Table of Contents

6) Troubleshooting
a) Calibration Errors
b) C-frame Errors
c) Computer Inoperable
d) Computer Slow or Locked Up
e) Indicator Light(s) Inoperable
f) Internal Sample(s) Inoperable
g) Keyboard Inoperable
h) Length or Weight Errors
i) No AC Power
j) Printer or Report Errors
k) Shutter Inoperable
l) Software Inoperable
m) Thickness Measurement Errors
n) Video Monitor Inoperable

7) Maintenance
a) Cable Replacement
b) Cleaning
c) Computer I/O Board Replacement
d) Detector Head Inspection
e) Drive Chain Adjustment
f) F.E.T. Replacement
g) Fuse Replacement
h) ISOcal™
i) ISOcheck™
j) Keyboard Door Hinge Replacement
k) Keyboard Replacement
l) Limit Switch Replacement and Adjustment
m) Main Computer Board Replacement
n) Manual Calibration
o) Opto22 Module Replacement
p) Photocell Replacement
q) Power Supply Replacement
r) Pre-Amp Board Replacement
s) Printer Replacement
t) Shutdown
u) Tachometer Replacement
v) Uninterruptible Power Supply (UPS) Replacement
w) Video Monitor Replacement

8) Schematics

400.050) Main Electronics Cabinet schematic
400.100) Block Diagram
400.150) C-Frame Assembly
400.151) Oscillating C-Frame Clearances
400.152) Electric/Manual C-Frame Clearances
400.200) AC Terminal Strip Wiring
400.250) DC Power Supply Wiring
400.300) C-frame Drive Schematic
400.400) Source Head Interconnect
400.450) Source Head Schematic
400.500) Detector Head Interconnect
400.550) Detector Head Schematic
400.600) Tachometer Photocell Interconnect
400.700) Opto22 Module Layout
400.800) Multifunction Board Schematic
400.850) Multifunction Board Layout

9) Appendices

a) Background Radiation
b) Product Menu Examples
c) System Messages
d) Replacement Parts
e) S.P.C. Definitions
f) Specifications
g) Parameter File

<u>Introduction</u>
SAC – 11/5/03

Introduction

The AGT400 Thickness Gauge & S.P.C. Reporting Manual is based on two assumptions. First, we assume that the user has a basic understanding of common Microsoft Windows® operating systems. Second, all information contained herein is based on our current version of the gauge. Not all information will be backwards compatible and applicable to all of the oldest gauges currently operating in the field.

Additional copies of the AGT400 System Manual are available for a nominal fee from Advanced Gauging Technologies (A.G.T.) by ordering part number MAN-400.

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Radiation Safety
SAC – 12/18/03

General Requirements

The AGT400 Thickness Gauge is engineered to safely measure material thickness in a harsh industrial environment. It uses a sealed radioactive source as a source of gamma radiation. This energy source is contained in a stainless steel capsule and housed in the Source Head Assembly. This assembly is equipped with a shutter and shutter position indicators. The Source Head is positioned on one side of the measured material and the Detector Head is positioned on the other side. Thickness readings are based on the amount of radiation penetrating the material. The amount of radiation measured at the detector is inversely proportional (in a non-linear fashion) to the thickness of the material being measured. The gauge is designed to withstand the normal conditions of the environment on a processing line, and incorporates a number of safety features. The purpose of this section of the System Manual is to make the user aware of the proper operating procedures and safety features of the AGT400 Thickness Gauge.

In the United States, the receipt, possession, use and transfer of this gauge are subject to General License requirements of the U.S.N.R.C., 10CFR31.5 or the equivalent regulations of an Agreement State. This means that a Federal or State regulation is already in place that permits you to acquire and use radioactive material for measuring purposes when it is incorporated into a gauge designed for this specific purpose, and distributed by an authorized vendor, such as Advanced Gauging Technologies, L.L.C.

In Canada, the receipt, possession, use and transfer of this gauge are subject to the regulations and licensing procedures of the Canadian Nuclear Safety Commission (C.N.S.C.). This means that you must obtain a license from C.N.S.C. which permits you to acquire and use radioactive material for measuring purposes when it is incorporated into a gauge designed for this specific purpose, and distributed by an authorized vendor, such as Advanced Gauging Technologies, L.L.C.

In Mexico or other countries, contact your local authorities for the applicable rules and regulations regarding the receipt, possession, licensing and use of radioactive material.

You are permitted to use this gauge for measurement, but you must comply with all of the respective license requirements. A user is not permitted to install, maintain or repair the measuring head containing the source capsule. Radiation surveys, leak testing and shutter operational checks must also be performed by licensed individuals. The source may not be abandoned, transferred or disposed of to anyone other than an authorized and licensed individual. A.G.T. can provide all of these services if the need should arise.

Radiation Source

The model AGT400 thickness gauge contains a sealed source of one (1) Curie of Americium 241 (Am241). This source is in the form of a ceramic disc, and is encapsulated in a stainless steel capsule. The only significant radiation which emerges from this capsule is a 60 keV gamma ray. The capsule has been designed so that it should not leak, and it is rated to withstand temperatures from –40 to 800 degrees Celsius.

Shutter Mechanism

The AGT400 Source Head contains a heavy metal (tungsten) shutter to reduce the radiation to permissible levels when the gauge is not in use. This shutter is moved to the open and closed positions by an electrical solenoid. The shutter solenoid is spring-loaded in such a way that if electrical power is lost the shutter will automatically return to the closed position. The shutter can be locked in the closed position by a key switch in the Electronics Cabinet of the gauge. The shutter cannot be locked in the open position and the key can only be removed in the LOCK position.

Visible On/Off Indicators

Three visible indicators of the shutter status are provided - two electrical and one mechanical. On the Operator's Video Monitor, a green indicator shows when the shutter is closed, and red indicator shows when the shutter is open. Visible from the measuring heads, a green light indicates shutter closed, and a red light indicates shutter opened. Through a viewing window in the top surface of the Source Head, a mechanical indicator shows green when the shutter is closed and red when the shutter is open.

Tests and Records Required by Law

As an AGT400 gauge user, there are several tests that you must ensure are completed, and records you must keep. Remember that only a specifically licensed person can do these tests. The tests include:

1. Leak tests of the source head - this test <u>must be done at installation and thereafter at intervals not to exceed six (6) months.</u>

2. Shutter tests of the mechanical and radiation shielding function of the shutter, and the shutter status indicators. These tests <u>must be done at installation and thereafter at intervals not to exceed six (6) months.</u>

You must keep records of these tests, including the dates, the names and the addresses of the persons performing the tests. You should also keep records of the date you received your gauge, and of any incidents in which the gauge was damaged. If you transfer or dispose of your gauge to Advanced Gauging or another party, you must keep a record of the date of transfer, and the name and address of the party.

Background Radiation

All of us receive some level of background radiation every day. Refer to the Background Radiation page in the Appendices section of this manual for a chart of common exposure levels to background radiation.

Procedure in the Event of Damage to the Source Head

In the event of damage to the Source Head, the shutter mechanism, or the shutter status indicators, immediately suspend operation of the gauge until a properly licensed person can make repairs. If the damage is severe the immediate area should be cleared and warning signs posted. Persons who may be contaminated should wash themselves. Do not try to repair or dispose of the Source Head - only a specifically licensed person is permitted to do this. You may need to report such an incident to your local regulatory agency.

The Radiation Safety Officer at Advanced Gauging should be contacted in the event of damage to the Source Head. The telephone number is (614) 882-0761.

If there is damage to or a failure of the shutter mechanism or indicators, or any indication of such damage or failure, or upon the detection of .005 microcuries or more of removable radioactive material you should immediately suspend operation of the gauge until it has been repaired by A.G.T. or another licensed individual. You must furnish a timely report to the appropriate agency, depending on your location. See the Radiation Safety Manual provided with your AGT400 Thickness Gauge & S.P.C. Reporting System for additional information. If you are still not sure who to contact, Advanced Gauging can help you determine the proper agency.

Safety in Using the AGT400

To measure thickness, the AGT400 directs a strong beam of gamma radiation from the source head to the detector head. The collimator in the source head keeps the beam in the gap and between the measuring heads. This serves to limit the amount of stray radiation. Certain safety precautions should be followed in using the gauge. These include:

1. Do not place any part of your body between the measuring heads when the shutter is open.

2. Do not remain within three feet of the measuring head for extended periods of time when the shutter is open. If it is necessary to remain within three feet with the shutter open, contact Advanced Gauging for additional instruction.

3. When the gauge is not in use, keep the shutter closed. With the shutter closed the dose rates are reduced to permissible levels at points outside the air gap and between the heads.

4. If work is being done in the vicinity of the gauge, lock the shutter in the closed position by removing the key from the key lock switch in Electronics Cabinet. This insures that no one will inadvertently open the shutter when people are in the area.

5. Ensure the radiation instruction label on the source head is visible. This label should not be covered or removed, and must remain legible.

6. **Do not, under any circumstances, open the Source Head**. Only a person specifically authorized on a radioactive materials license to perform such maintenance or service may do this. Under normal operating conditions no maintenance is required for the Source Head. Advanced Gauging can do repairs or maintenance on the Source Head.

7. Do not abandon, dispose of or transfer this device to anyone other than an authorized, licensed individual.

Theory of Operation
SAC – 10/3/03

The AGT400 Thickness Gauge & S.P.C. Reporting System operates according to the scientific principle that a low power radiation beam is absorbed by matter at a rate varying with its composition and thickness. As the moving material passes between the radiation source and detector, thickness variations cause measurable changes in the amount of radiation reaching the detector head. The system is calibrated based on these variations, using predetermined factors such as the gamma ray absorption coefficient of the material being measured. This permits the AGT400 to provide continuous, high speed, non-contact, accurate and reliable thickness measurements.

Installation

Installation Instructions

1) If replacing or upgrading an existing thickness gauge, remove the old equipment including:
   a. electronics cabinet
   b. cables from the electronics cabinet to C-frame junction box
   c. Reporting Package including: computer, monitor, printer, keyboard, junction box, and associated wiring (if applicable)
   d. cables from the electronics cabinet to Reporting Package junction box (if applicable)
   e. C-frame (if being replaced)

2) Install the new C-frame (if applicable). The C-frame should be solidly mounted with the source head (smaller unit) on the bottom, and the detector head (larger unit) on the top. In this configuration, the C-frame should be positioned so the strip passes within the bottom third of the gap between the measuring heads (refer to schematic #400-100). For example, if the air gap on your C-frame is 6 inches between the measuring head nose pieces, the passline (under normal tension) should be approximately two (2) inches above the source head. There is a centerline painted on the I-Beam of the AGT400 C-frame. **This centerline should be positioned in the center of the line, to allow the C-frame to travel across the entire strip**.

3) Lay conduit per the attached Interconnect Diagram.

4) Locate and mount the AGT400 system cabinet so it meets the following criteria:
   a. adequate space in both front and rear for access doors to be opened 90 degrees
   b. easily accessible by Operator
   c. in convenient view of the Operator, but not blocking his view of the line

5) Permanently mount the light fixture assemblies as follows:
   a. green and red shutter status indicators must be visible from the C-frame
   b. amber and blue classifier indicators should be visible from the Operator station
   c. all four light fixture assemblies may be mounted together on top of the AGT400 system cabinet, as long as both conditions above are met

6) If the system includes a remote digital display, cut a mounting hole (1.772"H x 3.622"W) in the panel where the display is to be mounted. Install the remote digital display in the new mounting hole.

7) Mount the AGT400 tachometer on a roll that turns whenever the strip is moving, and will have sufficient wrap to eliminate slippage. The closer the tachometer is to the C-frame, the more closely our measured thickness will align with the footage counted.

8) Pull two individual AC line feeds into the AGT400 system cabinet. There will need to be two separate dedicated 120VAC, 60 Hz. lines, originating from individual 20 amp circuit breakers, which are <u>completely free from line drive inference</u>, etc. **The AC line feeds must have solid earth grounds, and be completely free of noise, spikes, etc.** <mark>The AGT400 system will not function properly without good earth grounds and clean AC power.</mark> Both AC line feeds should pass through the AGT400 system cabinet floor, entering in the rear. Each one should be terminated in the form of a standard duplex receptacle. These receptacles should be mounted on the cabinet floor where indicated, on the **inside** of the cabinet.

9) Pull the source head cable (SH) through conduit, from the C-frame junction box to the AGT400 system cabinet. This cable should pass through the cabinet floor, entering in the right rear corner. Leave at least seven feet of cable inside the system cabinet. Note: this conduit may contain one or two other cables. See steps 11 and 12 below.

10) If the system has an electric or oscillating C-frame, pull the drive motor cable (DM) through the same conduit as in step 9, from the C-frame junction box to the AGT400 system cabinet. This cable should pass through the cabinet floor, entering in the right rear corner. Leave at least seven feet of cable inside the system cabinet.

11) If the system includes an oscillating C-frame, pull the photocell cable (PC) through the same conduit as in step 10, from the C-frame junction box to the AGT400 system cabinet. This cable should pass through the cabinet floor, entering in the right rear corner. Leave at least seven feet of cable inside the system cabinet.

12) Pull the detector head cable (DH) through conduit, from the C-frame junction box to the AGT400 system cabinet. <mark>The detector head cable should be in a separate conduit as shown in the interconnect diagram.</mark> This cable should pass through the cabinet floor, entering in the left rear corner. Leave at least seven feet of cable inside the system cabinet.

13) Pull the two light fixture cables (SL and CL) through conduit, from the light fixtures to the AGT400 system cabinet. These cables should pass through the cabinet floor, entering in the right rear corner. Leave at least seven feet of cable inside the system cabinet. Note: If the shutter lights are mounted on the C-frame, then the shutter light cable (SL) should be pulled in the same conduit as the source head cable (SH).

14) If the system has a remote digital display, pull the remote digital display cable (RD) through conduit, from the remote display location to the AGT400 system cabinet. This cable should pass through the cabinet floor, entering in the left rear corner. Leave at least seven feet of cable inside the system cabinet.

15) If the system has a remote video monitor, pull the remote monitor cable (RM) through conduit, from the remote monitor location to the AGT400 system cabinet. This cable should pass through the cabinet floor, entering in the right rear corner. Leave at least seven feet of cable inside the system cabinet. A 120VAC receptacle will need to be available at the location of the remote video monitor.

16) Pull the tachometer cable (TM) through conduit, from the tachometer to the AGT400 system cabinet. This cable should pass through the cabinet floor, entering in the left rear corner. Leave at least seven feet of cable inside the system cabinet. Plug the pre-assembled connector into the tachometer.

17) If the system includes Coil Mapping, pull the coil mapping cable (CM) through the conduit from the coil mapping jacks to the AGT400 system cabinet. This cable should pass through the cabinet floor, entering in the left rear corner. Leave at least seven feet of cable inside the system cabinet.

18) If the system includes Coil Mapping, mount the Coil Mapping jacks in electrical boxes at each of the possible inspection stations.

19) Terminate the source and detector head cables (SH and DH) in the C-frame junction box, as indicated in the Cable Terminations list. ==Be sure to leave the jumper wire between JTB2-6 and JTB2-7.==

20) If the system has an electric C-frame, terminate the drive motor cable (DM) in the C-frame junction box, as indicated in the Cable Terminations list.

21) If the system has an oscillating C-frame, terminate the photocell cable (PC) in the C-frame junction box, as indicated in the Cable Terminations list.

22) Terminate the shutter and classifier indicator light cables (SL and CL) in light fixture assemblies, as indicated in the Cable Terminations list.

23) If the system includes a remote digital display, terminate remote digital display cable (RD) at rear of remote digital display unit, as indicated in the Cable Terminations list.

24) If the system includes coil mapping, terminate the coil mapping cable (CM) at each coil mapping jack.

25) Determine where to locate the printer, which will be delivered at startup. The printer must be located within 45 feet of the AGT400 system cabinet, unless the Remote Printer option was purchased or a network card is to be used. The system printer requires a space that is at least 18" wide, 20" deep, and 18" high. Typically, the system printer is mounted inside the electronics cabinet. If an alternate location is selected, an additional hole will need to be cut in the cabinet, a 120VAC receptacle will need to be available at that location, and a printer enclosure should be used to extend printer life.

26) If replacing or upgrading an existing thickness gauge, ship all old electronics back to Advanced Gauging Technologies. This equipment comprises the old Electronics Cabinet and contents, Xycom workstation (GR200, 3500, 350 or 450 only), computer (GR100 only), and video monitor (GR100 only).

27) Ensure A.G.T. is scheduled to handle your AGT400 system startup. Please plan ahead, and <u>allow at least two weeks</u> advance notice.

28) Gather samples of all material types to be processed on the line. These samples should be approximately six to eight inches square and relatively flat. If Galvanized Steel or other coated materials are to be measured, at least one sample of each coating type and weight will be required. If measuring Stainless Steel or other non-coated materials, at least one sample of each alloy or grade is needed. The more samples that can be provided for the system startup, the better job our Field Service Engineers can do setting up the gauge to accurately measure each material type.

Cable Terminations

Source Head Cable (SH - see image below)
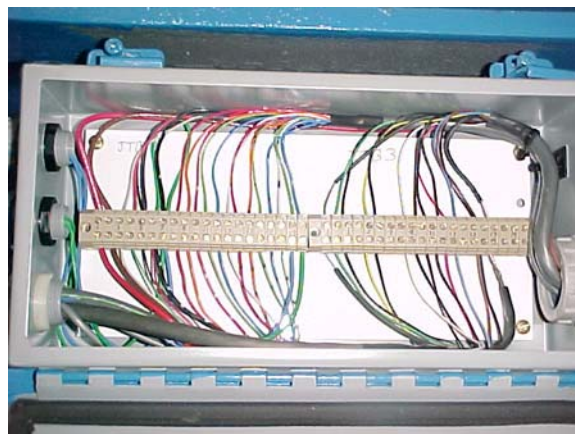(terminates on <u>upper or left</u> terminal block JTB-2 in C-frame junction box)
Terminal 7 - black wire <u>and</u> black wire with white stripe   +13.2 VDC power
Terminal 8 – red wire   spare
Terminal 9 - orange wire   shutter command
Terminal 10 – red wire with white stripe   spare
Terminal 11 - green wire   sample 1 command
Terminal 12 - blue wire   sample 2 command
Terminal 13 - white wire   shutter closed switch
Terminal 14 - red wire with black stripe   shutter open switch
Terminal 15 - orange wire with black stripe   sample 1 out switch
Terminal 16 - green wire with black stripe   sample 1 in switch
Terminal 17 - blue wire with black stripe   sample 2 out switch
Terminal 18 - white wire with black stripe   sample 2 in switch
Terminal 19 - green wire with white stripe   on sheet limit switch
Terminal 20 - blue wire with white stripe   off sheet limit switch

Detector Head Cable (DH – see image below)
(terminates on <u>lower or right</u> terminal block JTB-3 in C-frame junction box)
Terminal 1 - shield (in black/green twisted pair)   ground
Terminal 2 - green wire   high voltage
Terminal 3 - black wire (in black/green twisted pair)   high voltage return
Terminal 5 - yellow wire   spare
Terminal 6 - black wire (in black/yellow twisted pair)   ground
Terminal 9 - white wire   signal
Terminal 10 - black wire (in black/white twisted pair)   signal return
Terminal 11 - black wire (in black/red twisted pair)   spare
Terminal 12 - black wire (in black/blue twisted pair)   spare
Terminal 13 - red wire   +15VDC
Terminal 14 - blue wire   -15VDC
Terminal 16 - brown wire <u>and</u> black wire (black/brown twisted pair)   ground
Terminal 17 - five remaining shields (from all <u>except</u> black/green twisted pair)

Drive Motor Cable – (DM)
(terminates on <u>upper or left</u> terminal block JTB-2 in C-frame junction box)

Terminal 1 - red wire
Terminal 2 - black wire or brown wire

Photocell Cable (PC)
(terminates on <u>upper or left</u> terminal block JTB-2 in C-frame junction box)

Terminal 3 - white wire and 10KΩ pull-up resistor	off sheet photocell
Terminal 4 - red wire and 10KΩ pull-up resistor	on sheet photocell
Terminal 5 - black wire	DC ground
Terminal 6 - return for 10KΩ pull-up resistors	+13.2 VDC power

Shutter Status Indicator Light Cable (SL)
(terminates in green and red indicator light junction boxes)

white wire	green light
black wire	red light
green wire	common

Classifier Light Cable (CL)
(terminates in amber and blue indicator light junction boxes)

white wire	amber light
black wire	blue light
green wire	common

Remote Digital Display Cable (RD)
(terminates at rear of remote digital display)

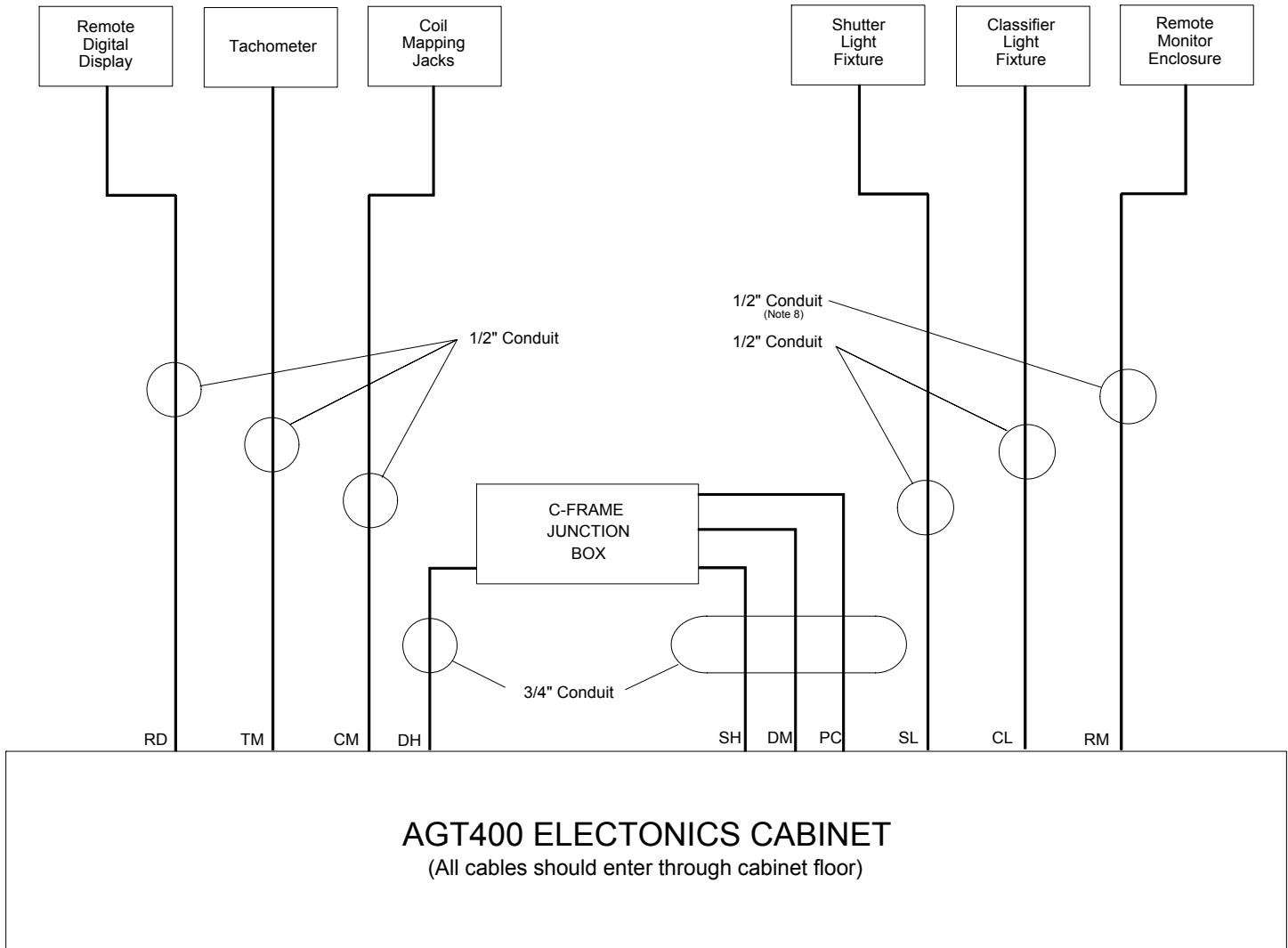|	
Terminal J1-1 - red wire	+13.2 VDC power
Terminal J1-2 - black wire	DC ground
Terminal J5-3 - green wire	signal return
Terminal J5-4 - white wire	thickness signal

AGT400 Interconnect Diagram

JPF - 12/3/03

| Remote Digital Display | Tachometer | Coil Mapping Jacks | | Shutter Light Fixture | Classifier Light Fixture | Remote Monitor Enclosure |

1/2" Conduit

1/2" Conduit
(Note 8)

1/2" Conduit

C-FRAME
JUNCTION
BOX

3/4" Conduit

RD   TM   CM   DH   SH DM PC   SL   CL   RM

AGT400 ELECTONICS CABINET
(All cables should enter through cabinet floor)

Note 1 - Two Separate 5 amp AC line feeds with good earth grounds should be brought into the system cabinet, entering through the floor, and terminating in a four outlet electrical box where indicated on the cabinet floor.

