated in the bevel at the start of the trace. Prior to issuing this message, the 4T attempts to re-trace the object. Re-calibrate the bevel.

Messages—Numbering for Software Version 1.22 and Later

E100: Undefined error occurred
> The 4T has reached some unexpected state or performed an illegal action from unknown causes. Cycle power off and then on again.

W105: Verify stylus is retracted
> The user has pressed the STOP softkey interrupting a trace in progress. Manually home the stylus arm if required, then press CLEAR.

W110: Using default setup values
> During power-up, the 4T was unable to read setup data (calibration values and configuration parameters) from the data EPROMs. This message is expected when first turning on a unit that has just been upgraded from some version prior to 1.04. If this is not the case, check that the data EPROM chips are properly installed at locations U4 and U7.

W115: Axis was not auto calibrated
> For frames, patterns and rimless lenses, the 4T can be set so that when the size is calibrated, the axis is also calibrated automatically. In the MANUAL setting, only the size is calibrated. This message appears after a manual calibration to remind the user that the axis was not re-calibrated. This message does not indicate an "error" unless the user intended to calibrate both size and axis and the use of MANUAL mode was unintended.

W120: Changes have not been saved
> This message appears if there have been changes to setup data and the user is about to leave the setup menu without saving these changes. Press the SAVE softkey if it is desired that the changes be saved. Otherwise, press the EXIT key to leave the setup menu without saving the changes.

E200: Job storage is full
> The user is attempting to store job data when the maximum 120 jobs are already stored. One or more stored jobs must be deleted, or the 4T should be set up to automatically delete the oldest job whenever there is an attempt to store a new job into a full job store space.

E205: Job# not found
> The user has requested display of a job which is not in the 4T job store. The job may never have been traced or it may have been deleted. If the 4T is configured to send jobs to a host, these jobs

will not also be stored in the 4T. After they are sent to the host they can no longer be viewed on the 4T.

E210: No jobs in storage

The user has attempted to display, edit or delete job data when no jobs are in the 4T job store. Repeated inability to store jobs may indicate that the data storage EPROM chips (positions U4 and U7) are not properly installed. If the 4T is configured to send jobs to a host, these jobs will not also be stored in the 4T. After they are sent to the host they can no longer be viewed on the 4T.

E215: Radial change limit exceeded

The 4T trace data is "too irregular" or does not form a continuous curve. This may be caused if the stylus loses contact with the object, or if the object or machine is jarred during the trace, or there is some interference with the stylus arm.

E300: An invalid entry has been made

An attempt has been made to enter 0 (zero) as the job#. The job# must be 1 or greater.

E305: An entry must be made

The user has not entered a required value, or has cleared the value in a field and then pressed ENTER before entering a new value.

E3110: Job# already exists

The user has requested the creation or saving of a job with a number that is already in the 4T job store.

E315: Can not delete, Job protected

The user is attempting to delete a protected job. The job must first be re-saved as unprotected before it can be deleted.

E320: Password is not correct

The user has entered the incorrect password when accessing a password-protected function. Press CLEAR and carefully re-enter the password. Check with Lab Management whether the password has been changed. If the password has been forgotten, contact Optronics Technical Support.

E325: Out of range (xxxxx to xxxxx)

The user has entered a numeric value which is either too large or too small. The allowed range is shown in parentheses.

E330: No frame detected

At the start of a frame trace, the stylus has moved too far without detecting a frame. Verify that a frame is properly mounted. The frame BEVEL may require calibration. If this message occurs when tracing a pattern or lens, the sensor detecting when the pattern holder is mounted may require adjustment. Use the SCREEN key to temporarily override this sensor.

E335: No pattern/lens detected

At the start of a pattern/lens trace, the stylus arm has moved too far inward without detecting a pattern or lens. Verify that a pattern or lens is properly mounted. The minimum pattern/lens diameter is about the same as the diameter of the mounting post on the pattern holder.

E340: Wrong pattern or bad orientation

The calibration pattern required for pattern/lens axis calibration is not mounted or was mounted backwards. The calibration pattern has a semi-circle on one side and two flat edges meeting in a point on the other side. It must be mounted so that the point faces towards the right side of the 4T. This message occurs when the 4T does not detect the two flat edges and the point at the expected locations.

E345: Wrong calibration template

The standard frame calibration plate has one round hole on the right side and a larger hole with a flat section on the left side. The flat section is at the bottom of the hole. At one time, a plate was used in which the flat section was not at the bottom of the left hole. This message is displayed if the 4T detects that one of these obsolete plates has been mounted.

E401: Arcnet hardware failure

The arcnet circuitry in the 4T failed to respond during the power-up sequence. This can occur if the arcnet happens to be in the process of a network reconfiguration while the 4T is initializing, or there may be a hardware problem in the 4T itself. Disconnect the 4T arcnet cable and cycle power off and then on again. If the message does not recur, then the problem originates elsewhere in the network, outside the 4T. If failure still occurs, replace processor board.