Note 2: Conduit should either be rigid or liquid-tight flexible steel conduit contact A.G.T. for alternate conduit types.

Note 3 - Remote digital display cable (RD) is only used with optional remote digital display.

Note 4 - Drive motor cable (DM) is only used with optional electric or oscillating C-frame.

Note 5 - Photocell cable (PC) is only used with optional oscillating C-frame.

Note 6 - Coil mapping cable (CM) is only used with optional coil mapping system.

Note 7 - Remote monitor cable (RM) is only used with optional remote video display monitor.

Note 8 - 1/2" conduit is used when CAT-5 cable is used, 2" Conduit is used when using VGA driver cable only.

RD - Remote Display Cable
TM - Tachometer Cable
CM - Coil Mapping Cable
DH - Detector Head Cable
SH - Source Head Cable
DM - Drive Motor Cable
PC - Photo Cell Cable
SL - Shutter Light Cable
CL - Classifier Light Cable
RM- Remote Monitor Cable

Startup

Startup Instructions

AGT400 system startups are performed by specifically trained A.G.T. Field Service Engineers. There are more than 70 steps completed by our personnel, and once commissioned your gauge will be fully operational. For reference purposes, following is a listing of the Cable Terminations usually completed at system startup.

Cable Terminations

Digital Inputs from Customer (optional)
(from customer-supplied cable to J7 on Multi-Function Circuit Board)
Terminal 1 – determined by customer   digital input #1
Terminal 2 – determined by customer   digital input #2
Terminal 3 – determined by customer   external ground

Scaled Analog Outputs to Customer (optional)
(from J6 on Multi-Function Circuit Board to customer-supplied cable)
Terminal 1 – determined by customer   thickness
Terminal 2 – determined by customer   deviation
Terminal 3 – determined by customer and shield   ground

Analog Outputs from Computer
(from Digital Computer Board Cable to J5 on Multi-Function Circuit Board)
Terminal 1 – red wire   thickness
Terminal 2 – white wire   deviation
Terminal 3 – black wire and shield   ground

Remote Digital Display Cable – RD (optional)
(from Remote Digital Display to J2 and J6 on Multi-Function Circuit Board)
Terminal J2-1 – red wire   +13.2 VDC power
Terminal J2-3 – black wire   DC ground
Terminal J6-1 – white wire   thickness signal
Terminal J6-3 – green wire and shield   signal return

Tachometer Cable - TM
(from Tachometer to J2 on Multi-Function Circuit Board)
Terminal 1 – red wire   +13.2 VDC power
Terminal 2 – white wire   signal
Terminal 3 – black wire and shield   ground

Detector Head Cable - DH
(from C-frame Junction Box JTB-3 to J1 On Multi-Function Circuit Board)

Terminal 1 – white wire   signal
Terminal 2 – black wire in white/black twisted pair   signal return
Terminal 3 – red wire   +15 VDC
Terminal 4 – blue wire   -15 VDC
Terminal 5 – black and brown wires in brown/black twisted pair   ground
Terminal 6 – all shields except shield in green/black twisted pair   ground
Terminal 7 – green wire   high voltage
Terminal 8 – black and shield wires in green/black pair   high voltage return

Analog Computer Board Cable
(from J4 On Multi-Function Circuit Board to Computer)

DC Power Plug
(from DC Power Supplies to J3 On Multi-Function Circuit Board)

Fan Power Cord
(from AC power strip and thermostat to cabinet cooling fan)

Drive Motor Cable – DM (optional)
(from Direction Relay to C-frame Junction Box JTB-2)

Terminal 1 - red wire
Terminal 8 - black wire or brown wire

Digital Computer Board Ribbon Cable
(from Computer to Opto22 Rack)

Classifier Light Cable - CL
(from Classifier Light Fixtures to Opto22 Rack)

Terminal 9 – green wire   common
Module 5-8 – white wire   amber light
Module 5-6 – black wire   blue light

Shutter Status Indicator Light Cable - SL
(from Shutter Status Indicator Light Fixtures to Opto22 Rack)

Terminal 9 – green wire   common
Module 5-4 – white wire   green light
Module 5-2 – black wire   red light

Photocell Cable – PC (optional)
(from C-frame Junction Box JTB-2 to Opto22 Rack)

Terminal 7 - black wire   ground
Module 4-8 – red wire   on sheet photocell
Module 4-6 – white wire   off sheet photocell

Source Head Cable - SH
(from C-frame junction box JTB-2 to Opto22 Rack)

Terminal 6 - black wire <u>and</u> black wire with white stripe	+13.2 VDC power
Module 4-4 - green wire with white stripe	on sheet limit switch
Module 4-2 - blue wire with white stripe	off sheet limit switch
Module 3-6 - blue wire with black stripe	sample 2 out switch
Module 3-4 - orange wire with black stripe	sample 1 out switch
Module 3-2 – white wire	shutter closed switch
Module 2-6 - white wire with black stripe	sample 2 in switch
Module 2-4 - green wire with black stripe	sample 1 in switch
Module 2-2 - red wire with black stripe	shutter open switch
Module 1-6 - blue wire	sample 2 command
Module 1-4 - green wire	sample 1 command
Module 1-2 - orange wire	shutter command

Screen Menu Screen
CJW – 10/30/03
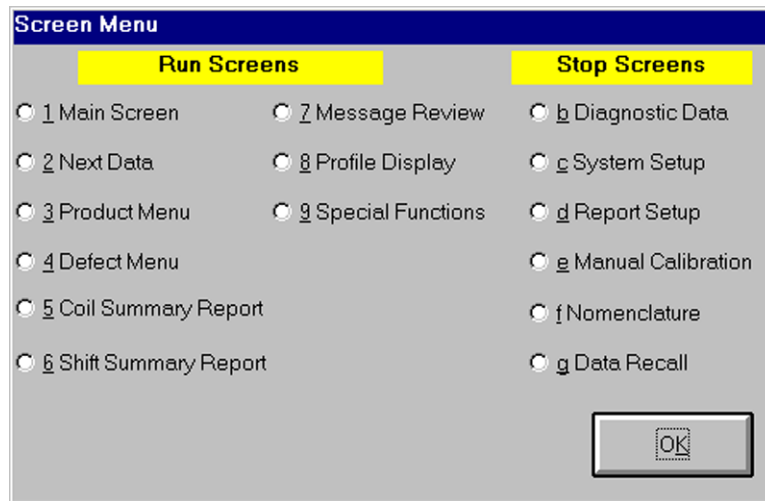
The screen menu displays all available screens. The Run Screens are available at any time. The Stop screens are only available when Report Control is in the Stop Mode and the C-Frame is stopped. Data Recall is the only Stop screen that does not require the MODE keyswitch to be in the PROGRAM position. All other Stop screens require the MODE keyswitch to be in the PROGRAM position to gain access.

To gain access to the screen menu, select the Screen Menu (Alt-7) button in the upper right hand corner of the main screen.
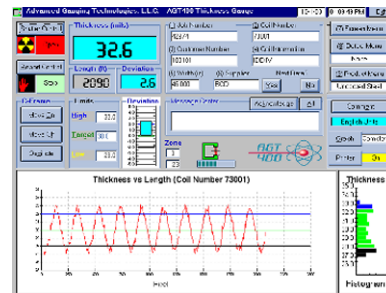
OK (Alt-K)
Exits the Screen Menu Screen and returns the operator to the AGT400 Main Screen.
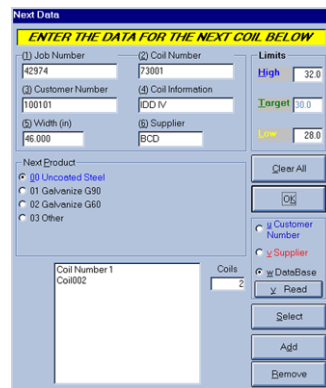
Run Screens

Main Screen (Alt-1)

The primary screen used during normal AGT400 system operation.
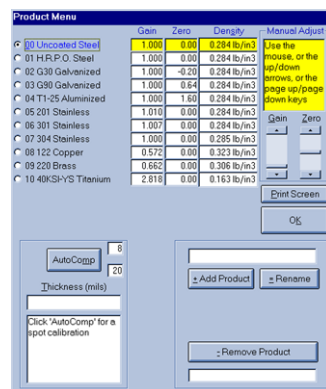

Next Data (Alt-2)

Used to enter data for the next coil. It may also be used to set up customers, suppliers, or select data to be loaded for the next coil.
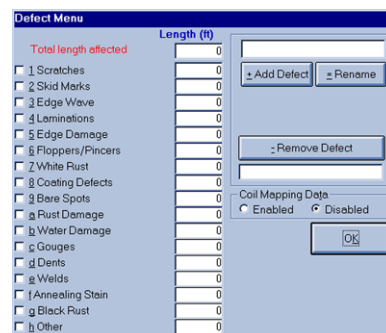

Product Menu (Alt-3)

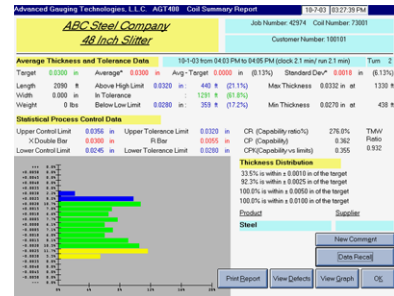Used to select or edit products to be measured.

Defect Menu (Alt-4)

Used to select or edit defects observed by the operator.

Coil Summary Report (Alt-5)

Used to view coil information for the last coil produced or recalled. The name of this screen and the corresponding report may be changed on the Nomenclature Screen.

Shift Summary Report (Alt-6)

Used to view shift information for the current shift or a recalled shift. The name of this screen and the corresponding report may be changed on the Nomenclature Screen.
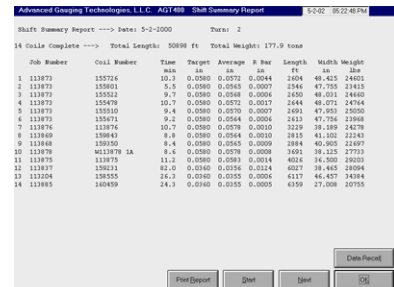
Message Review (Alt-7)

Used to view and print System Messages.

Profile Display (Alt-8)

Used to view the profile of a coil, or measured thickness versus strip width.

Special Functions (Alt-9)

Used to access many special functions.
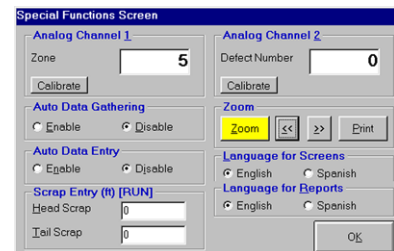
Stop Screens

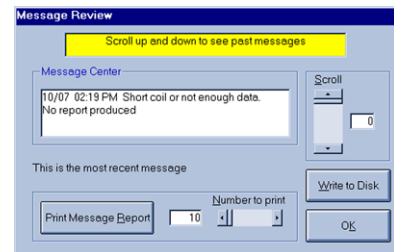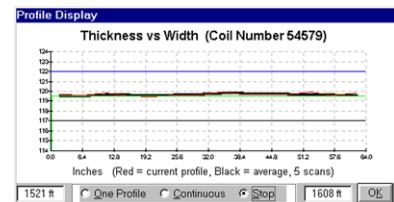### Diagnostic Data (Alt-B)
Used for diagnostic purposes and to perform calibration checks. This screen is also used to perform automatic calibrations using internal calibration samples.
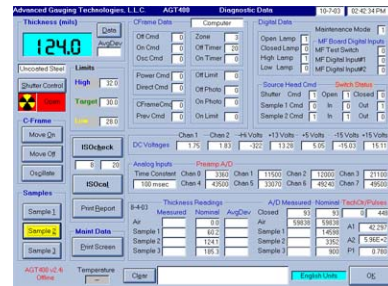
System Setup (Alt-C)
Used to customize system setup items, such as the Method of Setting the Target, Shift Start Times, and English or Metric units.
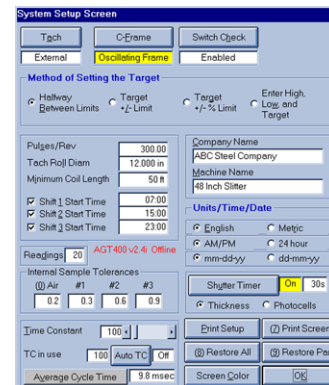
Report Setup (Alt-D)
Used to customize system reports, such as the Coil Summary Report, Shift Summary Report, Profile Report, and Defect Report.
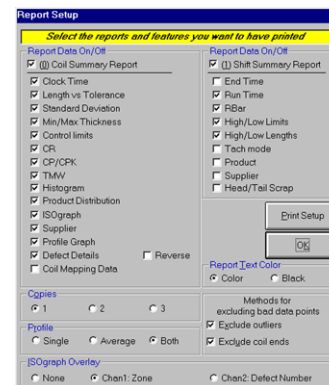
Manual Calibration (Alt-E)
Used to manually calibrate the AGT400 using N.I.S.T. traceable external samples placed on a sample holder at passline height and angle.

WARNING! It is *highly* recommended that a manual calibration be performed by a trained technician and with <u>N.I.S.T traceable samples suspended at the correct passline height and angle only.</u>

Nomenclature (Alt-F)

Used to customize the names of certain fields on various screens and reports.

Data Recall (Alt-G)

Used to recall data, such as Coil Summary Reports or Shift Summary Reports.

Main Screen
CJW – 12/09/03

The Main Screen is where the operator controls most aspects of the thickness gauge. This section gives a description of all areas of the main screen.

Shutter Control (Alt-S)
The Shutter Control button opens or closes the shutter whenever the SHUTTER Keyswitch is in the UNLOCK position. The graphic area shows the shutter command and is color coded. When the shutter is closed, the graphic area displays the word Closed on a green background with a key symbol to the left. When the shutter is open, the graphic area displays the word Open on a red background with a radiation symbol to the left.

Note: The shutter will not open with the SHUTTER Keyswitch in the LOCK position.

Report Control (Alt-R)
The Report Control button starts or stops the reporting function. When beginning a coil, press the report control button and the gauge will go into Run mode. The gauge will display a measured thickness, begin plotting the measured thickness versus length on the ISOgraph™, plotting the thickness information on the Histogram, making changes to the Deviation meter, and counting footage (assuming the tachometer is turning). When the Report Control button is pressed again at the end of the coil, the gauge will go into Stop mode, and save coil information to the hard disk and the Zip disk (or network if enabled). A Coil Summary Report is sent to

the printer at this time if the printer is enabled. The minimum coil length parameter may be changed on the System Setup Screen.

Note: The shutter must be open in order to collect data.

C-Frame Controls
Contains the buttons for moving the Electric C-Frame (if equipped and enabled). The C-Frame Controls are enabled on the System Setup Screen, as long as the Manual/Auto Switch on the Power Panel is set to AUTO. When C-Frame is commanded to move, the corresponding C-Frame Control button will have a yellow background.

Move On (Alt-O)
This button will move the C-Frame on sheet. The C-Frame will continue moving on sheet until any C-Frame control button is clicked, the C-Frame reaches the on sheet limit switch, the on sheet photocells reach the on sheet strip edge (with oscillating C-Frame) or a motor timeout occurs.

Move Off (Alt-F)
This button will move C-Frame off sheet. The C-Frame will continue moving off sheet until any C-Frame control button is clicked, the C-Frame reaches the off sheet limit switch or a motor timeout occurs.

Oscillate (Alt-C)
This button will move C-Frame on sheet and oscillate from edge to edge. The C-Frame will continue oscillating until any C-Frame control is clicked, either limit switch is reached or a motor timeout occurs. The oscillate function requires photocells.

Thickness Display
Displays Measured Thickness in thousandths of inches (mils) or millimeters (mm), depending on the Units selected on the System Setup Screen. When the measured thickness exceeds the upper limit, the Thickness and Deviation Display backgrounds and Deviation Bar Graph are blue, and the blue classifier light is illuminated. When the measured thickness is in tolerance, the Thickness and Deviation Display backgrounds and Deviation Bar Graph are green. When the measured thickness is below the lower limit, the Thickness and Deviation Display backgrounds and Deviation Bar Graph are yellow, and the amber classifier light is illuminated.

Length
Displays measured length in feet (ft) or meters (m). This display shows actual measured length or simulated length, depending on the Tach Mode selected in the system setup screen.

Deviation
Displays measured deviation from target thickness in thousandths of inches (mils), millimeters (mm), or percent of target thickness. When the measured thickness exceeds the upper limit, the deviation bar displays in blue. When the measured thickness is within tolerance, the deviation bar displays in green. When the measured thickness is below the lower limit, the deviation bar displays in yellow.

Limits
Contains the fields for entering the thickness limits of the current coil. This information must be in thousandths of an inch (mils) or millimeters (mm), depending on the units selected on the system setup screen. There are four target mode options called Method of Selecting Target on the System Setup Screen.

High Tolerance (Alt-H)
Operator enters the maximum thickness limit for a particular coil depending on the Method of Selecting Target on the System Setup Screen.

Low Tolerance (Alt-L)
Operator enters the minimum thickness limit for a particular coil depending on the Method of Selecting Target on the System Setup Screen.

Target (Alt-L)
Operator enters the target thickness limit for a particular coil depending on the Method of Selecting Target on the System Setup Screen.

Message Center
System messages are date and time stamped and displayed in this area. Only the oldest unacknowledged message is visible at any time. When two or more messages are in the queue, the Message Center heading changes to MESSAGES WAITING in bold red letters. When five or more messages are in the queue, the MESSAGES WAITING heading begins to flash from red to white. System messages can be reviewed on the message review screen.

Acknowledge (Alt-K)
Used to acknowledge and clear the oldest message from the message center display.

All (Alt-A)
Used to acknowledge and clear all messages from the message center display.

Coil Information Fields
Field names can be changed on the Nomenclature screen located in Screen Menu.

Field 1 - Job Number (Alt-1)
Operator enters Job or work order number or equivalent. Field name can be changed on the Nomenclature screen.
*Recommend not changing due to Database function.

Field 2 - Coil Number (Alt-2)
Operator enters Coil or Tag Number or equivalent. Field name can be changed on the Nomenclature screen.
*Recommend not changing due to Database function.

Field 3 - Customer Number (Alt-3)
Operator enters Customer Name or Number in this field. Field name can be changed on the Nomenclature screen.

Field 4 - Coil Information (Alt-4)
Operator enters coil information here. Field name can be changed on the Nomenclature screen.

Field 5 - Width (Alt-5)
Operator enters full coil width in this field. This information <u>must</u> be in inches (in) or centimeters (cm), depending on the units selected on the System Setup screen.

Field 6 - Supplier (Alt-6)
Operator enters supplier or vendor here. Field name can be changed on the Nomenclature screen.

Next Data
Allows the operator to set up next coil while running current coil.
Clicking Next Data will bring up the question 'Yes to confirm'? Auto-increment rotation can be used by clicking Next Data multiple times. Each subsequent time Next Data is clicked, the coil number will increment by one.

NOTE: If the Database function is selected and enabled in the Parameter file, the Next Data function will work differently. Selecting Next Data will take the user directly to the Next Data Screen to select the next coil from the database.

Yes (Alt-Y)
Loads data for the next coil from the Next Data Screen. Clicking the button once brings up a message prompting the operator to click the button again to load data for next coil. Clicking the button a second time loads the data for the next coil.

No (Alt-N)
Cancels the request to load data for the next coil.

ISOgraph™
Displays a graph showing measured thickness versus length of the current coil. The upper blue horizontal line on this graph indicates the upper thickness limit. The green horizontal line on this graph indicates the target thickness. The lower blue horizontal line indicates the lower thickness limit. The red line on this graph indicates the measured thickness. Graph scaling is partially determined by the limits and/or target thicknesses entered by the operator. The graph will display the entire coil or in 1000 foot (or 300 meter) increments, depending on setting of Graph (Alt-G).

Graph (Alt-G)
This button toggles the ISOgraph™ display between Complete and Detail modes.
Detail - Shows ISOgraph™ in 1000 foot or 300 meter increments.
Complete - Shows entire coil on ISOgraph™.

Printer (Alt-P)
The printer button toggles printing of the various automatic printouts on and off. Printer needs to be enabled here to print Coil Summary Reports or Shift Summary Reports automatically.

Note: Coil Data is saved to Hard Drive regardless of Printer setting.

Date/Time
Displays system date and time taken directly from computer operating system.

Units
Displays the units (English or Metric), depending on the units selected on the System Setup screen.

Product Menu (Alt-9)
Clicking this button displays the Product Menu. The text box shows the currently selected product. If any product other than Product 0 (normally Uncoated or Cold-Rolled Steel) is selected, the background color will change from white to yellow.

Defect Menu (Alt-8)
Clicking this button displays the Defect Menu. The text box shows the currently selected defect. If any defects are selected, the background color will change from white to yellow. If more than one defect is selected, this box will show "Multiple Defects".

Comments (Alt-E)
Click to open the comment box. Once the yellow box opens the operator can type any desired comments. When finished, click the comment box again to close. Comments will be saved with other coil information and can be changed at anytime by clicking the comments box again.

Note: Comments can also be added or changed in Coil Summary Report for any saved coil data.

Screen Menu (Alt-7)
Displays a menu of all available screens. Certain screens may be accessed only when the Report Control is in Stop Mode, the C-Frame is stopped, and/or the MODE Keyswitch is in the PROGRAM position.

Histogram
Histogram displays a bar graph showing measured thickness, with bars indicating relative percentages of material at each thickness. Measured thickness is scaled in thousandths of inches (mils) or millimeters (mm). The blue bars on this graph represent material that exceeded the upper thickness limit. The green bars on this graph represent material that was in tolerance. The black bars on this graph represent material that was below the Lower thickness limit.

C-Frame Icon
Displays the relative position of the C-Frame on the strip, if equipped with an electric or oscillating C-Frame. This icon oscillates back and forth at random with a Manual C-Frame.

Zone
The upper box displays the area in which the C-Frame is positioned and corresponds to the zone numbers used in the optional Coil Mapping. The lower box contains the approximate position of the frame in inches or centimeters from the off sheet edge.

Off = at Off Sheet Limit Switch
 0 = completely off sheet, but not at the Off Sheet Limit Switch
 1 = Off Sheet Photocell off sheet, On Sheet Photocell on sheet
 2 = not at center, both Photocells on sheet, near off sheet edge
 3 = approximate center
 4 = not at center, both Photocells on sheet, near on sheet edge

5 = Off Sheet Photocell on sheet, On sheet Photocell off sheet
6 = completely off sheet, but not at the On Sheet Limit Switch
7 = at On Sheet Limit Switch

Exit (Alt-X)
Clicking this button once prompts a system message asking the operator to click the button again to exit. Clicking the button a second time exits the AGT400 program and returns the operator to the operating system desktop.

Note: This function is only open to maintenance personnel. The MODE keyswitch must be in the PROGRAM position in order to exit AGT400 program.

Next Data Screen
CJW – 12/10/03

The Next Data screen allows the operator to pre-set coil data for the next coil. The operator may also build a database by Customer Name, Customer Number or Supplier. Coils may be loaded from this screen via the network by using the Database function, if enabled in the Parameter file and with the network enabled.

Job Number (Alt-1)
Operator enters Job or Work Order Number for the next coil in this field. Field name can be changed on the Nomenclature screen.

Coil Number (Alt-2)
Operator enters Coil or Tag Number for the next coil in this field. Field name can be changed on the Nomenclature screen.

Customer Number (Alt-3)
Operator enters Customer name or number for the next coil in this field. Field name can be changed on the Nomenclature screen.

Coil Information (Alt-4)
Operator enters Coil Information, Operator Name, Product or other Information for the next coil in this field. Field name can be changed on the Nomenclature screen.

Width (Alt-5)
Operator enters full coil width for the next coil in this field. This information will be in inches or centimeters, depending on the units selected on the System Setup screen.

Supplier (Alt-6)
Operator enters Supplier, Vendor or Mill name or number for the next coil in this field. Field name can be changed on the Nomenclature screen.

Limits
Contains the fields for entering the thickness limits for the next coil.

High (Alt-H)
Operator enters upper thickness limit.

Low (Alt-L)
Operator enters lower thickness limit.

Target (Alt-T)
Operator enters target thickness.

Product (Alt-0 is Uncoated Steel)
Operator selects the type of material for the next coil.

Clear All (Alt-C)
Resets Job Number, Coil Number, Customer Number, Coil Information, Width, Supplier, Limits and Product for the next coil.

Customer Number (Alt-U)
Selects the Customer database and displays a list of customers set up in the Customer File. The Customer File database does not save fields 1 or 2. The database only allows one entry for each customer name.

Supplier (Alt-V)
Selects Supplier database and displays a list of saved suppliers set up in the Supplier File. This is the most limited database and will only save supplier name. No other fields will be saved.

Database (Alt-W)
Selects the entire database and displays a list of all the saved coil data. Coil information is listed by coil number in alphanumeric order. Database is only available if enabled in the Parameter file. Added coil information is only saved when OK is selected. If Customer Number or Supplier are selected before selecting OK, the new data in the Database will be lost.

Read
Only available when database is enabled in Parameter file. Selecting the Read button reads the information contained in the Coil database file to be loaded into the gauge. This allows the database to be created remotely.

Coils
Displays number of coils contained in the Next Coil Database File. The maximum capacity is 1,000.

Select (Alt-S)
This is used to copy highlighted data from the Customer, Supplier or Database list box to the appropriate Next Data fields on this screen.

Add (Alt-D)
This button is used to add information from the Next Data fields to the Customer File or Supplier File.

Remove (Alt-R)
This button is used to remove information from the Customer File, Supplier File or Database.

OK (Alt-K)
Exits the Next Data screen and returns the operator to the AGT400 Main Screen. OK will also save all Database information to the AGTDB1.txt file. The file name for the Database information can be changed in the Parameter file.

Product Menu Screen
CJW – 11/26/03

Product Menu	Gain	Zero	Density	Manual Adjust
⊙ 00 Uncoated Steel	1.000	0.00	0.284 lb/in3	Use the mouse, or the up/down arrows, or the page up/page down keys
○ 01 H.R.P.O. Steel	1.000	0.00	0.284 lb/in3	
○ 02 G30 Galvanized	1.000	-0.20	0.284 lb/in3	
○ 03 G90 Galvanized	1.000	-0.64	0.284 lb/in3	
○ 04 T1-25 Aluminized	1.000	1.60	0.284 lb/in3	
○ 05 201 Stainless	1.010	0.00	0.284 lb/in3	Gain Zero
○ 06 301 Stainless	1.007	0.00	0.284 lb/in3	
○ 07 304 Stainless	1.000	0.00	0.285 lb/in3	
○ 08 122 Copper	0.572	0.00	0.323 lb/in3	
○ 09 220 Brass	0.662	0.00	0.306 lb/in3	
○ 10 40KSI-YS Titanium	2.818	0.00	0.163 lb/in3	

Print Screen

OK

AutoComp   8
             20

Thickness (mils)

Click 'AutoComp' for a spot calibration

+ Add Product   = Rename

- Remove Product

Product (Alt-0 is Uncoated Steel)
Operator selects default product for current coil.

Gain
Gain is used to correct measuring errors due to variations in the chemistry of different metals or alloys.

Gain displays the gain factor used by the AGT400 to calculate measured thickness for the particular product. This number is determined by a combination of the product density and its gamma ray absorption coefficient. Product 0, typically Uncoated Steel, will have a gain factor of 1.000. Other products may have different gains based on how they compare to Product 0.   The AGT400 multiplies the calculated thickness by the gain factor for a particular product to determine the measured thickness.

Zero
Zero is used to correct for measuring errors due to different coating types.

Zero displays the zero factor used by the AGT400 to calculate measured thickness for the particular product. This number is determined by the density and gamma ray absorption coefficient of the coating compared to that of the substrate. Uncoated products will have a zero factor of 0.00. Other products may range from -30.00 to 30.00, which indicates number of mils (thousandths of an inch) the calculated thickness is to be adjusted by.

Density
Displays the density factor used by the AGT400 to calculate weight for a coil of a particular product. This number is determined by the approximate density of the particular product. Uncoated Steel typically has a density of .284 pounds per cubic inch (lbs/in³), or 7.861 grams per cubic centimeter (gm/cm³), depending on the units selected on the system setup screen. Other products may range from .051 to .749 pounds per cubic inch (lbs/in³), or 1.385 to 20.760 grams per cubic centimeter (gm/cm³). Density can only be adjusted with the MODE Keyswitch in the PROGRAM position.

Manual Adjust
Contains the Gain and Zero scroll bars, and the instructions for their use. The contents of this area are only visible with the MODE Keyswitch in the PROGRAM position.

Gain (Alt-G)
Using the scroll bar for Gain will adjust the gain factor used by the AGT400 to calculate measured thickness for the particular product. This number is determined by a combination of the product density and its gamma ray absorption coefficient.

Zero (Alt-Z)
Using the scroll bar for Zero will adjust the zero factor used by the AGT400 to calculate measured thickness for the particular product. This number is determined by first adjusting the Gain of a coated product to match the Gain factor used for the substrate material. Then, the zero is adjusted until the overall thickness of the coated material can be measured accurately.

AutoComp (Alt-M)
This button is used to initiate the AutoComp process. This process is used for a spot calibration or as an automated method of adding new products to the Product Menu. The AutoComp areas are not visible during Run Mode. Once the AutoComp process has begun, the instructions for this procedure will appear in the dialog box.

There are two boxes to the right of the AutoComp button. The upper box shows the status of the Wait Time Counter. The lower box shows the number of readings being taken. There are between 6 and 20 cycles, automatically determined by the AGT400 program. Each cycle is approximately 10 to 1,000 milliseconds, depending on the time constant selected. During the AutoComp process, the Wait Time Counter serves as a "pause" to allow the measurement to stablize before any actual thickness readings are stored.

Thickness (Alt-T)
During the AutoComp process, the operator enters actual material thickness here. This area is not visible during Run mode.

Add Product (Alt-D)
Used to add a product to the Product Menu. One to 25 products can be set up on this screen. This area is not visible during Run mode.

Rename (Alt-E)
Used to rename an existing product on the Product Menu. Product 0, Uncoated Steel, cannot be renamed on this screen.

Yes (Alt-Y)
Confirms the request to add or rename a product. This button is only visible when either the Add Product or Rename button have been clicked. This area is not visible during Run mode.

No (Alt-N)
Cancels the request to add or rename a product. This button is only visible when either the Add Product or Rename button have been clicked. This area is not visible during Run mode.

Remove Product (Alt-R)
Used to remove an existing product from the Product Menu. Product 0 cannot be removed. This area is not visible during Run mode.

OK (Alt-K)
Exits the Product Menu Screen and returns the operator to the AGT400 Main Screen.

Defect Menu Screen
CJW – 12/09/03

Defect Menu

	Length (ft)
Total length affected	300
☐ 1 Scratches	128
☐ 2 Skid Marks	0
☐ 3 Edge Wave	0
☐ 4 Laminations	40
☐ 5 Edge Damage	0
☐ 6 Floppers/Pincers	0
☐ 7 White Rust	0
☐ 8 Coating Defects	0
☐ 9 Bare Spots	0
☐ a Rust Damage	117
☐ b Water Damage	0
☐ c Gouges	0
☐ d Dents	0
☐ e Welds	14
☐ f Annealing Stain	0
☐ g Black Rust	0
☐ h Other	0

Coil Mapping Data
○ Enabled ⦿ Disabled

OK

Defect (Alt-1 through Alt-P)
Operator selects currently visible defect. Checking a box enables a particular defect, and the gauge will start counting footage at that point. Unchecking a box disables a particular defect, and the gauge will stop counting footage.

Add Defect (Alt-D)
Used to add a new defect to the Defect Menu. Operator types the name of the new defect in the yellow text box, then clicks Yes to confirm. Defect will be added to Defect list. It is recommended that the last defect on the list remain "Other" for gauges without Coil Mapping. On gauges with Coil Mapping, the last two defects should be "Other Defect" and "Spot Defect".

Rename (Alt-E)
Used to rename an existing defect in the Defect Menu. Select the defect to be renamed and the defect will appear in the yellow text box. After making changes to defect name, click Yes to confirm changes.

Remove Defect (Alt-R)
Used to remove the selected defect from the Defect Menu. Select the defect to be removed and the defect will appear in the yellow box. Click on the Remove Defect button and then click Yes to confirm removal.

e

Yes (Alt-Y)
Confirms the request to add, rename or remove a defect. This button is only visible when the Add Defect, Rename or Remove Defect buttons have been clicked.

No (Alt-N)
Cancels the request to add, rename or remove a defect. This button is only visible when the Add Defect, Rename or Remove Defect buttons have been clicked.

Coil Mapping Data (Alt-A)
If Coil Mapping is present, the Coil Mapping Data will usually be Enabled. This will allow Defects to be entered using the Coil Mapping handheld units. When Enabled, Defects will not be able to be entered using the Defect Menu Screen. To enter defects using the Defect Menu Screen, Coil Mapping Data must be Disabled. When Coil Mapping Data is Disabled, defects will not be able to be entered using the Coil Mapping handheld units.

Total length affected
Displays the total length of the current coil where defects were present and noted by the operator.

Length
Displays the total length of the current coil where a particular defect was present and noted by the operator.

OK (Alt-K)
Exits the Defect Menu and returns the operator to the AGT400 Main Screen.

NOTE: Defects will print out on the second page of the Coil Summary Report Printout if enabled on the Report Setup Screen. See Coil Summary Screen section for an example of the Defect Menu Printout.

Coil Summary Report Screen
CJW – 11/26/03

The Coil Summary Report gives a report on the current coil or a saved coil by way of the Data Recall button. The Coil Summary Report includes the following information: Job Number, Coil Number, Customer, Coil Information, Date the coil was started, Time the coil began, Time the coil was completed, Clock Time, Run Time and Shift.

The **Average Thickness and Tolerance Data** section includes the following: Target, Average, Avg -Target, Standard Dev, Length of coil, Width of coil, Estimated weight of coil, Above High Limit, In Tolerance, Below Low Limit, Max Thickness at footage, Min Thickness at footage.

NOTE: For Average and Standard Dev: If only outliers are excluded from the S.P.C. calculations, the ^ symbol will appear on the Coil Report Screen and printouts. If only coil ends are excluded, the ' symbol will appear on the Coil Report Screen and printouts. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report Screen and printouts. Unusual thickness data points and coil ends may be excluded from S.P.C. calculations on the Report Setup Screen.

The **Statistical Process Control Data** section includes the following: Upper Control Limit, XDouble Bar, Lower Control Limit, Upper Tolerance Limit, R Bar, Lower Tolerance Limit, CR (Capabiity ratio %), CP (Capability), CPK (Capability vs. Limits). Explanations of these fields can be found in the S.P.C. Definitions list in this manual.

The **Thickness Distribution** section gives a breakdown of the percent of the coil within +/-0.0010", +/-0.0025", +/-0.0050" and +/-0.0100", or metric equivalents.

Data Recall (Alt-L)
The Data Recall button will access the Data Recall screen and allow the user to access saved coil data by either date or coil number.

New Comment (Alt-E)
The New Comment button allows the user to add comments to the coil data after the coil has been saved. Clicking the New Comment button opens a yellow text box that can be used to enter any desired comments. Simply click the New Comment button again to close the box.

Print Report (Alt-R)
The Print Report button will print a coil report for the coil currently selected in the Coil Summary Report.

View Defects (Alt-D)
The View Defects button allows the user to see all defects recorded when this coil initially ran. To return to the Coil Summary Screen from the View Defects Screen, click on the Return to previous menu button. Clicking the OK button from the View Defects screen will return the operator to the Main Screen.

View Graph (Alt-G)
The View Graph button allows the user to see a graphic representation of the current coil. To return to the Coil Summary Screen from the View Graph Screen, click on the Return to previous menu button. Clicking the OK button from the View Graph screen will return the operator to the Main Screen.

OK (Alt-K)
Exits the Coil Summary Report and returns the operator to the AGT400 Main Screen.

NOTE: See example of the Coil Summary Report on the next page. This report also includes a Profile Display and the Defects printout.

f

Shift Summary Report Screen
CJW – 11/14/03

```
Advanced Gauging Technologies, L.L.C.   AGT400   Shift Summary Report        5-2-02   05:22:48 PM

Shift Summary Report ---> Date: 5-2-2000          Turn:  2

14 Coils Complete --->    Total Length:  50898 ft   Total Weight: 177.9 tons

     Job Number       Coil Number    Time    Target  Average  R Bar   Length   Width  Weight
                                     min      in      in      in       ft      in     lbs
 1   113873           155726        10.3    0.0580  0.0572  0.0044    2604   48.425  24601
 2   113873           155801         5.5    0.0580  0.0565  0.0007    2546   47.755  23415
 3   113873           155522         9.7    0.0580  0.0568  0.0006    2650   48.031  24660
 4   113873           155478        10.7    0.0580  0.0572  0.0017    2644   48.071  24764
 5   113873           155510         9.4    0.0580  0.0570  0.0007    2691   47.953  25050
 6   113873           155671         9.2    0.0580  0.0564  0.0006    2613   47.756  23968
 7   113876           113876        10.7    0.0580  0.0578  0.0010    3229   38.189  24278
 8   113869           159843         8.8    0.0580  0.0564  0.0010    2815   41.102  22243
 9   113868           159350         8.4    0.0580  0.0565  0.0009    2884   40.905  22697
10   113878           W113878 1A     8.6    0.0580  0.0578  0.0008    3691   38.125  27733
11   113875           113875        11.2    0.0580  0.0583  0.0014    4026   36.500  29203
12   113837           159231        82.0    0.0360  0.0356  0.0124    6027   38.465  28094
13   113204           158555        26.3    0.0360  0.0355  0.0006    6117   46.457  34384
14   113885           160459        24.3    0.0360  0.0355  0.0005    6359   27.008  20755


                                                         Data Recall

                       Print Report      Start      Next        OK
```

The Shift Summary Report gives a detailed report of all coils ran during a particular shift. The date and shift are located in the upper portion of the report. Below the date and shift are the total number of coils completed during the shift, the Total Length of all the coils and the Total Weight of all the coils.

The Shift Summary Report then breaks down each coil by Job Number, Coil Number and several other pieces of information that can be configured on the Report Setup Screen.

Data Recall (Alt-L)
The Data Recall button takes the operator to the Data Recall Screen where the operator can recall old Shift Summary Reports.

Start (Alt-S)
The Start button returns the operator to the first page of the Shift Summary Report, provided there is more than one page in the report.

Next (Alt-N)
The Next button takes the operator to the next page of the Shift Summary Report, provided there is more than one page in the report.

Print Report (Alt-R)
The Print Report button allows the operator to print an "on demand" copy of the current Shift Summary Report, without waiting for the shift to end.

OK (Alt-K)
Exits the Shift Summary Report screen and returns the operator to the AGT400 Main Screen.

NOTE: See Shift Summary Report for an example of report printed from this screen.

Message Review Screen

CJW – 11/14/03
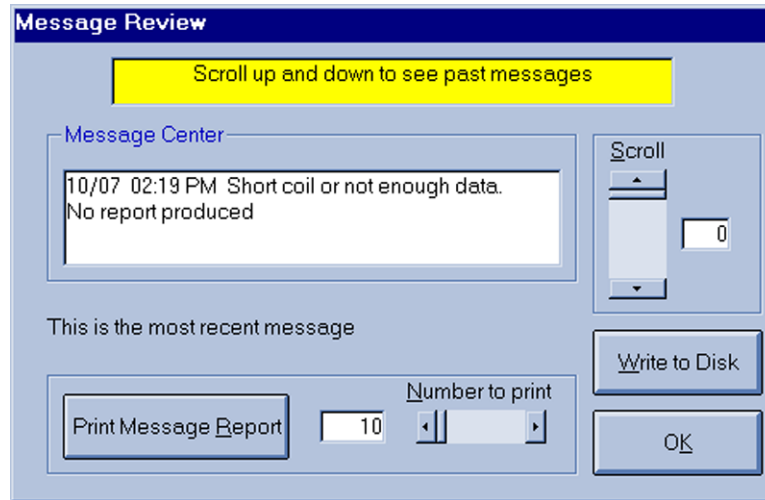
The Message Review Screen lists all messages since the last AGT400 program start. Exiting the gauge program will delete all messages.

Message Center
Displays the message with a date and time stamp when the message was generated.

Print Message Report (Alt-R)*
Used to send (Number to print) messages to the system printer. MODE key must be in PROGRAM in order to use this function.

Number to Print (Alt-N)*
Used to select the number of messages to print. The user can select any number of messages to print from 10 to 200.

Scroll (Alt-S)
Used to select individual message to be reviewed.

Write to Disk (Alt-W)
Used to write (Number to print) messages to specified area on hard drive. Can be accessed and viewed with Notepad. The MODE key must be in PROGRAM in order to use this function.

OK (Alt-K)
Exits the Message Review Screen and returns the operator to the AGT400 Main Screen.

Profile Display Screen
CJW – 11/14/03

Profile Display

Thickness vs Width (Coil Number 54579)

Inches   (Red = current profile, Black = average, 5 scans)

| 1521 ft | ○ One Profile   ○ Continuous   ⊙ Stop | 1608 ft | OK |
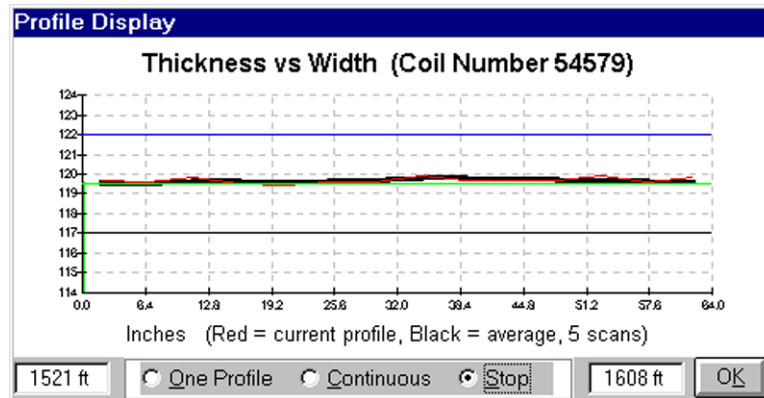
The Profile Display is a graphic representation for viewing the profile of a coil or a measured thickness versus strip width.

Thickness vs Width
A graph showing measured thickness versus entered width of the current strip profile. Measured thickness is scaled in thousandths of inches (mils) or millimeters (mm) and length is scaled in feet (ft) or meters (m). The upper blue horizontal line represents the upper thickness limit, the lower blue horizontal line represents the lower thickness limit, the green horizontal line represents the target thickness and the black line represents the average thickness when in continuous mode. The red line represents the measured thickness and will typically stop just short of both edges of the graph. This is because the AGT400 cannot measure all the way to the strip edge.

Measured Length
There are two white text boxes on the bottom of this screen. The left box displays the length of coil at the beginning of the most recent scan. The right box displays the length of coil at the end of the most recent scan.

One Profile (Alt-O)
Used to begin a single profile scan across the strip width. This selection is only visible with an Oscillating C-Frame.

Continuous (Alt-C)
Used to begin a repetitive profile scan across the strip. This selection is only visible with an Oscillating C-Frame.

Stop (Alt-S)
Used to stop a single or continuous profile scan. This selection is only visible with an Oscillating C-Frame.

Measure (Alt-M)
Used to take an instantaneous measurement. Once two or more measurements have been taken, a profile will be displayed. The calculated profile assumes that all measurements taken were evenly distributed across the entered strip width. This selection is only visible with a Manual or Electric C-Frame.

Clear (Alt-R)
Used to clear the calculated strip profile. This selection is only visible with a Manual or Electric C-Frame.

OK (Alt-K)
Exits the Profile Display Screen and returns the operator to the AGT400 Main Screen.

NOTE: Profile Display will print out on the second page of the Coil Summary Report Printout. See Coil Summary Screen section for an example of the Profile Display Printout.

Special Functions Screen
CJW – 12/09/03

This screen will allow the user to perform a few select special functions.

Language for Screens
The operator can select between the English or Spanish language for all screens.

Language for Reports
The operator can select between the English or Spanish language for all reports.

Zoom (Alt-Z)
Clicking the Zoom button will bring up two directional controls for the ISOgraph™. This allows the operator to view the coil in 500 foot (200 meter) increments. After clicking Zoom (Alt-Z), the graph will shrink to a 500 foot (200 meter) section. By selecting the **<< (Alt-<)**, the ISOgraph™ view will shift to the left (beginning) of the coil. By selecting the **>> (Alt->)**, the ISOgraph™ view will shift to the right (end) of the coil. Clicking the Zoom button a second time will set the ISOgraph™ back to normal view.

Print (Alt-P)
The Print button will allow the user to print a Coil Zoom report.

Auto Data Gathering
When activated in the Parameter file, allows Auto Data Gathering to be enabled and disabled. When enabled, the voltage present at Digital Input #1 on the Multifunction Board automatically opens the shutter, begins the reporting and moves the C-Frame online, depending on the system configuration and settings in the Parameter file. Removing the voltage at Digital Input #1 on the Multifunction Board will close the shutter, stops the

reporting and moves the C-Frame offline depending on system configuration and settings in the Parameter file.

Auto Data Entry

When activated in the Parameter file, this button allows Auto Data Entry to be enabled or disabled. When enabled, voltage present at Digital Input #2 on the Multifunction Board will trigger the AGT400 software to read setup data from the network. A network connection must be present and the Parameter file must be correctly enabled. Momentary signal is all that is required, but a continuous signal is acceptable as long as it is removed momentarily prior to the application of a subsequent signal.

Scrap Entry

The Scrap Entry allows the operator to enter head and tail scrap while a coil is running. To enter Head Scrap, click in Head Scrap box **(Alt-H)** and type in estimated footage scrapped at beginning of coil. To enter Tail Scrap, click in Tail Scrap box **(Alt-T)** and type in estimated footage scrapped at end of coil.

Analog Channel 1

The AGT400 continuously monitors eight channels of analog inputs. Channels 1 and 2 can be configured to monitor Multifunction Circuit Board temperature, which may be configured in Fahrenheit (°F) or Celsius (°C), or for customer inputs ranging from 0 to 10VDC. This frame is only visible if enabled in the Parameter File.

Analog Channel 2

The AGT400 continuously monitors eight channels of analog inputs. Channels 1 and 2 can be configured to monitor Multifunction Circuit Board temperature, which may be configured in Fahrenheit (°F) or Celsius (°C), or for customer inputs ranging from 0 to 10VDC. This frame is only visible if enabled in the Parameter File.

OK (Alt-K)

Exits the Special Functions Screen and returns the operator to the AGT400 Main Screen.

NOTE: See Zoom Report for example of a 'zoomed in' ISOgraph™ printout.

Diagnostic Data Screen
CJW – 11/26/03

Advanced Gauging Technologies, L.L.C.   AGT400   Diagnostic Data   10-7-03 02:42:34 PM

Thickness (mils) [Data] [AvgDev] **124.0**

Uncoated Steel

Shutter Control — Open

C-Frame — Move On / Move Off / Oscillate

Samples — Sample 1 / Sample 2 / Sample 3

Limits — High 32.0 / Target 30.0 / Low 28.0

ISOcheck   8   20
ISOcal
Print Report

Maint Data — Print Screen

AGT400 v2.4i Offline   Temperature –   [Clear]   English Units   [OK]

CFrame Data — Computer
Off Cmd	0	Zone	3
On Cmd	0	Off Timer	20
Osc Cmd	0	On Timer	0
Power Cmd	0	Off Limit	0
Direct Cmd	0	Off Photo	0
CFrameCmd	0	On Photo	0
Prev Cmd	0	On Limit	0

Digital Data   Maintenance Mode 1
Open Lamp	1
Closed Lamp	0
High Lamp	1
Low Lamp	0

MF Board Digital Inputs
MF Test Switch 0
MF Digital Input#1 0
MF Digital Input#2 0

Source Head Cmd — Switch Status
Shutter Cmd	1	Open	1	Closed	0
Sample 1 Cmd	0	In	0	Out	1
Sample 2 Cmd	1	In	1	Out	0

DC Voltages: Chan 1 1.75 / Chan 2 1.83 / Hi Volts -322 / +13 Volts 13.28 / +5 Volts 5.05 / -15 Volts -15.03 / +15 Volts 15.11

Analog Inputs — Preamp A/D
Time Constant	Chan 0 3360	Chan 1 11500	Chan 2 12000	Chan 3 21100
100 msec	Chan 4 43500	Chan 5 33070	Chan 6 49240	Chan 7 49500

8-4-03 Thickness Readings / A/D Measured — Nominal — TachCtr/Pulses

	Measured	Nominal	AvgDev		A/D Measured	Nominal		
				Closed	93	93	0	448
Air		0.0		Air	59838	59838	A1	42.297
Sample 1		60.2		Sample 1		14598	A2	5.96E+2
Sample 2		124.1		Sample 2		3352	P1	0.780
Sample 3		185.3		Sample 3		900		

The Diagnostic Data Screen is a unique feature of the AGT400. This screen is a great troubleshooting aid and allows for the quick viewing of all pertinent information such as analog and digital signals, DC voltages, shutter status, C-frame status, A/D values and many others. Among the best features of the Diagnostic Data Screen are the ISOcheck™ and ISOcal™ functions. They permit the quick and easy verification and/or correction of the measurement.

ISOcheck™ (Alt-H)
It is recommended that the ISOcheck™ feature be performed once per week in most applications. Although this is not necessary for your AGT400 thickness gauge to read correctly, it will ensure the best possible performance of your gauge.

The reason the ISOcheck™ is recommended once per week is that the gauge will correct any discrepancy in the Air value. Air will fluctuate over time due to many reasons and can easily be kept in tolerance, along with the internal samples, by using the ISOcheck™ feature.