E402: Arcnet duplicate ID

This message occurs when the 4T's arcnet ID is detected elsewhere on the network. Either the ID of the 4T must be changed, or the ID of the other offending device(s).

E407: Arcnet timeout - host busy

The 4T has initiated arcnet communications with a host but has not received the expected response. The host may actually be busy or "off line" temporarily. The problem can be caused by failure of any part of the network, including computers, optical machines, cables, taps, hubs, gateways, etc. It may be possible to isolate the problem by disconnecting other devices from the network, or by trying a separate cable between the 4T and the host.

E419: No Arcnet connection detected

The 4T is not connected to an operating network.

E420: Arcnet timeout – no host reply

The Arcnet connection timed out before establishing communications due to what the 4T interprets as the host being unavailable. Specifically, the 4T has initiated Arcnet communications with another device but has not received any response within the allotted time. The problem can be caused by failure of any part of the network, including computers, optical machines, cables, taps, hubs, gateways, etc. It may be possible to isolate the problem by disconnecting other devices from the network, or by trying a separate cable between the 4T and the device with which it is trying to communicate.

E425: OMA host requiring initialization

This message occurs when a host requires a level of initialization not supported by the 4T. This is a problem in the host; the 4T supports all initialization modes which the standard requires for a device of its type.

E430: OMA receive timeout

During an OMA communications session, the 4T has not received a response within the allotted time. The other device may be unavailable or (in the case of a computer) overloaded. There may be a cable system problem, or mis-matched communication parameters between the 4T and the other device.

E435: OMA NAK confirmation

An OMA device has received a message from the 4T which it did not "understand" or to which it is unable to respond. The problem may be temporary, i.e., the device may be temporarily too busy to respond. The 4T may be requesting a level of service which the other device can not supply. The OMA configuration of the other device should be checked. Because the OMA "standard" is not yet in its final form, it is possible that the OMA support in the 4T and in the other device conform to different versions of the "standard."

E440: An unknown OMA error occurred

The 4T has lost synchronization and cannot re-establish the OMA communication. Specifically, the 4T is unable to interpret data received from another device and unable to reset both itself and the other device to a known state. The most likely causes for this problem are electrical "noise" in the cable system, poor grounding, defective cable, or mis-matched communications setup parameters.

E515: Problem reading Setup data

Internal memory error: Contact Optronics Technical Support.

E520: Problem saving Setup data
    Internal memory error: Contact Optronics Technical Support.
E525: Problem reading Job data
    Internal memory error: Contact Optronics Technical Support.
E530: Problem saving Job data
    Internal memory error: Contact Optronics Technical Support.
E535: Problem reading Job Index Table
    Internal memory error: Contact Optronics Technical Support.
E540: Problem saving Job Index Table
    This message occurs when the 4T detects an error while attempting to read from or write to its data EPROM memory. Cycle power off and then on. If the problem persists, there is no user remedy other than changing EPROM's.
E545: Problem deleting Job data
    When deleting a job from its data EPROMs, the 4T overwrites the job data with zeros. This message occurs when the 4T detects that the data has not been overwritten. Check that the data EPROMs are properly installed at positions U4 and U7.
E600: System Error. Call Optronics.
    The 4T has failed its diagnostic self-test during power-on initialization because its program has become corrupted. The program EPROMS in positions U2 and U5 need to be replaced.
E605: Problem moving between eyes
    Internal sensors indicate that the carriage has not moved to the desired full-left or full-right position. Check any obstructions to carriage movement. Use the Diagnostic Screen to verify carriage motor, encoder, and sensor operation. Possible sensor problems: (1) Incorrect sensor alignment with magnet (2) Magnet missing (3) Incorrect magnet polarity (red dot out) (4) Broken sensor on board.
E610: Stylus dropout detected
    The stylus has lost contact with the trace object. Verify that trace object does not have any irregularities that are "kicking" the stylus away (such as an open eyewire in a frame or raised lettering on the face of a pattern.) Try a different frame setting. Adjust R and Z bias forces. Reduce trace speed.
E615: Insufficient data collected
    The AXIS has stopped rotating before the required 400 trace data points have been collected. This may be caused by a physical obstruction, misadjustment which causes the axis to bind, motor failure, encoder failure, or a wiring problem.
E620: Stylus not positioned properly
    In calibrating the BEVEL position, the stylus has not been properly pulled out and placed in the calibration position. The user must manually place the stylus for this calibration.
E625: Rotation fault – trace aborted
    At the start of each trace, the stylus rotates to a near vertical position. This message indicates that this rotation has not taken place as expected. Axis movement may be obstructed or require adjustment.
W630: Data bump at start of trace
    The 4T traces several extra points at the end of a trace which overlap the first several points. This message is issued if the radius in this overlap region do not match the corresponding values from the start of the trace. The usual cause is that the stylus is not fully seated in the frame bevel at the start of the trace. Prior to issuing this message, the 4T attempts to re-trace the object. Re-calibrate the bevel.