When the ISOcheck™ is performed, the gauge will compare the current Air measurement, Sample 1 measurement, Sample 2 measurement and Sample 3 measurement to the nominal values that were designated during the last manual calibration, in addition to correcting the Air reading if necessary.

Refer to ISOcheck™ in the Maintenance Section of this manual for procedure instructions.

ISOcal™ (Alt-L)

The ISOcal™ feature of the AGT400 should only be used if repeated ISOcheck™ attempts have failed. An ISOcal™ measures the internal samples and re-calculates the thickness algorithm variables (A1 and A2) based on those measurements.

Refer to ISOcal™ in the Maintenance Section in this manual for procedure instructions.

Shutter Control (Alt-S)

The Shutter Control button opens or closes the shutter whenever the shutter keyswitch is in the UNLOCK position. The graphic area shows the shutter command and is color-coded. When the shutter is commanded to close, the graphic area displays the word Closed on a green background with a key symbol to the left. When the shutter is commanded to open, the graphic area displays the word Open on a red background with a radiation symbol to the left.

Note 1: The Shutter Control button on the Diagnostic Data screen works the same as the Shutter Control button on the Main Screen. The shutter will not open with the Shutter Keyswitch in the LOCK position.

Note 2: If the Shutter Keyswitch is in the LOCK position and the Shutter button is activated, the graphic will show the shutter is commanded to be in the open position. The Message Center will display alarms indicating an incorrect shutter status.

Thickness Display

Displays Measured Thickness in thousandths of inches (mils) or millimeters (mm), depending on the units selected on the System Setup Screen. When the measured thickness exceeds the upper limit, the Thickness Display background will be blue, and the blue classifier light is illuminated. When the measured thickness is in tolerance, the Thickness Display background will be green. When the measured thickness is below the lower limit, the Thickness Display background will be yellow, and the amber classifier light is illuminated.

Data (Alt-D)

The Data button allows the user to average a predetermined number of measurements. The result is displayed in the Thickness Display along with an AvgDev count. The predetermined number can be changed in the Parameter file.

AvgDev
The AvgDev is the average deviation of the measurements taken using the Data button. The AvgDev is displayed after the predetermined number of readings have taken place.

C-Frame Control
Contains the buttons for moving the Electric C-Frame (if equipped and enabled). The C-Frame Controls are enabled on the System Setup Screen, as long as the MANUAL/AUTO Switch on the Power Panel is set to AUTO.

Move On (Alt-O)
This button will move the C-Frame on sheet, and turns yellow when motion is commanded.

Move Off (Alt-F)
This button will move the C-Frame off sheet, and turns yellow when motion is commanded.

Oscillate (Alt-C)
This button will bring the C-Frame on sheet and will oscillate it from edge to edge, and turns yellow when motion is commanded. The oscillate function requires photocells.

Note: The C-Frame Control section on the Diagnostic Data screen works the same as the C-Frame Control section on the Main Screen.

Samples Control
The internal samples are physically located inside the source head of the AGT400. There are two small samples used in conjunction with each other in order to make three internal sample values. These values are not the actual thickness of the samples, but are 'designated values'. The reason they are 'designated values' is that the internal samples are located well below the passline and inside the source head. When the gauge is calibrated manually, it takes into account any signal loss caused by the lid of the source head and the measurement of external samples at the correct passline height and angle.

The internal samples are used to verify calibration using the ISOcheck™ function or to correct the calibration using the ISOcal™ function.

The user can also manually check the internal samples against the Nominal values by opening the shutter using the Shutter Control button, and then inserting the desired sample to check. The values can then be compared to the correlating values in the Nominal area under Thickness Readings section.

Sample 1 (Alt-1)
The Sample 1 button will physically insert the internal sample number one. This sample is the smaller of the two internal samples. When Product 0 (typically Uncoated Steel) is selected, the measured thickness of sample one should be within +/-0.5% of the value located in the Thickness Readings section, Sample 1 Nominal.
Note: Shutter must be in Open position in order to select Sample 1.

Sample 2 (Alt-2)
The Sample 2 button will physically insert the internal sample number two. This sample is the larger of the two internal samples. When Product 0 (typically Uncoated Steel) is selected, the measured thickness of sample two should be within +/-0.5% of the value located in the Thickness Readings section, Sample 2 Nominal.
Note: Shutter must be in Open position in order to select Sample 2.

Sample 3 (Alt-3)
The Sample 3 button will physically insert the internal samples number one and number two. This sample is a combination of the two internal samples. When Product 0 (typically Uncoated Steel) is selected, the measured thickness of sample three should be within +/-0.5% of the value located in the Thickness Readings section, Sample 3 Nominal.
Note: Shutter must be in Open position in order to select Sample 3.

Limits
Displays the High, Low and Target thicknesses entered by the operator on the Main Screen. These values cannot be changed on the Diagnostic Data Screen.

Print Report
The Print Report button allows the user to print out an ISOcheck™ report or an ISOcal™ report. The report printed will be from the most recent procedure performed.

Print Screen
Located in the Maint Data section of the Diagnostic Data page, the Print Screen button allows the user to print an exact copy of the entire Diagnostic Data page. This is a very useful tool in troubleshooting, as the Diagnostic Data page printout can be faxed to A.G.T. for additional technical support.

System Information
This section, located in the lower left-hand portion of the Diagnostic Data page, contains the type of software, current software version and the system serial number.

Temperature
The Temperature section displays the temperature inside the main electronics cabinet. If this temperature exceeds approximately 85ºF, the cooling fan located on the back of the main electronics cabinet will turn on. The cooling fan will not turn off until the temperature inside the main electronics cabinet falls below approximately 70ºF. The fan is controlled by a thermostat located on the electronics shelf. Temperature may be configured in Fahrenheit (°F) or Celsius (°C) on the Special Functions Screen.

CFrame Data
The CFrame Data section of the Diagnostic Data screen gives a visual quick look at all signals relating to the C-Frame. In the upper portion of the CFrame Data is a text box. In it will be the word Computer on a white background or the word Manual on a yellow background. For manual C-Frames this will always be Manual on a yellow background. For Electric C-Frames, flipping the switch located on the Electronic Shelf inside the main electronics cabinet can change this. While the switch is in AUTO, the CFrame Data box will read Computer on a white background. While in MANUAL, the CFrame Data box will read Manual on a yellow background.

Off Cmd
The Off Cmd is a digital high or low depending on the status of the command. When the Move Off (Alt-F) button is selected under C-Frame, the 0 (low) next to Off Cmd will change to a 1 (high) until the C-Frame reaches the off limit switch or the C-Frame drive motor times out.

On Cmd
The On Cmd is a digital high or low depending on the status of the command. When the Move On (Alt-O) button is selected under C-Frame, the 0 (low) next to On Cmd will change to a 1 (high) until the C-Frame reaches the on limit switch, reaches the forward photocell or the C-Frame drive motor times out.

Osc Cmd
The Osc Cmd is a digital high or low depending on the status of the command. When the Oscillate (Alt-C) button is selected under C-Frame, the 0 (low) next to Osc Cmd will change to a 1 (high) until the C-Frame reaches the forward photocell. At the forward photocell, the C-Frame will reverse direction until it reaches the rear photocell. The C-Frame will then reverse direction again and move to the forward photocell. This process will continue until the Oscillate (Alt-C) button is selected again, the Move On (Alt-O) is selected or the Move Off (Alt-F) is selected, or the C-Frame motor times out.

Zone
The Zone area is the physical location of the C-Frame.

Off = at Off Sheet Limit Switch
 0 = completely off sheet, but not at the Off Sheet Limit Switch
 1 = Off Sheet Photocell off sheet, On Sheet Photocell on sheet
 2 = not at center, both Photocells on sheet, near off sheet edge
 3 = approximate center
 4 = not at center, both Photocells on sheet, near on sheet edge
 5 = Off Sheet Photocell on sheet, On sheet Photocell off sheet
 6 = completely off sheet, but not at the On Sheet Limit Switch
 7 = at On Sheet Limit Switch

NOTE: Zones 1 through 5 correspond to Zones 1 through 5 on systems equipped with coil mapping.

On Timer
The On Timer is a timeout feature of the AGT400 to prevent the C-Frame drive motor from burning out in the event of a C-frame obstruction or limit switch failure. The On Timer will commence counting as long as a C-Frame movement command is present. Once the On Timer has reached a predetermined count, typically 30 seconds (shown as 600 50-millisecond increments), the C-Frame drive motor will turn off. This timer may be adjusted in the Parameter file.

Off Timer
The Off Timer is a feature of the AGT400 to give the C-Frame a pause before moving or changing direction. The Off Timer will commence prior to any C-Frame movement or change in direction after a C-Frame movement command is given or present. Once the Off Timer has reached a predetermined count, typically one second (shown as 20 50-millisecond increments), the C-Frame will commence movement. This timer may be adjusted in the Parameter file.

Power Cmd
When the C-Frame is commanded to move, the Power Cmd will change from a 0 (low) to a 1 (high). This command will energize the power relay R1 on the Electronics Shelf.

Direct Cmd
When the Power Cmd is a 1 (high), the C-Frame will commence movement. The Direct Cmd determines in which direction the C-Frame will move. When moving On Sheet, the Direct Cmd will change from a 0 (low) to a 1 (high). This command will energize the power relay R2 on the Electronics Shelf. While energized, R2 will proved a DC voltage from the rectifier to move the C-Frame in the On Sheet direction. When moving Off

k

Sheet, the Direct Cmd will change from a 1 (high) to a 0 (low). This will de-energize the power relay R2 on the Electronics Shelf. While de-energized, R2 will pass a reverse polarity DC voltage from the rectifier to move the C-Frame in the Off Sheet direction.

CFrame Cmd
The CFrame Cmd will command the C-Frame to stop, move On Sheet, move Off Sheet or Oscillate.
0 = C-Frame is commanded to stop.
1 = C-Frame is commanded to move in the Off Sheet direction.
2 = C-Frame is commanded to move in the On Sheet direction.
3 = C-Frame is commanded to Oscillate.

Prev Cmd
The Prev Cmd is a receipt of, and will always follow the CFrame Cmd.
0 = C-Frame is commanded to stop.
1 = C-Frame is commanded to move in the Off Sheet direction.
2 = C-Frame is commanded to move in the On Sheet direction.
3 = C-Frame is commanded to Oscillate.

Off Limit
The Off Limit is a digital high or low depending on the status of the digital input. When the off limit switch is closed, the status is a 1 (high). When the off limit switch is open, the status is a 0 (low).

Off Photo
The Off Photo is a digital high or low depending on the status of the digital input. When the off photocell is blocked, the status is a 0 (low). When the off photocell is unblocked, the status is a 1 (high).

On Photo
The On Photo is a digital high or low depending on the status of the digital input. When the on photocell is blocked, the status is a 0 (low). When the on photocell is unblocked, the status is a 1 (high).

On Limit
The On Limit is a digital high or low depending on the status of the digital input. When the on limit switch is closed, the status is a 1 (high). When the on limit switch is open, the status is a 0 (low).

Digital Data
The Digital Data section shows the status of various digital inputs.

Open Lamp
The Open Lamp is a digital high or low depending on the status of the digital output. When the Shutter Lamp and Data Acquisition Control is set to 'by head switches', the digital high or low is triggered by the status of the shutter open microswitch inside the source head. When the shutter open microswitch is in the open position, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the red lamp. When the shutter open microswitch is in the closed position, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the red lamp. When the Shutter Lamp and Data Acquisition Control is set to 'by command', the digital high or low is triggered by the Shutter Control button. When the shutter is commanded to open, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the red lamp. When the shutter is commanded to close, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the red lamp.
Note: the Shutter Lamp and Data Acquisition Control setting can be changed in the Parameter file.

Closed Lamp
The Closed Lamp is a digital high or low depending on the status of the digital output. When the Shutter Lamp and Data Acquisition Control is set to 'by head switches', the digital high or low is triggered by the status of the shutter closed microswitch inside the source head. When the shutter closed microswitch is in the closed position, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the green lamp. When the shutter closed microswitch is in the open position, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the green lamp. When the Shutter Lamp and Data Acquisition Control is set to 'by command', the digital high or low is triggered by the Shutter Control button. When the shutter is commanded to close, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the green lamp. When the shutter is commanded to open, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the green lamp.
Note: the Shutter Lamp and Data Acquisition Control setting can be changed in the Parameter file.

High Lamp
The High Lamp is a digital high or low depending on the command to the digital output. When the shutter is open and the Measured Thickness is above the High Limit, the status is a 1 (high), sending 120 VAC to the blue lamp. When the shutter is closed or the Measured Thickness is below the High Limit, the status is a 0 (low), removing 120 VAC from the blue lamp.

Low Lamp

The Low Lamp is a digital high or low depending on the command to the digital output. When the shutter is open and the Measured Thickness is below the Low Limit, the status is a 1 (high), sending 120 VAC to the amber lamp. When the shutter is closed or the Measured Thickness is above the Low Limit, the status is a 0 (low), removing 120 VAC from the amber lamp.

Maintenance Mode

When the MODE Keyswitch is in the RUN mode, this digital input will be a 0 (low). When the Mode Keyswitch is in the PROGRAM mode, this digital input will be a 1 (high).

MF Board Digital Inputs

Shows the status if the three auxiliary digital inputs processed through the analog I/O board.

MF Test Switch

Shows the status of the Multifunction Board test switch. The normal status is a 0 (low). A 1 (high) indicates the Multifunction Board test switch is in the low or high test mode.

MF Digital Input#1

The MF Digital Input#1 is used with Auto Data Gathering. The normal status is a 0 (low). A 1 (high) activates the Auto Data Gathering if it is enabled in the Parameter file and on the Special Functions Screen. The AGT400 will gather data in one of two ways. If the Parameter file is set to a 1, the gauge will automatically open the Shutter and start the report. If the Parameter file is set to a 2, the gauge will automatically open the Shutter, start the report and command the C-Frame to move on sheet or oscillate, depending on C-Frame configuration.

MF Digital Input#2

The MF Digital Input#2 is used with Auto Data Entry. The normal status is a 0 (low). A 1 (high) activates the Auto Data Entry if it is enabled in the Parameter file and on the Special Functions Screen.

Source Head Cmd and Switch Status

This section gives the digital highs and lows for the source head.

Shutter Cmd

The Shutter Cmd is a digital high or low depending on the status of the command. If the Shutter Control (Alt-S) button is selected to open the shutter, the 0 (low) next to Shutter Cmd will change to a 1 (high), meaning the command has been sent to the Electronics Shelf for the shutter to open. If the Shutter Control (Alt-S) button is selected to close the shutter,

the 1 (high) next to the Shutter Cmd will change to a 0 (low), meaning the command has been sent to the source head for the shutter to close. Note: The Shutter will not receive the signal to open if the SHUTTER Keyswitch is in the LOCK position.

Shutter Switch Status
The Shutter Switch Status' (Open and Closed) are digital highs or lows depending on the status of the digital inputs. With the shutter in the closed position, the Shutter Open Switch Status reads 0 (low) and the Shutter Closed Switch Status reads 1 (high). With the shutter in the open position, the Shutter Open Switch Status should be a 1 (high) and the Shutter Closed Switch Status should be a 0 (low).

Sample 1 Cmd
The Sample 1 Cmd is a digital high or low depending on the status of the command. If the Shutter Control (Alt-S) button is selected to open the shutter, and the Sample 1 (Alt-1) or Sample 3 (Alt-3) button is selected, the 0 (low) next to Sample 1 will change to a 1 (high). This means the command has been sent to the source head for the sample one to insert. If the Shutter Control (Alt-S) button is selected to close the shutter, or the Sample 1 (Alt-1) or Sample 3 (Alt-3) button is selected, the 1 (high) next to the Sample 1 will change to a 0 (low). This means the command has been sent to the source head for the sample one to be removed.

Sample 1 Switch Status
The Sample 1 Switch Status' (In and Out) are digital highs or lows depending on the status of the digital inputs. With the shutter in the closed position, the Sample 1 In Switch Status reads 0 (low) and the Sample 1 Out Switch Status reads 1 (high). With the shutter in the open position, and sample one or sample 3 inserted, the Sample 1 In Switch Status reads 1 (high) and the Sample 1 Out Switch Status reads 0 (low).

Sample 2 Cmd
The Sample 2 Cmd is a digital high or low depending on the status of the command. If the Shutter Control (Alt-S) button is selected to open the shutter, and the Sample 2 (Alt-2) or Sample 3 (Alt-3) button is selected, the 0 (low) next to Sample 2 will change to a 1 (high). This means the command has been sent to the source head for the sample two to insert. If the Shutter Control (Alt-S) button is selected to close the shutter, or the Sample 2 (Alt-2) or Sample 3 (Alt-3) button is selected, the 1 (high) next to the Sample 2 will change to a 0 (low). This means the command has been sent to the source head for the sample two to be removed.

Sample 2 Switch Status
The Sample 2 Switch Status' (In and Out) are digital highs or lows depending on the status of the digital inputs. With the shutter in the closed position, the Sample 2 In Switch Status reads 0 (low) and the Sample 2 Out Switch Status reads 1 (high). With the shutter in the open position, and sample two or sample three inserted, the Sample 2 In Switch Status reads 1 (high) and the Sample 2 Out Switch Status reads 0 (low).

DC Voltages
The DC Voltages section gives the user the ability to quickly check important voltages. Chan 1 and Chan 2 are spare analog channels. -Hi Volts, +13 Volts, +5 Volts, -15 Volts and +15 Volts give the user the ability to monitor the gauge power supplies without having to use a voltmeter.

Analog Inputs
This section gives the user the ability to monitor the eight 16 bit analog input channels. Values range from 0 to 65535, with 0 representing 0 VDC and 65535 representing 10 VDC.

Time Constant
The Time Constant listed on the Diagnostic Data page is the Time Constant for the gauge at that moment. Special Note: If the gauge is in Auto Time Constant mode, the Time Constant shown on the Diagnostic Data screen will be the maximum Time Constant available. The Time Constant can be changed on the System Setup screen.

Chan 0
Channel 0 is a digital value for the analog signal from the detector head. This value will change depending on how much radiation is being received by the detector. Typically, with the shutter closed, the Preamp A/D value for Chan 0 will be about 131, and with the shutter open, it will be about 62500.

Chan 1
Spare, usually used for Multifunction Board temperature monitoring.

Chan 2
Spare, may be configured for strip width or any other analog input from customer.

Chan 3
Negative High Voltage (-430VDC), typically around 30200

Chan 4
Positive 13 Volts (+13VDC), typically around 43200

Chan 5
Positive 5 Volts (+5VDC) typically around 32800

Chan 6
Negative 15 Volts (-15VDC), typically around 49300

Chan 7
Positive 15 Volts (+15VDC), typically around 49300

Thickness Readings
This section is divided into a few areas. The first section gives the user the ability to see nominal values for comparing to the measured values. The second section gives the user the ability to see nominal A/D values for comparing to the measured A/D values. The third section contains the tachometer counter and tachometer pulses, as well as the gauge calibration curve coefficients.

Date
The date in the upper left-hand corner of the Thickness Readings section is the date the gauge was last calibrated manually. This date is there so the user knows when the Nominal values were generated.

Measured
The measured thickness for Air, Sample 1, Sample 2 and Sample 3 during an ISOcheck™ or ISOcal™ are displayed in this column. They will be compared to the corresponding Nominal values next to them. If they are within a preset tolerance percentage, they will be displayed on a green background. If they are not within tolerance, they will be displayed on a yellow background.

Nominal
The Nominal values for Air, Sample 1, Sample 2 and Sample 3 are displayed in this column. These values will be compared to the current measurement during an ISOcheck™ or an ISOcal™. The Nominal values are determined using the internal samples during a manual calibration. The date in the upper left-hand corner of the Thickness Readings is the date the last manual calibration was completed.

A/D Measured
The A/D Measured is the average Channel 0 digital value for the analog signal from the detector head. This value will change depending on how much radiation is being received by the detector. With the shutter closed, the Closed A/D Measurement will be about 131. With the shutter open, the Air A/D Measurement will be about 62500. The three samples will vary depending on thickness and value of Air A/D Measurement.

The A/D Measured value for Closed, Air, Sample 1, Sample 2 and Sample 3 during an ISOcheck™ or ISOcal™ are displayed in this column. They will be compared to the corresponding Nominal values next to them. If the Air A/D Measured value is too far off, the gauge thickness will not read 0.0 in measured thickness. The ISOcheck™ program will adjust the measured thickness of Air to read 0.0, which means the Air A/D Measured value may not match the Air A/D Nominal value.

During an ISOcal™, the gauge will ignore the A/D Nominal values completely, and instead focus on the Nominal Thickness Readings by forcing the gauge to read the correct thickness regardless of the A/D values.

TachCtr/Pulses
The TachCtr/Pulses section of the Diagnostic Data screen monitors tachometer rotation and operation. If the tachometer is currently moving, the Pulses section will scroll numbers as it pulses from the tachometer. The TachCtr section is a continuous tachometer counter. If the tachometer stops moving, this section will give a current count of tachometer pulses received.

A1
This is the first term thickness algorithm variable calculated by the AGT400 software. This value is theoretically equal to the inverse of the gamma ray absorption coefficient of Product 0 (normally Uncoated Steel). Typically, this value will range between 42.000 and 44.000.

A2
This is a second term thickness algorithm variable calculated by the AGT400 software. This value will typically range between 300 and 600, and will be shown in scientific notation (i.e. 3.00E+2 to 6.00E+2)

P1
This is a proprietary constant equal to 0.78 used by the AGT400 software during the thickness algorithm calculation.

Message Box
The message box will give the user valuable information relating to the ISOcheck™ procedure, the ISOcal™ procedure, C-Frame errors, etc.

OK (Alt-K)
Exits the Diagnostic Data Screen and returns the operator to the AGT400 Main Screen.

NOTE: See ISOcheck™ Report for an example of printed reports from this screen.

Diagnostic Data Screen
SAC – 2/11/2013

The Diagnostic Data Screen is a unique feature of the AGT400. This screen is a great troubleshooting aid and allows for the quick viewing of all pertinent information such as analog and digital signals, DC voltages, shutter status, C-frame status, A/D values and many others. Among the best features of the Diagnostic Data Screen are the ISOcheck™ and ISOcal™ functions. They permit the quick and easy verification and/or correction of the measurement.

ISOcheck™ (Alt-H)
It is recommended that the ISOcheck™ feature be performed once per week in most applications. Although this is not necessary for your AGT400 thickness gauge to read correctly, it will ensure the best possible performance of your gauge.

The reason the ISOcheck™ is recommended once per week is that the gauge will correct any discrepancy in the Air value. Air will fluctuate over time due to many reasons and can easily be kept in tolerance, along with the internal samples, by using the ISOcheck™ feature.

When the ISOcheck™ is performed, the gauge will compare the current Air measurement, Sample 1 measurement, Sample 2 measurement and Sample 3 measurement to the nominal values that were designated during the last manual calibration, in addition to correcting the Air reading if necessary.

Refer to ISOcheck™ in the Maintenance Section of this manual for procedure instructions.

ISOcal™ (Alt-L)

The ISOcal™ feature of the AGT400 should only be used if repeated ISOcheck™ attempts have failed. An ISOcal™ measures the internal samples and re-calculates the thickness algorithm variables (A1 and A2) based on those measurements.

Refer to ISOcal™ in the Maintenance Section in this manual for procedure instructions.

Shutter Control (Alt-S)

The Shutter Control button opens or closes the shutter whenever the shutter keyswitch is in the UNLOCK position. The graphic area shows the shutter command and is color-coded. When the shutter is commanded to close, the graphic area displays the word Closed on a green background with a key symbol to the left. When the shutter is commanded to open, the graphic area displays the word Open on a red background with a radiation symbol to the left.

Note 1: The Shutter Control button on the Diagnostic Data screen works the same as the Shutter Control button on the Main Screen. The shutter will not open with the Shutter Keyswitch in the LOCK position.

Note 2: If the Shutter Keyswitch is in the LOCK position and the Shutter button is activated, the graphic will show the shutter is commanded to be in the open position. The Message Center will display alarms indicating an incorrect shutter status.

Thickness Display

Displays Measured Thickness in thousandths of inches (mils) or millimeters (mm), depending on the units selected on the System Setup Screen. When the measured thickness exceeds the upper limit, the Thickness Display background will be blue, and the blue classifier light is illuminated. When the measured thickness is in tolerance, the Thickness Display background will be green. When the measured thickness is below the lower limit, the Thickness Display background will be yellow, and the amber classifier light is illuminated.

Data (Alt-D)

The Data button allows the user to average a predetermined number of measurements. The result is displayed in the Thickness Display along with an AvgDev count. The predetermined number can be changed in the Parameter file.

AvgDev
The AvgDev is the average deviation of the measurements taken using the Data button. The AvgDev is displayed after the predetermined number of readings have taken place. The units (mils or mm.) are as selected on the System Setup screen.

C-Frame Control
Contains the buttons for moving the Electric C-Frame (if equipped and enabled). The C-Frame Controls are enabled on the System Setup Screen, as long as the MANUAL/AUTO Switch on the Power Panel is set to AUTO.

Move On (Alt-O)
This button will move the C-Frame on sheet, and turns yellow when motion is commanded.

Move Off (Alt-F)
This button will move the C-Frame off sheet, and turns yellow when motion is commanded.

Oscillate (Alt-C)
This button will bring the C-Frame on sheet and will oscillate it from edge to edge, and turns yellow when motion is commanded. The oscillate function requires photocells.

Samples Control
The internal samples are physically located inside the source head of the AGT400. There are two small samples used in conjunction with each other in order to make three internal sample values. These values are not the actual thickness of the samples, but are 'designated values'. The reason they are 'designated values' is that the internal samples are located well below the passline and inside the source head. When the gauge is calibrated manually, it takes into account any signal loss caused by the lid of the source head and the measurement of external samples at the correct passline height and angle.

The internal samples are used to verify calibration using the ISOcheck™ function or to correct the calibration using the ISOcal™ function.

The user can also manually check the internal samples against the Nominal values by opening the shutter using the Shutter Control button, and then inserting the desired sample to check. The values can then be compared to the correlating values in the Nominal area under Thickness Readings section.

Sample 1 (Alt-1)
The Sample 1 button will physically insert the internal sample number one.
This sample is the smaller of the two internal samples. When Product 0
(typically Uncoated Steel) is selected, the measured thickness of sample
one should be within +/-0.5% of the value located in the Thickness
Readings section, Sample 1 Nominal.
Note: Shutter must be in Open position in order to select Sample 1.

Sample 2 (Alt-2)
The Sample 2 button will physically insert the internal sample number two.
This sample is the larger of the two internal samples. When Product 0
(typically Uncoated Steel) is selected, the measured thickness of sample
two should be within +/-0.5% of the value located in the Thickness
Readings section, Sample 2 Nominal.
Note: Shutter must be in Open position in order to select Sample 2.

Sample 3 (Alt-3)
The Sample 3 button will physically insert the internal samples number
one and number two. This sample is a combination of the two internal
samples. When Product 0 (typically Uncoated Steel) is selected, the
measured thickness of sample three should be within +/-0.5% of the value
located in the Thickness Readings section, Sample 3 Nominal.
Note: Shutter must be in Open position in order to select Sample 3.

Limits
Displays the High, Low and Target thicknesses entered by the operator on
the Main Screen. These values cannot be changed on the Diagnostic
Data Screen.

Print Report
The Print Report button allows the user to print out an ISOcheck™ report
or an ISOcal™ report. The report printed will be from the most recent
procedure performed.

Print Screen
Located in the Maint Data section of the Diagnostic Data page, the Print
Screen button allows the user to print an exact copy of the entire
Diagnostic Data page. This is a very useful tool in troubleshooting, as the
Diagnostic Data page printout can be faxed to A.G.T. for additional
technical support.

System Information
This section, located in the lower left-hand portion of the Diagnostic Data
page, contains the type of software, current software version and the
system serial number.

Temperature
The Temperature section displays the temperature inside the main electronics cabinet. If this temperature exceeds approximately 85ºF, the cooling fan located on the back of the main electronics cabinet will turn on. The cooling fan will not turn off until the temperature inside the main electronics cabinet falls below approximately 70ºF. The fan is controlled by a thermostat located on the electronics shelf. Temperature may be configured in Fahrenheit (°F) or Celsius (°C) on the Special Functions Screen.

CFrame Data
The CFrame Data section of the Diagnostic Data screen gives a visual quick look at all signals relating to the C-Frame. In the upper portion of the CFrame Data is a text box. In it will be the word Computer on a white background or the word Manual on a yellow background. For manual C-Frames this will always be Manual on a yellow background. For Electric C-Frames, flipping the switch located on the Electronic Shelf inside the main electronics cabinet can change this. While the switch is in AUTO, the CFrame Data box will read Computer on a white background. While in MANUAL, the CFrame Data box will read Manual on a yellow background.

Off Cmd
The Off Cmd is a digital high or low depending on the status of the command. When the Move Off (Alt-F) button is selected under C-Frame, the 0 (low) next to Off Cmd will change to a 1 (high) until the C-Frame reaches the off limit switch or the C-Frame drive motor times out.

On Cmd
The On Cmd is a digital high or low depending on the status of the command. When the Move On (Alt-O) button is selected under C-Frame, the 0 (low) next to On Cmd will change to a 1 (high) until the C-Frame reaches the on limit switch, reaches the forward photocell or the C-Frame drive motor times out.

Osc Cmd
The Osc Cmd is a digital high or low depending on the status of the command. When the Oscillate (Alt-C) button is selected under C-Frame, the 0 (low) next to Osc Cmd will change to a 1 (high) until the C-Frame reaches the forward photocell. At the forward photocell, the C-Frame will reverse direction until it reaches the rear photocell. The C-Frame will then reverse direction again and move to the forward photocell. This process will continue until the Oscillate (Alt-C) button is selected again, the Move On (Alt-O) is selected or the Move Off (Alt-F) is selected, or the C-Frame motor times out.

Zone

The Zone area is the physical location of the C-Frame.

Off = at Off Sheet Limit Switch
 0 = completely off sheet, but not at the Off Sheet Limit Switch
 1 = Off Sheet Photocell off sheet, On Sheet Photocell on sheet
 2 = not at center, both Photocells on sheet, near off sheet edge
 3 = approximate center
 4 = not at center, both Photocells on sheet, near on sheet edge
 5 = Off Sheet Photocell on sheet, On sheet Photocell off sheet
 6 = completely off sheet, but not at the On Sheet Limit Switch
 7 = at On Sheet Limit Switch

NOTE: Zones 1 through 5 correspond to Zones 1 through 5 on systems equipped with coil mapping.

On Timer

The On Timer is a timeout feature of the AGT400 to prevent the C-Frame drive motor from burning out in the event of a C-frame obstruction or limit switch failure. The On Timer will commence counting as long as a C-Frame movement command is present. Once the On Timer has reached a predetermined count, typically 30 seconds (shown as 600 50-millisecond increments), the C-Frame drive motor will turn off. This timer may be adjusted in the Parameter file.

Off Timer

The Off Timer is a feature of the AGT400 to give the C-Frame a pause before moving or changing direction. The Off Timer will commence prior to any C-Frame movement or change in direction after a C-Frame movement command is given or present. Once the Off Timer has reached a predetermined count, typically one second (shown as 20 50-millisecond increments), the C-Frame will commence movement. This timer may be adjusted in the Parameter file.

Power Cmd

When the C-Frame is commanded to move, the Power Cmd will change from a 0 (low) to a 1 (high). This command will energize the power relay R1 on the Electronics Shelf.

Direct Cmd

When the Power Cmd is a 1 (high), the C-Frame will commence movement. The Direct Cmd determines in which direction the C-Frame will move. When moving On Sheet, the Direct Cmd will change from a 0 (low) to a 1 (high). This command will energize the power relay R2 on the Electronics Shelf. While energized, R2 will proved a DC voltage from the rectifier to move the C-Frame in the On Sheet direction. When moving Off

Sheet, the Direct Cmd will change from a 1 (high) to a 0 (low). This will de-energize the power relay R2 on the Electronics Shelf. While de-energized, R2 will pass a reverse polarity DC voltage from the rectifier to move the C-Frame in the Off Sheet direction.

CFrame Cmd
The CFrame Cmd will command the C-Frame to stop, move On Sheet, move Off Sheet or Oscillate.
0 = C-Frame is commanded to stop.
1 = C-Frame is commanded to move in the Off Sheet direction.
2 = C-Frame is commanded to move in the On Sheet direction.
3 = C-Frame is commanded to Oscillate.

Prev Cmd
The Prev Cmd is a receipt of, and will always follow the CFrame Cmd.
0 = C-Frame is commanded to stop.
1 = C-Frame is commanded to move in the Off Sheet direction.
2 = C-Frame is commanded to move in the On Sheet direction.
3 = C-Frame is commanded to Oscillate.

Off Limit
The Off Limit is a digital high or low depending on the status of the digital input. When the off limit switch is closed, the status is a 1 (high). When the off limit switch is open, the status is a 0 (low).

Off Photo
The Off Photo is a digital high or low depending on the status of the digital input. When the off photocell is blocked, the status is a 0 (low). When the off photocell is unblocked, the status is a 1 (high).

On Photo
The On Photo is a digital high or low depending on the status of the digital input. When the on photocell is blocked, the status is a 0 (low). When the on photocell is unblocked, the status is a 1 (high).

On Limit
The On Limit is a digital high or low depending on the status of the digital input. When the on limit switch is closed, the status is a 1 (high). When the on limit switch is open, the status is a 0 (low).

Digital Data
The Digital Data section shows the status of various digital inputs.

Open Lamp
The Open Lamp is a digital high or low depending on the status of the digital output. When the Shutter Lamp and Data Acquisition Control is set to 'by head switches', the digital high or low is triggered by the status of the shutter open microswitch inside the source head. When the shutter open microswitch is in the open position, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the red lamp. When the shutter open microswitch is in the closed position, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the red lamp. When the Shutter Lamp and Data Acquisition Control is set to 'by command', the digital high or low is triggered by the Shutter Control button. When the shutter is commanded to open, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the red lamp. When the shutter is commanded to close, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the red lamp.
Note: the Shutter Lamp and Data Acquisition Control setting can be changed in the Parameter file.

Closed Lamp
The Closed Lamp is a digital high or low depending on the status of the digital output. When the Shutter Lamp and Data Acquisition Control is set to 'by head switches', the digital high or low is triggered by the status of the shutter closed microswitch inside the source head. When the shutter closed microswitch is in the closed position, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the green lamp. When the shutter closed microswitch is in the open position, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the green lamp. When the Shutter Lamp and Data Acquisition Control is set to 'by command', the digital high or low is triggered by the Shutter Control button. When the shutter is commanded to close, the status will change from a 0 (low) to a 1 (high), sending 120 VAC to the green lamp. When the shutter is commanded to open, the status will change from a 1 (high) to a 0 (low), removing 120 VAC from the green lamp.
Note: the Shutter Lamp and Data Acquisition Control setting can be changed in the Parameter file.

High Lamp
The High Lamp is a digital high or low depending on the command to the digital output. When the shutter is open and the Measured Thickness is above the High Limit, the status is a 1 (high), sending 120 VAC to the blue lamp. When the shutter is closed or the Measured Thickness is below the High Limit, the status is a 0 (low), removing 120 VAC from the blue lamp.

Low Lamp
The Low Lamp is a digital high or low depending on the command to the digital output. When the shutter is open and the Measured Thickness is below the Low Limit, the status is a 1 (high), sending 120 VAC to the amber lamp. When the shutter is closed or the Measured Thickness is above the Low Limit, the status is a 0 (low), removing 120 VAC from the amber lamp.

Maintenance Mode
When the MODE Keyswitch is in the RUN mode, this digital input will be a 0 (low). When the Mode Keyswitch is in the PROGRAM mode, this digital input will be a 1 (high).

MF Board Digital Inputs
Shows the status if the three auxiliary digital inputs processed through the analog I/O board.

MF Test Switch
Shows the status of the Multifunction Board test switch. The normal status is a 0 (low). A 1 (high) indicates the Multifunction Board test switch is in the low or high test mode.

MF Digital Input#1
The MF Digital Input#1 is used with Auto Data Gathering. The normal status is a 0 (low). A 1 (high) activates the Auto Data Gathering if it is enabled in the Parameter file and on the Special Functions Screen. The AGT400 will gather data in one of two ways. If the Parameter file is set to a 1, the gauge will automatically open the Shutter and start the report. If the Parameter file is set to a 2, the gauge will automatically open the Shutter, start the report and command the C-Frame to move on sheet or oscillate, depending on C-Frame configuration.

MF Digital Input#2
The MF Digital Input#2 is used with Auto Data Entry. The normal status is a 0 (low). A 1 (high) activates the Auto Data Entry if it is enabled in the Parameter file and on the Special Functions Screen.

Source Head Cmd and Switch Status
This section gives the digital highs and lows for the source head.

Shutter Cmd
The Shutter Cmd is a digital high or low depending on the status of the command. If the Shutter Control (Alt-S) button is selected to open the shutter, the 0 (low) next to Shutter Cmd will change to a 1 (high), meaning the command has been sent to the Electronics Shelf for the shutter to open. If the Shutter Control (Alt-S) button is selected to close the shutter,

the 1 (high) next to the Shutter Cmd will change to a 0 (low), meaning the command has been sent to the source head for the shutter to close. Note: The Shutter will not receive the signal to open if the SHUTTER Keyswitch is in the LOCK position.

Shutter Switch Status
The Shutter Switch Status' (Open and Closed) are digital highs or lows depending on the status of the digital inputs. With the shutter in the closed position, the Shutter Open Switch Status reads 0 (low) and the Shutter Closed Switch Status reads 1 (high). With the shutter in the open position, the Shutter Open Switch Status should be a 1 (high) and the Shutter Closed Switch Status should be a 0 (low).

Sample 1 Cmd
The Sample 1 Cmd is a digital high or low depending on the status of the command. If the Shutter Control (Alt-S) button is selected to open the shutter, and the Sample 1 (Alt-1) or Sample 3 (Alt-3) button is selected, the 0 (low) next to Sample 1 will change to a 1 (high). This means the command has been sent to the source head for the sample one to insert. If the Shutter Control (Alt-S) button is selected to close the shutter, or the Sample 1 (Alt-1) or Sample 3 (Alt-3) button is selected, the 1 (high) next to the Sample 1 will change to a 0 (low). This means the command has been sent to the source head for the sample one to be removed.

Sample 1 Switch Status
The Sample 1 Switch Status' (In and Out) are digital highs or lows depending on the status of the digital inputs. With the shutter in the closed position, the Sample 1 In Switch Status reads 0 (low) and the Sample 1 Out Switch Status reads 1 (high). With the shutter in the open position, and sample one or sample 3 inserted, the Sample 1 In Switch Status reads 1 (high) and the Sample 1 Out Switch Status reads 0 (low).

Sample 2 Cmd
The Sample 2 Cmd is a digital high or low depending on the status of the command. If the Shutter Control (Alt-S) button is selected to open the shutter, and the Sample 2 (Alt-2) or Sample 3 (Alt-3) button is selected, the 0 (low) next to Sample 2 will change to a 1 (high). This means the command has been sent to the source head for the sample two to insert. If the Shutter Control (Alt-S) button is selected to close the shutter, or the Sample 2 (Alt-2) or Sample 3 (Alt-3) button is selected, the 1 (high) next to the Sample 2 will change to a 0 (low). This means the command has been sent to the source head for the sample two to be removed.

Sample 2 Switch Status
The Sample 2 Switch Status' (In and Out) are digital highs or lows depending on the status of the digital inputs. With the shutter in the closed position, the Sample 2 In Switch Status reads 0 (low) and the Sample 2 Out Switch Status reads 1 (high). With the shutter in the open position, and sample two or sample three inserted, the Sample 2 In Switch Status reads 1 (high) and the Sample 2 Out Switch Status reads 0 (low).

DC Voltages
The DC Voltages section gives the user the ability to quickly check important voltages. Chan 1 and Chan 2 are spare analog channels. -Hi Volts, +13 Volts, +5 Volts, -15 Volts and +15 Volts give the user the ability to monitor the gauge power supplies without having to use a voltmeter.

Analog Inputs
This section gives the user the ability to monitor the eight 16 bit analog input channels. Values range from 0 to 65535, with 0 representing 0 VDC and 65535 representing 10 VDC.

Time Constant
The Time Constant listed on the Diagnostic Data page is the Time Constant for the gauge at that moment. Special Note: If the gauge is in Auto Time Constant mode, the Time Constant shown on the Diagnostic Data screen will be the maximum Time Constant available. The Time Constant can be changed on the System Setup screen.

Chan 0
Channel 0 is a digital value for the analog signal from the detector head. This value will change depending on how much radiation is being received by the detector. Typically, with the shutter closed, the Preamp A/D value for Chan 0 will be about 131, and with the shutter open, it will be about 62500.

Chan 1
Spare, usually used for Multifunction Board temperature monitoring.

Chan 2
Spare, may be configured for strip width or any other analog input from customer.

Chan 3
Negative High Voltage (-430VDC), typically around 30200

Chan 4
Positive 13 Volts (+13VDC), typically around 43200

Chan 5
Positive 5 Volts (+5VDC) typically around 32800

Chan 6
Negative 15 Volts (-15VDC), typically around 49300

Chan 7
Positive 15 Volts (+15VDC), typically around 49300

Thickness Readings
This section is divided into a few areas. The first section gives the user the ability to see nominal values for comparing to the measured values. The second section gives the user the ability to see nominal A/D values for comparing to the measured A/D values. The third section contains the tachometer counter and tachometer pulses, as well as the gauge calibration curve coefficients.

Date
The date in the upper left-hand corner of the Thickness Readings section is the date the gauge was last calibrated manually. This date is there so the user knows when the Nominal values were generated.

Measured
The measured thickness for Air, Sample 1, Sample 2 and Sample 3 during an ISOcheck™ or ISOcal™ are displayed in this column. They will be compared to the corresponding Nominal values next to them. If they are within a preset tolerance percentage, they will be displayed on a green background. If they are not within tolerance, they will be displayed on a yellow background.

Nominal
The Nominal values for Air, Sample 1, Sample 2 and Sample 3 are displayed in this column. These values will be compared to the current measurement during an ISOcheck™ or an ISOcal™. The Nominal values are determined using the internal samples during a manual calibration. The date in the upper left-hand corner of the Thickness Readings is the date the last manual calibration was completed.

A/D Measured
The A/D Measured is the average Channel 0 digital value for the analog signal from the detector head. This value will change depending on how much radiation is being received by the detector. With the shutter closed, the Closed A/D Measurement will be about 131. With the shutter open, the Air A/D Measurement will be about 62500. The three samples will vary depending on thickness and value of Air A/D Measurement.

The A/D Measured value for Closed, Air, Sample 1, Sample 2 and Sample 3 during an ISOcheck™ or ISOcal™ are displayed in this column. They will be compared to the corresponding Nominal values next to them. If the Air A/D Measured value is too far off, the gauge thickness will not read 0.0 in measured thickness. The ISOcheck™ program will adjust the measured thickness of Air to read 0.0, which means the Air A/D Measured value may not match the Air A/D Nominal value.

During an ISOcal™, the gauge will ignore the A/D Nominal values completely, and instead focus on the Nominal Thickness Readings by forcing the gauge to read the correct thickness regardless of the A/D values.

TachCtr/Pulses
The TachCtr/Pulses section of the Diagnostic Data screen monitors tachometer rotation and operation. If the tachometer is currently moving, the Pulses section will scroll numbers as it pulses from the tachometer. The TachCtr section is a continuous tachometer counter. If the tachometer stops moving, this section will give a current count of tachometer pulses received.

A1
This is the first term thickness algorithm variable calculated by the AGT400 software. This value is theoretically equal to the inverse of the gamma ray absorption coefficient of Product 0 (normally Uncoated Steel). Typically, this value will range between 42.000 and 44.000.

A2
This is a second term thickness algorithm variable calculated by the AGT400 software. This value will typically range between 300 and 600, and will be shown in scientific notation (i.e. 3.00E+2 to 6.00E+2)

P1
This is a proprietary constant equal to 0.78 used by the AGT400 software during the thickness algorithm calculation.

Message Box
The message box will give the user valuable information relating to the ISOcheck™ procedure, the ISOcal™ procedure, C-Frame errors, etc.

OK (Alt-K)
Exits the Diagnostic Data Screen and returns the operator to the AGT400 Main Screen.

NOTE: See ISOcheck™ Report for an example of printed reports from this screen.

System Setup Screen
CJW – 12/11/03

The System Setup Screen is used to customize the system for the user's preferences.

Tach (Alt-A)
This button is used to toggle the tachometer between the External and Internal mode. When Tach is in External mode, the gauge will count footage from the actual tachometer based on the settings in the Pulses/Rev and Tach Roll Diam fields. When Tach is in Internal mode, the gauge will give a steady, but inaccurate, footage count. This is useful in the situation that the tachometer is damaged. The internal footage counter will allow reports to be generated, until the tachometer is repaired, although the footage and estimated weight will be inaccurate in this mode.

C-Frame (Alt-F)
The C-Frame button allows the user to choose between three separate C-Frame modes of operation. The user can choose between Manual, Electric and Oscillating C-Frames with this button. NOTE: The type of C-Frame will determine what settings are available.

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Switch Check (Alt-H)

The Switch Check button gives the user the ability to enable or disable the switch checking inside the source head. If a switch has become damaged, and no longer functions correctly, a system message will be given on various screens under certain conditions. The user can disable the check here to allow the operation of the gauge <u>until the switch inside the source head can be repaired</u> **by a licensed individual.**

Method of Setting the Target

This setting allows the user to determine the manner in which the operator will enter the Target thickness, High limit or Low limit.

Halfway Between Limits (Alt-B)

The most common way to enter target thickness is with the Halfway Between Limits setting. In this setting, the operator enters the High Limit and the Low Limit. The gauge will then calculate the target halfway between the High and Low Limits, then set the Target thickness there.

Target +/- Limit (Alt-/)

In this mode, the operator enters the target thickness. The gauge then adds a predetermined amount to the target for a High Limit and subtracts a predetermined amount from the target for the Low Limit. The amount of thickness added and subtracted from the target can be set in the Parameter file. The predetermined limit can be overwritten by the operator on the Main Screen. In this mode, both limits will always be the same distance from the target thickness.

Target +/- % Limit (Alt-G)

In this mode, the operator enters the target thickness. The gauge then adds a predetermined percentage of the target to the target for a High Limit and subtracts a predetermined percentage of the target from the target for the Low Limit. The amount of thickness percentage added and subtracted from the target can be set in the Parameter file. The predetermined limit can be overwritten by the operator on the Main Screen. In this mode, both limits will always be the same distance from the target thickness.

Enter High, Low and Target (Alt-W)

This mode requires the operator enter the High, Low and Target value for each coil.

Pulses/Rev (Alt-S)

This is the number of electrical pulses the tachometer produces each time the roll it is attached to makes one complete rotation.
Standard AGT400 tachometers are 300 PPR.

Minimum Coil Length (Alt-I)
This is the smallest length the AGT400 software will interpret as a genuine coil. Coils with less length than this setting will be treated as operator errors. No report will be printed and no data will be saved.

NOTE: Half of this setting will be used as the excluded coil end length when 'Exclude Coil Ends' is checked on the Report Setup Screen.

Tach Roll Diam (Alt-L)
This is the diameter of the roll the tachometer is connected to. This setting is in inches (in) or centimeters (cm) depending on the settings in the Units section of this screen.

Shifts
The AGT400 has the ability to distinguish between the shifts and at what times these shifts start and stop. To change the Shifts section, determine how many shifts will be working, and at what times they will begin and end. To toggle a shift on or off, check the box (on) next to the shift to be run or uncheck (off) if there is no shift at that time.

For example: If the gauge was only going to be used during the first and second shift, Shift 1 and Shift 2 would have a check in the box next to them. Shift 3 would be unchecked. With this setup, the AGT400 will generate Shift Summary Reports for Shift 1 and Shift 2, but not Shift 3.

To change the Shift Start Times, simply click in the box to the right of the Shift and enter the time the shift is to begin. The time must be entered in AM/PM or 24 hour format, depending on the setting in the Time section of this page.

Company Name (Alt-C)
The company name to be printed on all reports can be changed here.

Machine Name (Alt-M)
The name of the processing line to be printed on all reports can be changed here.

Units/Time/Date
This section allows the user to determine what settings will be used on all screens and reports.

English (Alt-E)   Metric (Alt-R)
Allows the user to toggle between English and Metric units for all measurements and calculations. The setting here will determine how all values are viewed.

AM/PM   24 hour
Allows the user to toggle between the 12 hour clock and the 24 hour clock for all times to be viewed.

mm-dd-yy   dd-mm-yy
Allows the user to toggle between the month/day/year and day/month/year format for all dates to be viewed.

Shutter Timer (Alt-U)
This allows the user to toggle the Shutter Timer on and off. With the Shutter Timer ON, and no material in the radiation beam, the gauge will automatically close the shutter after a predetermined amount of time has passed. The gauge can sense material in the radiation beam two ways. The two choices, Thickness and Photocells, are below the Shutter Timer button. **Thickness** determines there is no material in the radiation beam by examining the actual measured thickness. This is typically around the 0.0 measurement and can be adjusted in the Parameter file. **Photocells** determines there is no material in the radiation beam by checking the status of the two photocell receivers. If both photocell receivers are able to detect their respective emiiters, then there is no material blocking them, and thus, no material blocking the radiation beam. The amount of time for automatic shutter closing can be changed in the box to the right off the Shutter Timer status.

WARNING! This is a safety feature. If the Shutter Timer is turned OFF, there is a radiation risk to anyone near the source head. There is typically no reason for the Shutter Timer to be turned OFF, and should be left ON at all times.

Readings (Alt-D)
This allows the user to determine the number of readings the AGT400 will use when performing a Manual Calibration, ISOcheck™, ISOcal™ or Data measurement. Normally this is set to 20, but may vary slightly from gauge to gauge.

Internal Sample Tolerances
The values listed in Air, #1, #2 and #3 are the tolerances used during an ISOcheck™ or an ISOcal™. If the measured thicknesses of Air, Sample 1, Sample 2 or Sample 3 are not within the values determined here, the ISOcheck™ or ISOcal™ will fail. Typically these values are +/- 0.5% of the target thickness.

Time Constant (Alt-T)
This is what the AGT400 uses to determine how fast calculations are made. The thicker the material is, the higher the Time Constant needs to be to more accurately measure the material. In most cases, the AGT400

will use an Auto Time Constant (Auto TC). This allows the gauge software to determine what Time Constant would be best to use for a particular measurement determined by pre-set parameters. The Auto Time Constant parameters can be changed in the Parameter file.

TC in use
If Auto TC is turned off, the user can enter the Time Constant to be used here.

Auto TC
This button will toggle Auto TC on and off. This allows the gauge to determine what Time Constant would be best to use for a particular measurement determined by pre-set parameters. The Auto Time Constant parameters can be changed in the Parameter file. When the Auto Time Constant is selected, the Time Constant will change to the minimum Time Constant, determined in the Parameter file, for the Manual Calibration, ISOcheck™ and ISOcal™.

Average Cycle Time (Alt-V)
Average Cycle Time is the amount of time to complete one complete data analysis cycle in the AGT400 software. When this button is clicked, 1000 data analysis cycles are completed and the amount of time this takes is measured. The displayed value is the elapsed time divided by 1000. A healthy computer will have an Average Cycle Time between 8 and 12 milliseconds.

Print Setup (Alt-P)
Sends the AGT400 Setup Report to the system printer.

Print Screen (Alt-7)
Allows the user to print the System Setup Screen.

Restore All (Alt-8)
This button will restore all data on this page to the default settings.

Restore Par (Alt-9)
The Restore Par button is in a sense a safety net. If the settings of the AGT400 have been altered by a great deal. For instance, the gauge calibration curve has been lost, System Settings have been changed, Product or Defect menu is lost, etc. The user may click on the Restore Par button, and the AGT400 will reset all system setup settings to the date of the last successful Manual Calibration. This previous system setup was saved in a special file that is updated each time a Field Service Engineer completes a successful Manual Calibration.

Screen Color (Alt-C)
The Screen Color button allows the user to cycle through seven different colors to be used in the background. Each time the Screen Color button is selected, the gauge background color will change. The color choices are gray, yellow, turquoise, white, blue, black and purple.

OK (Alt-K)
Exits the System Setup Screen and returns the operator to the AGT400 Main Screen.

Report Setup Screen
CJW – 11/14/03

Report Setup

Select the reports and features you want to have printed

Report Data On/Off
- ☑ (0) Coil Summary Report
  - ☑ Clock Time
  - ☑ Length vs Tolerance
  - ☑ Standard Deviation
  - ☑ Min/Max Thickness
  - ☑ Control limits
  - ☑ CR
  - ☑ CP/CPK
  - ☑ TMW
  - ☑ Histogram
  - ☑ Product Distribution
  - ☑ ISOgraph
  - ☑ Supplier
  - ☑ Profile Graph
  - ☑ Defect Details   ☐ Reverse
  - ☐ Coil Mapping Data

Report Data On/Off
- ☑ (1) Shift Summary Report
  - ☐ End Time
  - ☑ Run Time
  - ☑ RBar
  - ☑ High/Low Limits
  - ☑ High/Low Lengths
  - ☐ Tach mode
  - ☐ Product
  - ☐ Supplier
  - ☐ Head/Tail Scrap

[Print Setup]

[OK]

Report Text Color
- ● Color   ○ Black

Copies
- ● 1   ○ 2   ○ 3

Methods for excluding bad data points
- ☑ Exclude outliers
- ☑ Exclude coil ends

Profile
- ○ Single   ○ Average   ● Both

ISOgraph Overlay
- ○ None   ● Chan1: Zone   ○ Chan2: Defect Number

The Report Setup screen allows the user to customize if and how the Coil and Shift Summary Reports will print out.

Report Data On/Off (Coil Summary Report) (Alt-0)
This section allows the user to turn the Coil Summary Report printouts on and off. This is a useful tool if the user only wishes to print out Shift Summary Reports with no Coil Summary Reports.

The user has the option to customize the Coil Summary Report. By checking (to include in report) or unchecking (to exclude from report) certain boxes, the user can include or exclude Clock Time, Length vs Tolerance, Standard Deviation, Min/Max Thickness, Control Limits, CR, CP/CPK, TMW, Histogram, Product Distribution, ISOgraph™, Supplier, Profile Graph, Defect Details, Coil Mapping Data and Reverse.

Report Data On/Off (Shift Summary Report) (Alt-1)
This section allows the user to turn the Shift Summary Report printouts on and off. This is a useful tool if the user only wishes to print out Coil Summary Reports with no Shift Summary Reports.

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The user has the option to customize the Shift Summary Report. By checking (to include in report) or unchecking (to exclude from report) certain boxes, the user can include or exclude End Time, Run Time, Rbar, High/Low Limits, High/Low Lengths, Tach Mode, Product, Supplier and Head/Tail Scrap.

NOTE 1: If the Reverse box is checked, the AGT400 will record defects in reverse order. This option is available so that when the coil is unwound, the defects will be in the correct order.

NOTE 2: The Thickness portion of the coil will not be affected by the Reverse box.

Report Text Color (Alt-T, then left/right arrow)
This feature allows the user to choose between printing reports in full color or black and white. In order for Coil Summary Reports to be printed automatically, the Printer button on the Main Screen must be turned On.

Copies (Alt-O, then left/right arrow)
This feature allows the user to choose the number of Coil Summary Reports and Shift Summary Reports to be printed. In order for Coil Summary Reports and Shift Summary reports to be printed automatically, the Printer button on the Main Screen must be turned On.

Profile (Alt-R, then left/right arrow)
This feature allows the user to determine how a Profile Display is displayed. The user may choose between Single, Average or Both.

ISOgraph Overlay (Alt-I, then left/right arrow)
This feature allows the user to determine whether or not an overlay graph is used, and what overlay graph will be used.

Methods for excluding bad data points
This feature allows the user to determine whether or not bad data points, as determined by the gauge software, coil heads and coil tails will be used in S.P.C. calculations.

Exclude outliers (Alt-X)
Will exclude all unusual thickness data points in S.P.C. calculations. The AGT400 software defines outliers as any readings in excess of three standard deviations from the mean thickness of the coil. If only outliers are excluded, the ^ symbol will appear on the Coil Report Screen and printouts. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report Screen and printouts.

Exclude coil ends (Alt-U)
Will exclude all thickness data points at the start and end of a coil in
S.P.C. calculations. The AGT400 software defines coil ends as half of the
Minimum Coil Length, which can be adjusted on the System Setup
Screen. If only coil ends are excluded, the ' symbol will appear on the Coil
Report Screen and printouts. If both coil ends and outliers are excluded,
the * symbol will appear on the Coil Report Screen and printouts.

Print Setup (Alt-P)
Sends the AGT400 Setup Report to the system printer.

OK (Alt-K)
Exits the Report Setup Screen and returns the operator to the AGT400
Main Screen.

Manual Calibration Screen
CJW – 11/14/03

Manual Calibration				
External	Enter	Calc	A/D	
☑ 1	25.0	25.0	36219	Internal samples complete
☑ 2	59.3	59.3	16393	Keep these tolerance values, or
☑ 3	87.2	87.2	8641	enter new ones
☑ 4	119.3	119.6	4135	Click on 'Save Cal' to finish
☑ 5	189.9	189.9	895	
☑ 6	244.4	244.3	323	

Calibrate

Save Cal   Recalculate

Print Report   Print Screen

Clear Data   OK

8 20   English Units

Internal	Thickness	Tol	A/D
Closed			76
Air	0.0	0.2	64531
Sample1	65.2	0.3	14317
Sample2	174.4	0.9	1239
Sample3	228.0	1.1	429

A1 43.070 A2 3.61E+2 P1 0.780

Average deviation 0.1
Avg % deviation 0.08% 10-10-03

+ Add Sample   = Rename

- Remove Sample

WARNING! It is *highly* recommended that a manual calibration be performed by a trained technician and with <u>N.I.S.T. traceable samples suspended at the correct passline height and angle only.</u>

A manual calibration should be performed every six months or any time there is a change in the alignment of the measuring heads. Normally, an A.G.T. Field Service Technician completes a manual calibration using N.I.S.T. traceable samples during the routine Semi-Annual inspection.

This section will break down each element of the Manual Calibration Screen. To perform the actual procedure, see Manual Calibration in the Maintenance section of this manual.

Calibrate (Alt-L)
The Calibrate button will be used several times throughout the calibration sequence. The Calibrate button is used to start the calibration, confirm the source head is wiped off, after each measurement is taken and after all included samples have been checked.

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Message Box
The Message Box will display all relevant system messages pertaining to the Manual Calibration. The Message Box will give instructions for completing the calibration, errors in performing the procedure and errors in calculations.

External
The External area lists the number/letter box for external samples to be used for a Manual Calibration. To check a particular sample (minimum of 4 samples and a maximum of 12 samples), either click the box next to the number or use the hotkeys (Alt-1 through Alt-C).

Enter
The Enter boxes list the thickness values to be used for the external samples during a manual calibration. To change these values, see Manual Calibration in the Maintenance Section of this manual.

Calc
The Calc section will give the measured value of the external sample after all external samples readings have been completed.

A/D
The A/D section will give the digital reading of the external sample after all external sample readings have been completed. This value represents the amount of radiation measured by the Detector Head.

Save Cal (Alt-S)
The Save Cal button is used to complete the external portion of the Manual Calibration. During the calibration procedure, once all external samples have been measured, the Save Cal button will accept the measurements and begin the second part of the calibration, which will assign values to the internal samples.

Recalculate (Alt-U)
During the Manual Calibration, the Recalculate button can be used to reselect the external samples to be used in the calculations.

Print Report
Allows the user to print a report of the most recent manual calibration.

Print Screen
Allows the user to print the Manual Calibration Screen.

Clear Data (Alt-T)
This function will clear all data being used to perform a Manual Calibration EXCEPT the Enter values.

Add Sample (Alt-+)
Used to add a sample to the Enter section. Click the Add Sample button, type in external sample value and click Yes to confirm or No to cancel.

Rename (Alt-=)
Used to rename an existing external sample from the Enter section. Click the Rename button, type in the new external sample value and click Yes to confirm or No to cancel.

Remove Sample (Alt-E)
Used to remove an existing external sample from the Enter section. Click the Remove Sample button, then click Yes to confirm or No to cancel.

Yes (Alt->)
Used to confirm an action. Only visible when Add Sample, Rename or Remove Sample has been selected.

No (Alt-<)
Used to cancel an action. Only visible when Add Sample, Rename or Remove Sample has been selected.

Internal Sample Section.
Located in the lower left-hand portion of the Manual Calibration screen is the Internal Sample Section. Once a Manual Calibration is complete, the gauge will designate the internal samples and measure the nominal A/D values of those samples.

A1
This is the first term thickness algorithm variable calculated by the AGT400 software. This value is theoretically equal to the inverse of the gamma ray absorption coefficient of Product 0 (normally Uncoated Steel). Typically, this value will range between 42.000 and 44.000.

A2
This is a second term thickness algorithm variable calculated by the AGT400 software. This value will typically range between 300 and 600, and will be shown in scientific notation (i.e. $3.00E+2$ to $6.00E+2$)

P1
This is a proprietary constant equal to 0.78 used by the AGT400 software during the thickness algorithm calculation.

Average deviation
The average deviation is calculated by comparing the Enter value with the Calc value during the Manual Calibration.

Avg % deviation
This is the average deviation of all the external samples, whether they are selected or not.

NOTE: See Calibration Report for an example of report printed from this screen.

Nomenclature Screen
CJW – 11/14/03

Nomenclature Screen

1 Job Number	Job	Number	These are the titles and captions that will appear on the screens and printed reports
2 Coil Number	Coil	Number	
3 Customer Number	Customer	Number	
4 Coil Information	Coil	Information	
5 Width	Width		Restore Defaults
6 Supplier	Supplier		
7 Shift	Shift		Print Setup
8 Coil Summary Report	Coil Summary	Report	OK
9 Shift Summary Report	Shift Summary	Report	

The Nomenclature Screen of the AGT400 allows the user to change the titles and captions that will appear on the Main Screen and the printed reports.

Job Number (Alt-1)
The user can change the word Job, Number or both. This field must remain Job Number, Work Order Number or the equivalent for Data Storage purposes.

Coil Number (Alt-2)
The user can change the word Coil, Number or both. This field must remain Coil Number or the equivalent for Data Storage purposes.

Customer Number (Alt-3)
The user can change the word Customer, Number or both. This field can be used for anything the user desires.

Coil Information (Alt-4)
The user can change the word Coil, Information or both. This is a spare field, and can be used for anything the user desires.

Width (Alt-5)
The user can change the word Width. This field must remain Width or the equivalent for weight calculations.

Supplier (Alt-6)
The user can change the word Supplier. This field must remain Supplier, Mill or the equivalent for Database purposes.

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Shift (Alt-7)
The user can change the word Shift. This field must remain Shift, Turn or the equivalent for accurate reporting purposes.

Coil Summary Report (Alt-8)
The user can change the word Coil Summary, Report or both. This field must remain Coil Summary Report or the equivalent for reporting purposes.

Shift Summary Report (Alt-9)
The user can change the word Shift Summary, Report or both. This field must remain Shift Summary Report or the equivalent for reporting purposes.

Restore Defaults (Alt-R)
This feature will restore all Nomenclatures to the default settings.

Print Setup (Alt-P)
Sends the AGT400 Setup Report to the system printer.

OK (Alt-K)
Exits the Nomenclature Screen and returns the operator to the AGT400 Main Screen.

Data Recall Screen
CJW – 11/14/03

The Data Recall screen allows the user to recall saved Coil Summary Reports and Shift Summary Reports.

Data Recall Field
The Data Recall Field displays all coils that have been saved to the hard disk, Zip drive or Network, depending on parameter settings and network connections. The coils and shift summaries will be in either date order [(yymmdd@time)coilnumber.txt] or coil/shift number order [coilnumber(yymmdd@time).txt] depending on 'Sort by' selection.

NOTE 1: Files with 'SRx' in place of coilnumber are Shift Summary files. (i.e. SR1, SR2 and SR3 translate to Shift1, Shift 2 and Shift 3, respectively.

NOTE 2: If searching by coil number, select the first coil in the Data Recall field and begin typing the coil number. As the number is typed, the scroll bar will move to the typed number. If the scroll bar does not move, the coil is not present.

Data File Selected (Alt-S)
Displays the file currently highlighted in the Data Recall field. When Read Data (Alt-R) is selected, or the highlighted file is double-clicked, this file will be recalled.

Files
Displays the total number of files in the Data Recall field for a selected month, Zip disk or network (if enabled).

Month (Alt-H)
The Month section allows the user to select a particular month to recall past data from. When a month is selected, all coils for that month, regardless of the year, will appear in the Data Recall field. To select a particular month, the operator may click on the month, or use the hotkeys, January **(Alt-1)** through December **(Alt-C)**. The operator also has the option to select to view the data on the Zip Drive **(Alt-Z)**. This data will only list the information currently on the Zip disk that is in the Zip drive. If enabled in the Parameter file, the user may select to retrieve data from the Network **(Alt-N)**. The Network button will not be visible if the network is not enabled in the Parameter file.

January (Alt-1) through December (Alt-C)
Allows the user to select the month for recalling past data.

Zip Drive (Alt-Z)
Allows the user to select the Zip drive for recalling past data.

Network
Allows the user to select the Network for recalling past data.

Date (Alt-D)
Allows the user to sort all data in the Data Recall field by the date and time [(yymmdd@time)coilnumber.txt] file was saved.

Number (Alt-N)
Allows the user to sort all data in the Data Recall field by the coil number [coil#(yymmdd@time).txt] the file was saved under.

Move to Zip
This feature will move all files in the Data Recall field to the Zip disk in the Zip drive, provided there is enough space available on the Zip disk. This option is only visible if enabled in the Parameter file.

Message Box
This box contains any system messages pertaining to the usage of the Data Recall feature.

Clear (Alt-E)
Allows the user to clear any messages in the Message Box.

OK (Alt-K)
Exits the Data Recall screen and returns the operator to the AGT400 Main Screen.

Coil Mapping Operation

CJW – 12/11/03

NOTE: There are 25 possible defects for coil mapping. When selecting the desired defect, refer to the Defect Menu on the AGT400 for a list of defects. The defects to be used with Coil Mapping will correlate to the defects on the Menu. For example; if defect number 4 on the Defect Menu was Laminations, and the operator of the Coil Mapping unit viewed a lamination defect on the coil, the operator would press Defect 4 on the handheld unit. Throughout this section, Defect xx will be used in place of a specific defect, where xx will be the defect number (1-25).

NOTE: There are 5 possible zones for Coil Mapping. When selecting the desired zone, refer to the Zone section in the Main Screen section of this manual. The zones used with Coil Mapping will correlate to the zones in this section. For example; if an operator noticed a defect in the center of the coil, the Zone would be 3, approximate center. After selecting the defect, the operator would then press Zone 3 on the handheld unit. Throughout this section, Zone x will be used in place of a specific zone, where x will be the zone number (1-5).

The five zones used with Coil Mapping are as follows:

Zone 1 = Near the off sheet edge.
Zone 2 = Between off sheet edge and center of coil.
Zone 3 = Approximate center of coil.
Zone 4 = Between on sheet edge and center of coil.
Zone 5 = Near the on sheet edge.

To enter a defect in a single zone, press Defect xx, Zone x, then Send. The system will respond by lighting the selected Zone LED.

To end a defect, press Defect xx , Zone x, End, then Send. The system will respond by turning off the corresponding LED(s).

To enter a defect in two or three zones, press Defect xx, Zone x, Zone x, then Send. The system will respond by lighting the selected Zone LEDs.

To end a defect in two or three zones, press Defect xx, Zone x, Zone x, End, then Send. The system will respond by turning off the corresponding LED(s).

To enter a defect in all zones, press Defect xx, All, then Send. The system will respond by lighting all the LEDs.

To end a defect in all zones, press Defect xx, All, End, then Send. The system will respond by turning off all the LEDs.

To enter a spot defect, press Spot (F2).

To clear all defects in all zones for a single handheld unit, press Clear, All, End, then Send. The system will respond by clearing all defects in all zones for that handheld unit.

To clear all defects in all zones of both handheld units, press Clear, Both, End, then Send. The system will respond by clearing all defects in all zones for both handheld units.

To view which defects are active, press Show. The system will respond with the first four active defects, and the zones in which they are active. To view the next group of defects, press Show again.

To view the status of a particular defect, press Defect xx. The system will respond with the defect number and name, and light the LEDs showing which zones are active for that defect.

To change the port offset of a handheld unit, press Clear, Port (F1), Zone x, End then Send. Note: The port offset values are stored and can be changed in the Parameter file. There may be up to five port offsets saved in the Parameter file.

To view a specific stored port offset, press Clear, Port (F1), Zone x (for specific port), then Send.

To view the current unit information, press Unit. The system will respond with the unit number (01 or 02), unit name, port and offset value.

Calibration Errors
SAC – 11/11/03

If the AGT400 Thickness Gauge will not ISOcheck™ correctly, repeat the process then try the ISOcal™ procedure if necessary. If the ISOcal™ fails, repeat the process or try the Manual Calibration procedure. If the Manual Calibration fails, or no N.I.S.T.-traceable samples are available, use the following procedure to isolate the problem:

ISOcheck™ Unsuccessful

1) If any error messages are generated when the ISOcheck™ process fails, refer to the System Messages list in this manual for an explanation and possible resolution. Contact A.G.T. for further assistance.

2) If the ISOcheck™ completes unsuccessfully for no apparent reason, retry the ISOcheck™ procedure a second time. If it is still unsuccessful, perform the ISOcal™ procedure.

ISOcal™ Unsuccessful

1) If any error messages are generated when the ISOcal™ process fails, refer to the System Messages list in this manual for an explanation and possible resolution. Contact A.G.T. for further assistance.

2) If the ISOcal™ completes unsuccessfully for no apparent reason, retry the ISOcal™ procedure a second time. If it is still unsuccessful, verify the shutter closed A/D value is approximately 130 (65 to 260 acceptable in most cases) and the shutter open A/D value is approximately 62,500 (60,500 to 64,500 acceptable in most cases).

3) If the measured shutter closed A/D value is significantly different than the nominal shutter closed A/D value or measures 0, see if the amount of error is relatively consistent with the amount of error with the shutter open, and on samples 1, 2 and 3. If the A/D error seems to be a consistent amount or reads 0, this may indicate a defective F.E.T. in the detector head. Refer to the procedure for F.E.T. Replacement.

4) If the measured shutter open A/D value is significantly different than the nominal shutter open A/D value, this may indicate that the C-frame has been damaged (i.e. bent). A shutter open A/D value of 65,535 is not normal and may indicate a defective pre-amplifier board in the detector head. Close the shutter and inspect the C-frame for any signs of recent physical damage.

Repair the C-frame as necessary. Then adjust VR2 on the Multifunction Board for a shutter open reading of 9.50 VDC measuring from TP1 (ground) to TP9. Once this adjustment is made, the shutter open A/D reading (CH0) should be approximately 62,250.

5) If the measured sample 1, 2 or 3 A/D value is significantly different than the nominal sample 1, 2 or 3 A/D value, this may indicate a problem with the source head cable or source ring assembly. See the procedure for Internal Samples Inoperable.

Manual Calibration Unsuccessful

1) If any error messages are generated when the Manual Calibration process fails, refer to the System Messages list in this manual for an explanation and possible resolution. Contact A.G.T. for further assistance.

2) If the Manual Calibration completes unsuccessfully for no apparent reason, verify the shutter closed A/D value is approximately 130 (65 to 260 acceptable in most cases) and the shutter open A/D value is approximately 62,500 (60,500 to 64,500 acceptable in most cases).

3) If the measured shutter closed A/D value is significantly different than the nominal shutter closed A/D value, see if the amount of error is relatively consistent with the amount of error with the shutter open, and on samples 1, 2 and 3. If the A/D error seems to be a consistent amount, this may indicate a defective F.E.T. in the detector head. Refer to the procedure for F.E.T. Replacement.

4) If the measured shutter open A/D value is significantly different than the nominal shutter open A/D value, this may indicate that the C-frame has been damaged (i.e. bent). Close the shutter and inspect the C-frame for any signs of recent physical damage. Repair the C-frame as necessary.

5) If the measured sample 1, 2 or 3 A/D value is significantly different than the nominal sample 1, 2 or 3 A/D value, this may indicate a problem with the source head cable or source ring assembly. See the procedure for Internal Samples Inoperable.

6) If the Manual Calibration completes unsuccessfully for no apparent reason, and all the measured and nominal A/D values seem to be relatively consistent, there may be an issue with the selected external calibration samples. Print a copy of the screen and contact A.G.T. for further assistance.

C-frame Errors
SAC – 12/11/03

When trying to resolve C-frame movement issues, the first step should be to qualify the type of problem being experienced. Use the examples below to determine what type of C-frame movement issue you are experiencing:

C-frame Will Not Move

1) If the C-frame will not move, first check that the Auxiliary circuit breaker on the Electronics Shelf has power and is turned on. If not, see the procedure for No AC Power. Note: the Auxiliary circuit breaker also powers the indicator lights and electronics cabinet cooling fan.

2) Verify that the C-frame command button is turning yellow when clicked. If not, the Manual/Auto switch on the Electronics Shelf may be set incorrectly (must be set to Auto), the C-frame may be configured incorrectly on the System Setup screen (must be set to Electric or Oscillating) or you may be attempting to move the frame illegally (can't move on sheet if the C-frame is already at the on sheet limit for example).

3) Command the C-frame to Move On or Move Off (choose the opposite of the current C-frame position so the command is valid), while measuring the voltage at the Direction Relay on the Electronics Shelf (R2-1 to R2–8). It should read 30 to 120 VDC. If not, there may be a problem with the rectifier or Speed Control, or it may be incorrectly adjusted or turned off. Contact A.G.T. for further assistance.

4) Check the fuse in Opto22 module 0 (the first red Opto22 module). Replace it if necessary. See the procedure for Fuse Replacement.

5) If the Auxiliary circuit has AC power, the C-frame is properly configured, the C-frame is being commanded to move in a legitimate fashion and the fuse is good, turn the MODE keyswitch on the Electronics Shelf to the PROGRAM position and switch to the Diagnostic Data screen.

6) Command the C-frame to Move On or Move Off (choose the opposite of the current C-frame position so the command is valid), while monitoring the digital output for Pwr Command. It should become a 1 shortly after the Move On or Move Off button is clicked. During the period when this digital output is a 1, Opto 22 module 0, LED 1 should be illuminated. If not, there may be a problem with the Digital Computer Board, the Digital Board Cable, or Opto Module 0. Contact A.G.T. for further assistance.

7) Disconnect the two wires at the Direction Relay on the Electronics Shelf (R2-1 to R2–8), and measure the resistance across them. It should measure 5 to 50 Ω. If it measures less than 5 Ω, there may be a shorted Drive Motor Cable or Drive Motor. Disconnect the cable on both ends and measure across the cable conductors and across the motor winding. Replace the defective cable or motor as necessary.

8) If the measurement across the two wires at the Direction Relay on the Electronics Shelf (R2-1 to R2–8) measures greater than 50 Ω, there may be an open Drive Motor Cable or Drive Motor. Disconnect the cable on both ends and measure across the cable conductors and across the motor winding. Replace the defective cable or motor as necessary.

C-frame Moves Too Slowly

1) If the C-frame moves, but moves slower than the desired speed, adjust the Speed Control on the Electronics Shelf. Rotating the Speed Control knob clockwise will increase the C-frame speed, while rotating it counterclockwise will decrease the C-frame speed. Note: excessive C-frame speed can cause a variety of problems such as missed strip edges (with Oscillating C-frame).

2) Command the C-frame to Move On or Move Off (choose the opposite of the current C-frame position so the command is valid), while measuring the voltage at the Direction Relay on the Electronics Shelf (R2-1 to R2–8). It should read 30 to 120 VDC. If not, there may be a problem with the rectifier or Speed Control. Contact A.G.T. for further assistance.

3) Verify drive chain is adjusted properly, and does not have excess slack.

4) Disconnect the C-frame drive chain and manually move the C-frame all the way from one mechanical limit to the other. The frame should move freely and without restriction. If not, remove any debris from the C-frame I-beam and/or bend things back into position as necessary in order to facilitate free movement.

5) Inspect the motor brushes, remove brush cap on side of motor and verify each brush is in good condition and making good contact.

6) Check continuity on the drive motor wires. Replace the drive motor cable if necessary.

7) If the C-frame Speed Control is set correctly, the motor voltage is correct, there are no physical C-frame restrictions and the drive motor cable is good, replace the C-frame drive motor.

C-frame Moves, But Will Not Oscillate

1) With the shutter closed and the C-frame in an easily accessible location, you should be able to see a red LED in each of the (lower) photocell emitters. If not, there may be a problem with the 13 VDC power supply, the photocell wiring or the photocell emitter(s). This 13 VDC power supply can be tested at the Multifunction Board by measuring between TP1 (ground) and TP5 (+13.2 VDC), in the C-frame junction box between JTB2-5 (ground) and JTB2-6 (+13.2 VDC).

2) There is another terminal block behind the rear access cover in the top of the C-frame and the 13 VDC photocell power supply can be measured here between terminals 1 (+13.2 VDC) and 2 (ground). Replace the photocell cable or photocell emitter(s) as required.

3) Check for power at each of the (upper) photocell receivers by looking for a green LED on each one. If one or both are missing, there may be a problem with the 13 VDC power supply, the photocell wiring, the photocell pull-up resistors or the photocell receiver(s). This 13 VDC power supply can be tested at the Multifunction Board by measuring between TP1 (ground) and TP5 (+13.2 VDC), in the C-frame junction box between JTB2-5 (ground) and JTB2-6 (+13.2 VDC).

4) There is another terminal block behind the rear access cover in the top of the C-frame and the 13 VDC photocell power supply can be measured here between terminals 1 (+13.2 VDC) and 2 (ground). The photocell pull-up resistors (10kΩ) can be inspected on this terminal strip. Replace the photocell cable, photocell pull-up resistors or photocell receiver(s) as required.

5) If both photocell emitters and both photocell receivers have power, the next step is to verify correct operation of the photocell receivers. With no photocell beam obstructions, each photocell receiver should have a yellow LED illuminated in addition to the green power LED described in step 2 above.

6) Ensure the shutter is closed and use your hand to block each photocell beam with your hand, and the yellow LED on each respective photocell receiver should go out. If one or both of the photocell receivers is not working correctly, verify all four photocells (emitters and receivers) are clean and properly aligned with each other.

7) Once proper photocell operation has been verified, the next step is to verify the correct digital signals are being received by the gauge software. With no photocell beam obstructions, turn the MODE key on the Electronics Shelf to PROGRAM and look for a one (1) in the Off Photo and On Photo fields contained in the C-frame Data frame. Since each photocell receiver should be detecting its respective photocell emitter, there should be a corresponding 1 in each of these boxes. If one or both are low (0), measure for the proper signals (+13.2 VDC) at terminals 3 (off sheet photocell) and 4 (on sheet photocell) on the internal C-frame terminal strip, then at terminals JTB2-3 (off sheet photocell) and 4 (on sheet photocell) in the C-frame junction box, then at Opto22 module 4-6 (off sheet photocell) and 4-8 (on sheet photocell). Once it is determined where the photocell signal(s) is being lost, repair or replace the cable as required.

8) Contact A.G.T. for further assistance.

Computer Inoperable
SAC – 10/9/03

If the AGT400 computer is completely inoperable, use this procedure to determine the cause:

1) Verify AC power is present at the outlet box in the AGT400 Electronics Cabinet where the computer plugs in. If not, see No AC Power.

2) Ensure the computer is plugged in and turned on. If not, plug it in and/or turn it on.

3) Attempt to restart the computer using the computer power switch or the left (Computer/Electronics) circuit breaker on the AGT400 electronics shelf. If the computer doesn't restart automatically when power is reapplied, press the power button on the computer. In some instances, just restarting the computer will 'solve' unexplained computer problems.

4) If AC power is present, everything is plugged in properly and the computer still will not run, your computer may have a defective internal power supply, defective main board or defective CPU. Contact A.G.T. for further assistance.

Computer Slow or Locked Up
SAC – 10/30/03

If the AGT400 computer operation has slowed, or the computer is completely locked up, use this procedure to determine the cause:

1) Reboot the computer. Attempt to do a proper shutdown by exiting the AGT400 software, then properly shutting down Windows®. If this isn't possible, use the computer power switch or the left (Computer/Electronics) circuit breaker on the AGT400 electronics shelf to remove power. If the computer doesn't restart automatically when power is reapplied, press the power button on the computer. In some instances, just rebooting the computer will 'solve' unexplained computer problems.

2) After the reboot, check the print queue for backed up print jobs. Note: a simple paper jam or printer error can cause the AGT400 to fill up the print queue to the point where the CPU can only function very slowly if at all. Delete any and all jobs in the print queue. If the print queue was empty, and the computer seems to be running at normal speed, monitor the system for the next week or so.

3) If the computer is still running slow or exhibits a tendency to lock up, check the ZIP disk to be sure it isn't more than 85% full. If so, replace the ZIP disk.

4) If the computer is still running slow or exhibits a tendency to lock up, remove the computer cover and inspect the CPU cooling fan with the computer running. It must operate at full speed in order to keep the CPU from overheating and slowing down to a crawl. If the fan is turning slowly or not at all, it must be replaced.

5) If the computer is still running slow or exhibits a tendency to lock up, disconnect the plant network (if applicable) and reboot the AGT400 computer again. If the problem disappears, it was probably a network related issue and the Network Administrator should investigate the situation.

6) If the computer is still running slow or exhibits a tendency to lock up, contact A.G.T. for further assistance.

Indicator Light(s) Inoperable
SAC – 12/8/03

1) Check each of the indicator lamps to ensure it is not defective, loose or missing. Replace the lamp(s) as necessary.

2) If all four lamps (red and green shutter indicators and amber and blue classifier indicators) are inoperable, verify that the Auxiliary circuit breaker on the Electronics Shelf has power and is turned on. If not, see the procedure for No AC Power.

3) If all four lamps (red and green shutter indicators and amber and blue classifier indicators) are inoperable, check the fuse in Opto22 module 5 (the only black Opto22 module). Replace the fuse if necessary. See the procedure for Fuse Replacement.

4) If both shutter indicators (red and green) are inoperable, switch the PROGRAM Keyswitch to the PROGRAM position and go to the Diagnostic Data screen. Command the shutter to close and verify the Closed Lamp command in the Digital Data frame is a '1'. If not, skip to step 9 below.

5) Verify that LED 2 on Opto22 module 5 is illuminated. If not, there may be a problem with the Digital Computer Board, Digital Board Cable or Opto22 Rack. Contact A.G.T. for further assistance.

6) Measure the voltage between Opto22 TB-9 and Opto22 module 5-4. It should measure ~ 120 VAC. If so, locate the cable problem, and repair/replace the cable as necessary. If not, contact A.G.T. for further assistance.

7) If only the closed (green) shutter indicator is inoperable switch the PROGRAM Keyswitch to the PROGRAM position and go to the Diagnostic Data screen. Command the shutter to close and verify the Closed Lamp command in the Digital Data frame is a '1' and LED 2 is illuminated on Opto22 module 5. If not, proceed to step 9 below.

8) If only the open (red) shutter indicator is inoperable, switch the PROGRAM Keyswitch to the PROGRAM position and go to the Diagnostic Data screen. Command the shutter to open, verify the Open Lamp command in the Digital Data frame is a '1', LED 1 is illuminated on Opto22 module 5, and measure the voltage between Opto22 TB-9 and Opto22 module 5-2. It should measure ~ 120 VAC. If so, locate the cable problem, and repair/replace the cable as necessary. If not, skip to step 9 below.

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9) If the shutter is commanded to open or close, but the AGT400 software is not commanding the corresponding digital output for the respective shutter status indicator, there may be a problem with the source head microswitch(es). When the shutter is closed, look in the Switch Status frame for the Closed digital input, and when the shutter is open, look in the Switch Status frame for the Open digital input. If one or both of these digital inputs is not functioning correctly, there may be a problem with the source head cable or the source ring assembly inside the source head. In this case, contact A.G.T. for further assistance. <u>Only licensed individuals are permitted to perform any service on the source head and/or source ring assembly</u>.

10) If the low (amber) classifier indicator is inoperable, verify the user limits are set correctly on the Main Screen. If so, switch the PROGRAM keyswitch to the PROGRAM position and go to the Diagnostic Data screen. Command the shutter open with no thickness in the beam. This will force the AGT400 software to issue the low (amber) classifier indicator command. Verify the Low Lamp command in the Digital Data frame is a '1'. If not, there may be a problem with the Digital Computer Board, Digital Board Cable or Opto22 Rack. Contact A.G.T. for further assistance.

11) Verify that LED 4 on Opto22 module 5 is illuminated. Measure the voltage between Opto22 TB-9 and Opto22 module 5-8. It should measure ~ 120 VAC. If so, locate the cable problem, and repair/replace the cable as necessary. If not, contact A.G.T. for further assistance.

12) If the high (blue) classifier indicator is inoperable, follow the procedure in step 7 above, looking for the High Lamp command in the Digital Data frame, and LED 3 on Opto22 module 5, measuring the voltage between Opto22 TB-9 and Opto22 module 5-6. It should measure ~ 120 VAC. If so, locate the cable problem, and repair/replace the cable as necessary. If not, there may be a problem with the Digital Computer Board, Digital Board Cable or Opto22 Rack. Contact A.G.T. for further assistance.

Internal Sample(s) Inoperable

SAC – 12/11/03

If one or more of the internal samples in your AGT400 thickness gauge do not function properly, use this procedure to determine the cause:

1) Verify the shutter is operating correctly. If not, see the procedure for Shutter Inoperable.

2) If the shutter is operating correctly, but one or both of the internal samples is not functioning, use the Diagnostic Data screen and TP5 on the Multifunction Board on the Electronics Shelf to verify the 13VDC Power Supply reads 13.20 ± 0.50 VDC. If so, skip ahead to step 5 below. If not, disconnect each circuit from this supply individually in order to determine where the short is originating. Start by unplugging J3 on the Multifunction Board. This supply also powers the Source Head, which can be disconnected at the Opto22 module rack (two purple wires on screw terminal #2).

3) If the power supply voltage returns to normal when a specific load is disconnected, check for shorts in that circuit. A typical failure in this area would include a situation where the Tachometer Cable or connector has been damaged by scrap steel.

4) If every 13VDC load has been disconnected and the supply still has low or no output, the power supply itself may need to be replaced. Contact A.G.T. for further assistance.

5) If the 13VDC power supply measures correctly, but one or both of the internal samples is not functioning, command the shutter to open and insert sample 3 from the Diagnostic Data Screen while monitoring the same voltage. If the voltage stays constant, or only drops ~ .03 volts, most likely there is not an excessive load or power supply problem. Reboot the AGT400 computer to ensure the digital board does not need to be reset.

6) If there is not an excessive load or a power supply problem, open the shutter, command sample 3 into the beam and measure the DC voltage on the Opto22 rack between Opto22 module 1-4 (ground) and Opto22 terminal number 6. Also measure the DC voltage on the Opto22 rack between Opto22 module 1-6 (ground) and Opto22 terminal number 6. It should read 13.20 ± 0.50 VDC in both locations. If not, check the fuse in Opto22 module 1. If the fuse is defective, replace it. See the procedure for Fuse Replacement. If the fuse is good, there may be a problem with the digital computer board, digital cable or Opto22 module.

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7) If the reading was 13.20 $\pm$ 0.50 VDC in step 6 above, go to the C-frame junction box and measure the same voltage between JTB2-11 (ground) and JTB2-7. Also measure between JTB2-12 (ground) and JTB2-7. Both points should measure 13.20 $\pm$ 0.50 VDC, allowing for some voltage loss depending on the length of your source head cable. If both of the voltages are slightly low, one or both of the spares (red and/or red with white stripe) may be used in parallel with the black and black with white stripe in your source head cable. If one or both of the voltages are not present, then your source head cable should be replaced between the Electronics Cabinet and the C-frame junction box. If both of the voltage measure good, most likely the source head cable needs replaced between the C-frame junction box and the source head or there is a problem with the source ring assembly. Contact A.G.T. for further assistance. Only licensed individuals are permitted to perform any service on the source head and/or source ring assembly.

Keyboard Inoperable
SAC – 10/14/03

If your AGT400 keyboard is inoperable, use this procedure to determine the cause:

1) Ensure the computer is functioning otherwise (i.e. has video, etc.). If not, see Computer Inoperable or Computer Slow or Locked Up.

2) Ensure the keyboard is plugged in.

3) Ensure the keyboard lock switch on the computer is turned OFF. The '0' end of this rocker switch should be pressed down. If this switch was turned on, turn it OFF and restart the computer. Note: most industrial computer models have this keyboard lock switch, but most standard computer models do not.

4) If your computer is working properly, the keyboard is plugged in, and the keyboard lock is turned OFF, see procedure for Keyboard Replacement.

Length or Weight Errors
SAC – 10/31/03

If the AGT400 system counts footage incorrectly, calculates weight incorrectly or fails to measure length correctly, use the examples below to first determine what type of length or weight issue your gauge is experiencing:

Length Measurement Incorrect

1) Check a few Coil Reports with incorrect lengths to see if there is a pattern to the length reporting error. For example, is the reported length error always in the same direction and/or approximately the same percentage?

2) If the reported length is consistently low by roughly the same percentage, the most likely causes are tachometer roll slippage, incorrect tachometer, incorrect system setup or a damaged or defective tachometer or cable. See step 5 below.

3) If the reported length is consistently high by roughly the same percentage, the most likely causes are incorrect tachometer, incorrect system setup or a damaged or defective tachometer or cable. See step 6 below.

4) If the reported length seems to be random, with no obvious pattern when compared to the actual length, the most likely causes are tachometer roll slippage, or a damaged or defective tachometer or cable. See step 5 below.

5) Check the tachometer roll for slippage.

6) Verify your tachometer is a 300 PPR (pulses per revolution) model.

7) Go to the System Setup page and verify the Tach, Pulses/Rev and Tach Roll Diam are set up correctly. See the System Setup page for an explanation of these parameters.

8) Inspect your tachometer, cable and connector. Replace the cable or connector as required. If no problem is found, see the procedure for Tachometer Replacement.

Weight Calculation Incorrect

The AGT400 software uses calculates the weight of each coil using the measured length, measured thickness and density as entered on the Product Menu screen.

1) Refer to the procedure for ISOcheck™ to verify thickness measurement accuracy.

2) Check a few Coil Reports to verify the correct length is being reported. If not, see the above procedure for Length Measurement Incorrect.

3) If the AGT400 is reporting length correctly, but the weight in inaccurate, verify the Density of each product in your Product Menu using the Product Menu Examples list in this manual.

No Length

1) Inspect the tachometer fuse on the Multifunction Board. Replace the fuse if necessary.

2) Inspect your tachometer cable and connector. Replace the cable or connector as required.

3) Measure the voltage on the Multifunction Board at J2-1 in reference to ground (TP1). It should read 13.20 ± 0.50 VDC. If not, disconnect each circuit from this power supply individually in order to determine where the short is originating. Start by disconnecting the Tachometer wires at J2 on the Multifunction Board. This supply also powers the Source Head, which can be disconnected by removing the two purple wires at Opto22 terminal #2.

4) If the power supply voltage returns to normal when a specific load is disconnected, check for shorts in that circuit. A typical failure in this area would include a situation where the Tachometer Cable or connector has been damaged by scrap steel.

5) Have an assistant slowly rotate the tachometer roll and verify the tachometer is actually rotating. Observe the LED on the Multifunction Board and verify that it flashes as the roll is turned (18.75 FPR).

6) Have an assistant slowly rotate the tachometer roll and verify the presence of tachometer pulses on the Diagnostic Data screen.

7) If a problem is not found, see the procedure for Tachometer Replacement.

No AC Power
SAC – 11/5/03

If the AGT400 cabinet does not have AC power on one or both of its circuits, use this procedure to determine the cause:

1) Verify both AGT400 circuit breakers (on the electronics shelf) are turned on. If not, turn them on. If so, determine which breakers actually do or do not have power. Note: these two circuit breakers should be on individual AC power feeds.

2) If circuit breakers are both turned on, and there is an absence of AC power, check for AC power at each of the outlets in the electrical box inside the AGT400 electronics cabinet. Note: two separate AC feeds should be located in this electrical box, so it will be necessary to check each outlet for power.

3) If there is still no AC power at any of the outlets, locate the main circuit breaker box that feeds the AGT400 and resolve the issue at the origin.

4) If only the left (Computer/Electronics) circuit breaker was tripped, reset the breaker and see if it trips again. If so, you may have a single device loading down the 5-amp circuit, or the breaker itself may need to be replaced.

5) If both circuit breakers are turned on, and there is an absence of AC power on the left (Computer/Electronics) circuit, check the AGT400 U.P.S. for AC power out. If it does not have AC power output, check its AC feed. If it does not have AC power in, see step 3 above. If it has AC in, but no AC out, ensure it is turned on. If it is turned on, but still does not have AC out, the U.P.S. may need to be repaired or replaced. Contact A.G.T. for further assistance.

6) If only the right (Auxiliary) circuit breaker was tripped, reset the breaker and see if it trips again. If so, there may be a single circuit loading down the 5-amp circuit, or the breaker itself may need to be replaced. Note: this circuit powers the indicator lights, C-frame drive circuit and cabinet cooling fan.

7) Contact A.G.T. for further assistance.

Printer or Report Errors
SAC – 11/25/03

If the AGT400 system has any type of report/printout error, ranging from portions of reports missing to a complete failure to generate reports, use the examples below to first determine what type of report issue you are experiencing:

Portion of Reports Missing

1) Check a few incorrectly printed Coil Reports to see if there is a pattern to which portions are actually being printed and which portions are missing.

2) If all or most of the black ink portions of the report seem to be missing, but the color ink portions are present, replace the black printer ink cartridge. If some of the color ink portions of the report seem to be missing, but all the black ink portions are present, replace the color printer ink cartridge.

3) If a certain piece of information is missing from the Coil Reports, check the Report Setup screen to verify that parameter is enabled.

4) If the Profile Graph is missing from the Coil Reports, check the Report Setup screen to verify that parameter is enabled.

5) If the Defect Details are missing from the Coil Reports, check the Report Setup screen to verify that parameter is enabled.

6) If the Coil Mapping Data is missing from the Coil Reports, check the Report Setup screen to verify that parameter is enabled.

7) If the entire ISOgraph™ is missing from the Coil Reports, check the Report Setup screen to verify that parameter is enabled. If so, shut down the AGT400 software and restart the AGT400 computer.

8) If a certain piece of information is missing from the Shift Summary Reports, check the Report Setup screen to verify that parameter is enabled.

9) If there is still a report printing problem, check Windows® to verify the default printer driver corresponds to the printer used on this computer and is correctly installed.

10) If the printer ink cartridges have been replaced, the computer has been rebooted and the appropriate printer driver is correctly installed, see procedure for Printer Replacement or contact A.G.T. for assistance.

Printer Prints Gibberish

1) Turn the printer power off.

2) Shut down the AGT400 software and restart the AGT400 computer.

3) Turn the printer back on.

4) Check Windows® to verify the default printer driver corresponds to the printer used on this computer and is correctly installed.

5) Replace the printer cable.

6) If the computer has been rebooted, the appropriate printer driver is correctly installed and the printer cable has been replaced, test the printer on another computer if feasible.

7) See procedure for Printer Replacement.

8) If there is still a report gibberish issue, contact A.G.T. for assistance.

No Reports

1) If the printer will not print Coil Reports, but does not have trouble printing System Startup or other reports, verify gauge is in Run mode and length is being measured on the Main Screen. If the length remains at zero, see the procedure for No Length.

2) Verify the printer has paper, does not have a paper jam and is ready (steady green LED is illuminated, but no other LEDs are illuminated or flashing).

3) Verify that the Printer button on the Main Screen is set to On.

4) Check the print queue for backed up print jobs. Note: a simple paper jam or printer error can cause the AGT400 to fill up the print queue to the point where the CPU can only function very slowly if at all. Delete any and all jobs in the print queue.

5) Reboot the computer. Do a proper shutdown by exiting the AGT400 software, then properly shutting down Windows®. In some instances, just rebooting the computer will 'solve' unexplained computer problems.

6) If there is still a report printing problem, check Windows® to verify the default printer driver corresponds to the printer used on this computer and is correctly installed.

7) Replace the printer cable.

9) If the printer is ready to print, enabled in the AGT400 software, the computer has been rebooted, print queue cleared and the appropriate printer driver is correctly installed, test the printer on another computer if feasible.

10) See procedure for Printer Replacement.

11) If replacing the printer does not resolve the issue, contact A.G.T. for further assistance.

Shutter Inoperable
SAC – 12/9/03

If the shutter on your AGT400 thickness gauge will not open or close, use this procedure to determine the cause:

1) If the AGT400 shutter appears to be stuck open or will not close, see step 9 below.

2) If the AGT400 shutter will not open, verify the SHUTTER Keyswitch on the Electronics Shelf is turned to the UNLOCK position.

3) Use the Diagnostic Data screen and TP5 on the Multifunction Board on the Electronics Shelf to verify the 13VDC Power Supply reads 13.20 ± 0.50 VDC. If so, skip ahead to step 5 below. If not, disconnect each circuit from this supply individually in order to determine where the short is originating. Start by unplugging J3 on the Multifunction Board to rule out the tachometer circuit. This supply also powers the Source Head, which can be disconnected at the Opto22 module terminal (two purple wires on screw terminal #2).

4) If the power supply voltage returns to normal when a specific load is disconnected, check for shorts in that circuit. A typical failure in this area would include a situation where the Tachometer Cable or connector has been damaged by scrap steel.

5) If every 13VDC load has been disconnected and the supply still has low or no output, the power supply itself may need to be replaced. Replace this power supply or contact A.G.T. for further assistance.

6) If the 13VDC power supply measurement is correct, but the shutter will not open, command the shutter to open and insert sample 3 from the Diagnostic Data Screen while monitoring the same voltage. If the voltage stays constant, or only drops ~ .03 volts, there is not an excessive load or power supply problem. Try rebooting the AGT400 computer just to make certain the digital board isn't in need of a reset.

7) If there is not an excessive load or power supply problem, command the shutter to open and measure the DC voltage on the Opto22 rack between Opto22 module 1-2 (ground) and Opto22 terminal number 6. It should read 13.20 ± 0.50 VDC. If not, check the fuse in Opto22 module 1. If the fuse is defective, replace it. See the procedure for Fuse Replacement. If the fuse is good, there may be a problem with your digital computer board, digital cable or Opto22 module. Contact A.G.T. for further assistance.

8) If the reading was 13.20 ± 0.50 VDC in step 7 above, go to the C-frame junction box and measure the same voltage between JTB2-9 (ground) and JTB2-7. It should measure close to the original 13.20 ± 0.50 VDC, allowing for some voltage loss depending on the length of your source head cable. Insert internal sample 3 and check for increased voltage loss. If the voltage is slightly low, one or both of the spares (red and/or red with white stripe) may be used in parallel with the black and black with white stripe in your source head cable. If the voltage is not present, then your source head cable should be replaced between the Electronics Cabinet and the C-frame junction box. If the voltage measures good, most likely the source head cable needs replaced between the C-frame junction box and the source head or there is a problem with the source ring assembly. Contact A.G.T. for further assistance.

9) If the AGT400 shutter appears to be stuck open or will not close, command the shutter closed, go to the C-frame junction box and measure the voltage between JTB2-9 (ground) and JTB2-7. It should measure 0.0 VDC. If so, there is most likely a problem with the source ring assembly inside the source head. In this case, contact A.G.T. for further assistance, since only licensed individuals are permitted to perform any service on the source head and/or source ring assembly.

10) If the voltage in step 9 measures ~13.20 VDC, remove the fuse from Opto22 module 1 and repeat the measurement. If the voltage now measures 0.0 VDC, there may be a problem with the digital computer board, digital cable or Opto22 module. Contact A.G.T. for further assistance.

Software Inoperable
SAC – 10/22/03

If the AGT400 software will not start, run or is inoperable, use this procedure to determine the cause:

1) Start by rebooting the AGT400 computer in case Windows® needs to be restarted.

2) If the AGT400 software starts but does not run, see step 3 below. If your software still will not start, record the specific error message encountered and refer to the System Messages list. If no specific error message is encountered, contact A.G.T. for further assistance.

3) If the AGT400 software starts but does not run, record the specific error message encountered and refer to the System Messages list.

4) If the AGT400 software starts but does not run and there is not a specific error message, see the procedure for Computer Slow or Locked Up.

5) If none of the above steps serve to resolve the issue, please contact A.G.T. for further assistance.

Thickness Measurement Errors
SAC – 12/12/03

When trying to resolve thickness measurement issues, the first step should be to qualify the type of problem being experienced. Most thickness measurement errors can be broken down into six different error groups. Observe the ISOgraph™ on your AGT400 video monitor or Coil Report and use the examples below to determine what type of measurement error you have:

Thickness Measurement Spikes (up)

Thickness vs Length (Tag Number)

Feet
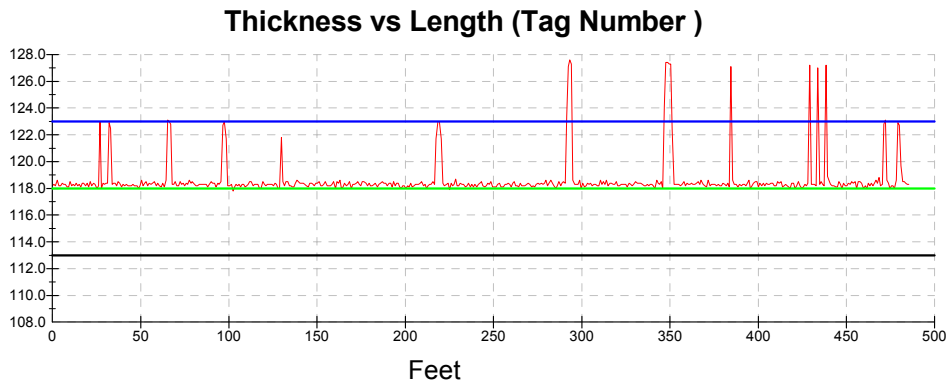
1) Upward thickness spikes are most commonly caused by a reduction in beam strength due to metal blocking all or a portion of the radiation beam. If the C-frame is Oscillating, and the spikes seem to occur at the same point during each pass across the strip, verify nothing is interfering with the beam at that point. On most Braner slitting lines, for example, if the C-frame speed control is set too fast, the measuring heads will interpret the edge guide rails as thickness spikes each time the C-frame reaches a strip edge. The solution in this case may be as simple as slowing down the C-frame drive motor speed.

2) If the C-frame is Oscillating, the spikes seem to occur at the same point during each pass across the strip, and nothing is interfering with the beam, the most likely cause is a damaged or defective source or detector head cable. Stop the C-frame at or near the point where the spikes seem to occur, then also stop the processing line. Once the C-frame and strip are stationary, have an assistant monitor the measured thickness on the AGT400 video monitor while you manually manipulate the head cables on the C-frame. Many damaged or defective head cables can be pinpointed in this manner. Once the problem is isolated, repair or replace the head cable(s) as necessary. See the procedure for Cable Replacement.

m

Note: on Oscillating C-frames, it is prudent to replace the source and detector head cables at the same time, even though only one may be defective at the time.

3) Verify the strip does not contact the C-frame or either measuring head when the spikes occur. If so, take the necessary steps to prevent this in the future.

4) If the spikes seem to be related to C-frame movement, but do not necessarily occur at the same point in each pass across the strip, there may be a problem with the mounting or internals of one or both of the measuring heads. Close the shutter, stop the C-frame and stop the processing line. Once the C-frame and strip are stationary, verify both heads are securely mounted in the C-frame. Then have an assistant monitor the measured thickness on the AGT400 video monitor while you tap on the side of each measuring head in the C-frame. Many loose or broken components inside the measuring heads can be pinpointed in this manner. Caution: be sure your assistant maintains a safe distance of at least three feet from the Source Head while the shutter is open. If the problem seems to be in the detector head, see the procedure for Detector Head Inspection. If the problem seems to be in the source head, contact A.G.T. for further assistance. Only licensed individuals are permitted to perform any service on the source head and/or source ring assembly.

5) If the spikes do not seem to be related to C-frame movement, check all the screw terminals in the C-frame junction box. Many C-frame related issues are resolved at this point.

6) Turn the MODE key on the electronics shelf to the PROGRAM position and go to the Diagnostic Data screen. Observe each of the DC Power Supplies, looking for a voltage that may be spiking. Pay particular attention to the high voltage power supply. If a problem is found in this area, the next step will be to begin disconnecting the individual loads for that particular power supply.

7) Contact A.G.T. for further assistance.

Thickness Measurement Spikes (down)

Thickness vs Length (Tag Number)

m
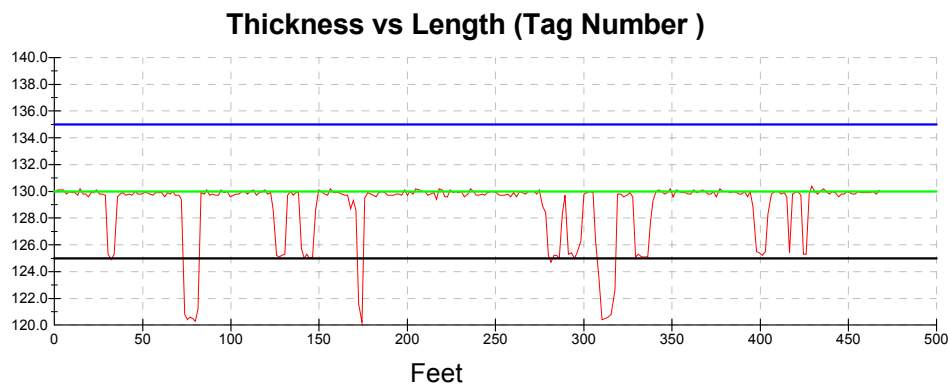
1) Downward thickness spikes are most commonly caused by an increase in beam strength due to all or a portion of the radiation beam going off the strip edge. If the C-frame is Oscillating, and the spikes seem to occur at the same point during each pass across the strip, verify the measuring heads are not getting too close to the edge of the strip at that point. On most processing lines, for example, if the C-frame speed control is set too fast, the measuring heads will interpret the strip edges as thickness spikes. The solution in this case may be as simple as slowing down the C-frame drive motor speed.

2) If the C-frame is Oscillating, the spikes seem to occur at the same point during each pass across the strip, and nothing is interfering with the beam, the most likely cause is a damaged or defective source or detector head cable. Stop the C-frame at or near the point where the spikes seem to occur, then also stop the processing line. Once the C-frame and strip are stationary, have an assistant monitor the measured thickness on the AGT400 video monitor while you manually manipulate the head cables on the C-frame. Many damaged or defective head cables can be pinpointed in this manner. Once the problem is isolated, repair or replace the head cable(s) as necessary. See the procedure for Cable Replacement.

   Note: on Oscillating C-frames, it is prudent to replace the source and detector head cables at the same time, even though only one may be defective at the time.

3) Verify the strip does not contact the C-frame or either measuring head when the spikes occur. If so, take the necessary steps to prevent this in the future.

4) If the spikes seem to be related to C-frame movement, but do not necessarily occur at the same point in each pass across the strip, there may be a problem with the mounting or internals of one or both of the measuring heads. Close the shutter, stop the C-frame and stop the processing line. Once the C-frame and strip are stationary, verify both heads are securely mounted in the C-frame. Then have an assistant monitor the measured thickness on the AGT400 video monitor while you tap on the side of each measuring head in the C-frame. Many loose or broken components inside the measuring heads can be pinpointed in this manner. Caution: be sure your assistant maintains a safe distance of at least three feet from the Source Head while the shutter is open. If the problem seems to be in the detector head, see the procedure for Detector Head Inspection. If the problem seems to be in the source head, contact A.G.T. for further assistance. Only licensed individuals are permitted to perform any service on the source head and/or source ring assembly.

5) If the spikes do not seem to be related to C-frame movement, check all the screw terminals in the C-frame junction box. Many C-frame related issues are resolved at this point.

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6) Turn the MODE key on the electronics shelf to the PROGRAM position and go to the Diagnostic Data screen. Observe each of the DC Power Supplies, looking for a voltage that may be spiking. Pay particular attention to the high voltage power supply. If a problem is found in this area, the next step will be to begin disconnecting the individual loads for that particular power supply.

7) Contact A.G.T. for further assistance.

Thickness Measurement Shifts

Thickness vs Length (Tag Number)

Feet

1) Measurement shifts are most commonly caused by a change in beam strength. If the C-frame is Oscillating, and the shifts seem to occur at the same point during each pass across the strip, verify the gap between the measuring heads is not being interfered with or changing at that point.

2) If the C-frame is Oscillating, the shifts seem to occur at the same point during each pass across the strip, and nothing is interfering with the beam, the most likely cause is a damaged or defective source or detector head cable. Stop the C-frame at or near the point where the shifts seem to occur, then also stop the processing line. Once the C-frame and strip are stationary, have an assistant monitor the measured thickness on the AGT400 video monitor while you manually manipulate the head cables on the C-frame. Many damaged or defective head cables can be pinpointed in this manner. Once the problem is isolated, repair or replace the head cable(s) as necessary. See the procedure for Cable Replacement.

   Note: on Oscillating C-frames, it is prudent to replace the source and detector head cables at the same time, even though only one may be defective at the time.

3) Verify the strip does not contact the C-frame or either measuring head when the shifts occur. If so, take the necessary steps to prevent this in the future.

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4) Verify the strip passline height and angle are remaining unchanged while the measurement shifts occur. Passline height and angle must remain constant while the line is running and the gauge is measuring. If the passline height and/or angle changes during the measurement, the gauge reading will shift. If this is found to be the case, take the necessary steps to prevent this in the future.

5) If the shifts seem to be related to C-frame movement, but do not necessarily occur at the same point in each pass across the strip, there may be a problem with the mounting or internals of one or both of the measuring heads. Close the shutter, stop the C-frame and stop the processing line. Once the C-frame and strip are stationary, verify both heads are securely mounted in the C-frame. Then have an assistant monitor the measured thickness on the AGT400 video monitor while you tap on the side of each measuring head in the C-frame. Many loose or broken components inside the measuring heads can be pinpointed in this manner. Caution: be sure your assistant maintains a safe distance of at least three feet from the Source Head while the shutter is open. If the problem seems to be in the detector head, see the procedure for Detector Head Inspection. If the problem seems to be in the source head, contact A.G.T. for further assistance. Only licensed individuals are permitted to perform any service on the source head and/or source ring assembly.

6) If the shifts do not seem to be related to C-frame movement, check all the screw terminals in the C-frame junction box. Many C-frame related issues are resolved at this point.

7) Turn the MODE key on the electronics shelf to the PROGRAM position and go to the Diagnostic Data screen. Observe each of the DC Power Supplies, looking for a voltage that may be shifting. Pay particular attention to the high voltage power supply. If a problem is found in this area, the next step will be to begin disconnecting the individual loads for that particular power supply.

8) Contact A.G.T. for further assistance.

Thickness Measurement Drift

Thickness vs Length (Tag Number)

m
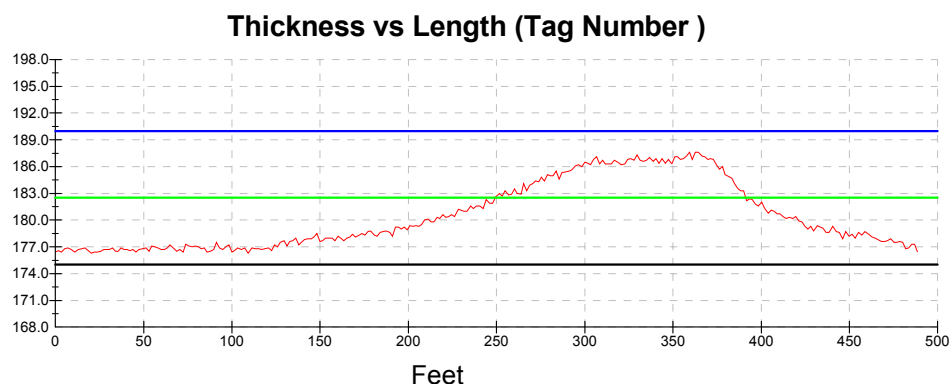
1) Measurement drift is most commonly caused by a slow and steady change in beam strength. If the C-frame is Oscillating, and the shift seems to occur at the same point during each pass across the strip, verify the gap between the measuring heads is not being interfered with or changing at that point.

2) If the C-frame is Oscillating, the drift seems to occur at the same point during each pass across the strip, and nothing is interfering with the beam, the most likely cause is a damaged or defective source or detector head cable. Stop the C-frame at or near the point where the shift seems to occur, then also stop the processing line. Once the C-frame and strip are stationary, have an assistant monitor the measured thickness on the AGT400 video monitor while you manually manipulate the head cables on the C-frame. Many damaged or defective head cables can be pinpointed in this manner. Once the problem is isolated, repair or replace the head cable(s) as necessary. See the procedure for Cable Replacement.

   Note: on Oscillating C-frames, it is prudent to replace the source and detector head cables at the same time, even though only one may be defective at the time.

3) Verify the strip passline height and angle are remaining unchanged while the measurement drift occurs. Passline height and angle must remain constant while the line is running and the gauge is measuring. If the passline height and/or angle changes during the measurement, the gauge reading will drift. If this is found to be the case, take the necessary steps to prevent this in the future.

4) If the drift seems to be related to C-frame movement, but do not necessarily occur at the same point in each pass across the strip, there may be a problem with the mounting or internals of one or both of the measuring heads. Close the shutter, stop the C-frame and stop the processing line. Once the C-frame and strip are stationary, verify both heads are securely mounted in the C-frame. Then have an assistant monitor the measured thickness on the AGT400 video monitor while you tap on the side of each measuring head in the C-frame. Many loose or broken components inside the measuring heads can be pinpointed in this manner. Caution: be sure your assistant maintains a safe distance of at least three feet from the Source Head while the shutter is open. If the problem seems to be in the detector head, see the procedure for Detector Head Inspection. If the problem seems to be in the source head, contact A.G.T. for further assistance. Only licensed individuals are permitted to perform any service on the source head and/or source ring assembly.

5) If the drift does not seem to be related to C-frame movement, check all the screw terminals in the C-frame junction box. Many C-frame related issues are resolved at this point.

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6) Turn the MODE key on the electronics shelf to the PROGRAM position and go to the Diagnostic Data screen. Observe each of the DC Power Supplies, looking for a voltage that may be drifting. Pay particular attention to the high voltage power supply. If a problem is found in this area, the next step will be to begin disconnecting the individual loads for that particular power supply.

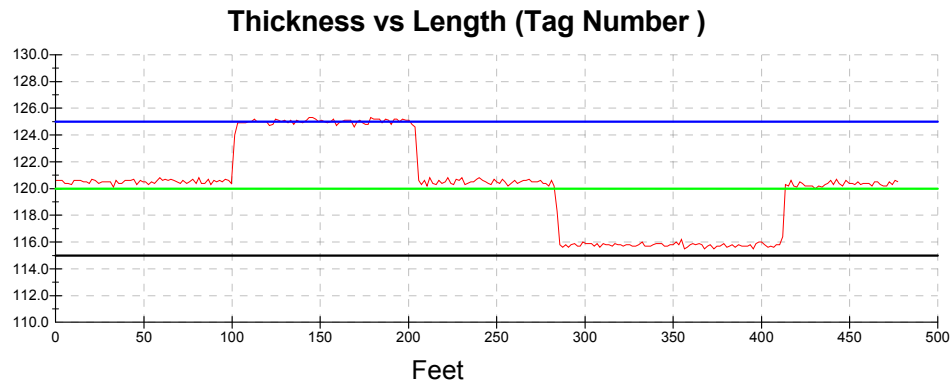7) Contact A.G.T. for further assistance.

Will Not Measure

1) If the gauge always reads '0' or close to zero when the shutter is commanded open, proceed to step 6 below. If the gauge always reads '400' when the shutter is commanded open, this typically indicates that the shutter is not opening, or there is no signal returning from the detector head. Open the shutter and see if the red Open light is coming on. If not, see the procedure for Shutter Inoperable. If so, proceed to step 2 below.

2) If the gauge always reads '400' when the shutter is commanded open, and the red light is coming on, this typically indicates that there is no signal returning from the detector head.

3) Turn the MODE key on the Electronics Shelf to PROGRAM, go to the Diagnostic Data page and observe the five DC Voltages. If one or more of the DC voltages appear to be incorrect, there may be a problem with that power supply or the load for that particular supply. This can usually be determined by disconnecting each load for that supply individually until the power returns. Refer to the Schematics in this manual, or contact A.G.T. for further assistance.

4) Observe the reading in the Preamp A/D frame. With the shutter open, this should read approximately 62,250 with no metal in the air gap. The shutter closed reading should be approximately 131. Open and close the shutter a few times to determine if the reading is actually changing.

5) If the Preamp A/D stays at or near 0 or 131 with the shutter opening and closing, there is most likely an issue with the detector head or detector head cable. Inspect the detector cable for damage, then refer to the procedure for Detector Head Inspection.

6) If the Preamp A/D stays at 65,535 with the shutter opening and closing, there is most likely an issue with the detector head or detector head cable. Inspect the detector cable for damage, then refer to the procedure for Detector Head Inspection.

7) If the Preamp A/D changes when the shutter is commanded to open and close, but the gauge does not measure, perform an ISOcheck™, then print the report and make an analysis of the A/D numbers. If the nominal and actual A/D numbers have approximately the same error amount for each measurement point (1,000 counts low or high for example), this almost always indicates a defective F.E.T. in the detector head. Refer to the procedure for F.E.T. Replacement.

8) Contact A.G.T. for further assistance.

Inaccurate Measurement

1) Perform an ISOcheck™. See the procedure for ISOcheck™. If the procedure is successful, try running the gauge on another coil. If not, or the gauge continues to measure inaccurately, proceed to step 2 below.

2) Perform an ISOcal™. See the procedure for ISOcal™. If the procedure is successful, try running the gauge on another coil. If not, or the gauge continues to measure inaccurately, proceed to step 3 below.

3) Verify the operator has selected the correct Product on the Product Menu.

4) Verify the strip passline height and angle are correct. Passline height and angle must be consistent with the original gauge startup settings while the line is running and the gauge is measuring. If the passline height and/or angle has changed since our last manual calibration, the gauge will read incorrectly. If there has been a change in this area, make the necessary passline height and/or angle corrections.

5) Contact A.G.T. for further assistance.

Video Monitor Inoperable
SAC – 10/9/03

If your AGT400 has no video, use this procedure to determine the cause:

1) Ensure there is AC power where the video monitor receives its power. If not, see No AC Power.

2) Ensure the video monitor is plugged into AC power, plugged into the computer and turned on. If not, plug it in and/or turn it on.

3) Ensure the computer is turned on. If not, turn it on.

4) Test the video monitor on another computer elsewhere in the plant. If you suspect the monitor to be defective, you can verify your suspicion by testing a known good video monitor by connecting it to the AGT400 computer.

5) If you have AC power, your video monitor and computer are both turned on and you still have no video, the problem is most likely a defective video card or main board inside the AGT400 computer. Contact A.G.T. for further assistance.

Cable Replacement
DJM – 12/18/03

Replacing the C-Frame cable or cables is not complicated but time consuming. There are two common places the cables are replaced: from the cabinet to the C-Frame J-Box, and inside the C-Frame. It is recommended if a C-Frame cable needs replaced, to replace both the Detector and Source cables inside the C-Frame.

Tools Required: Electrical Tape   Adjustable Wrench
                       Flathead Screwdriver   Wire Snake
                       3/16" Hex Driver

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

Replacing Cables from the Cabinet to the J-Box

- Disconnect the cable terminations in the J-Box and in the cabinet on the electronic shelf.

- Pull the new cables through conduit. Tip: Remove about three inches of the outer cover of both cables exposing the smaller wires. Tape each of the smaller wires together separately and then tape the exposed wires. Have someone feed the cable through as someone else is pulling on the other end.

- Once the wires have been successfully pulled, remove the outer cover of the cable and refer to the schematics in this manual to make the proper connections in the J-Box and the Electronics Shelf.

Replacing the Cables in the C-Frame

- Disconnect the wire connections for the defective cables in the J-Box.

- Remove the four socket head screws that attach the Detector Head to the C-frame with a 3/16" Hex Driver. Pull the head free from the C-frame and unscrew the cable connector from the back of the head. There is also an access panel on the back of the C-Frame that can be removed if there is a problem pulling the wires. The wire track on the back of the C-Fame can be removed and laid flat to make it easier to pull the cables.

a

- Pull the new cable through conduit, festoon and C-Frame. Tip: Note which end the connector is on and ensure it is correctly positioned. Remove about three inches of the outer cover of both cables exposing the smaller wires. Tape each of the smaller wires together separately and then tape the exposed wires. Have someone feed the cable through as someone else is pulling the other end.

- Once the cable has been pulled through the C-Frame refer to the schematics in this manual to make the proper connections in the J-Box.

- Connect the cable to the head and mount it in the C-Frame.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically while others have to be started using the power button on the computer.

<u>Cleaning</u>
DJM – 12/11/03

Cleaning the AGT400 gauge is very simple and should take no longer that 15 minutes.

<u>Tools Required:</u>   Clean Rags   Contact Cleaner
                                          Degreaser

The most important things to clean are the measuring heads. If the measuring heads are covered with metal debris or dirt, it will affect the accuracy of the measurement. The environment the gauge is in will determine how often it needs cleaned.

- Ensure the shutter is closed (check the Shutter Status lights or the AGT400 main operating screen) before attempting to clean either of the measuring heads.

- Use a clean rag to wipe off the bottom measuring head. If there is a heavy oil buildup, spray a degreaser on the Source Head and wipe it off with a rag.

- Wipe off the underside of the Detector Head (top measuring head). If there is an oil buildup use a degreaser to clean it.

Replacing the filters on the cabinet will help air circulation and prevent dirt build up in the gauge.

- Unscrew the two thumbscrews on the filter cover on the cabinet. Remove the filter cover and the dirty filter, install a new filter and replace the cover.

- Repeat the previous step if there is more than one filter in the cabinet.

Cleaning the Multifunction Circuit Board will extend the life of the board. The environment the gauge is in and how often the filters are changed will determine how often the board needs cleaned.

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- Spray contact cleaner on the two main places susceptible to dirt highlighted in the following picture.
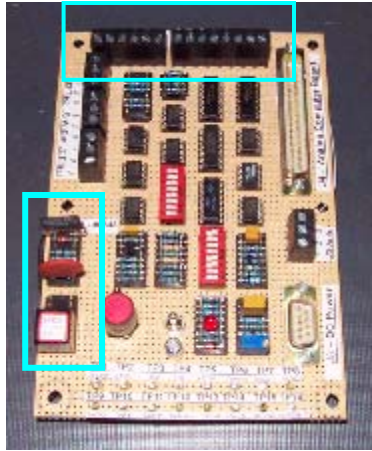
- If the board has an unusual amount of dirt on it spray the entire board. Let the board completely dry before restarting to the gauge.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically. Others have to be started using the power button on the computer.

Computer I/O Board Replacement
DJM –12/12/03

Replacing either of the computer boards is a very simple process that should take less than an hour. It is recommended that this procedure be done in a controlled environment to keep dirt and debris from getting into the computer.

Tools required: Phillips Head Screwdriver

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- Remove all connections from the rear of the computer (Video, Keyboard, Printer, Analog and Digital cable, etc.).

- Remove the computer from the AGT400 cabinet and take it to a controlled environment. To release the rack-mounted computer pull it out as far as it can go and press the tab on each rail.

- Remove the cover from the computer. Rack-mount style computers have four Phillips screws holding the cover on. PC style computers may or may not have a screw holding the side cover, some will have a locking mechanism that slides to unlock the cover.

- Once the cover is removed, look for two boards labeled "**A**" for Analog and "**D**" for Digital. If there is no label, the Analog Board will be the larger of the two. Rack-mount style computers have a metal retaining bracket, remove the two Phillips screws to release the bracket. Remove the Phillips screw that holds the board to the case.

- Remove the defective board, compare the jumper and dip switch settings from the defective board with the new board. Change any settings that are different on the new board to match the old board.

Digital Board Settings:

XFER   UPDATE

J1-

J2-

J3-

9 8 7 6 5 4

ADDRESS

Analog Board Settings:

9 8 7 6 5 4 3

ADDRESS

CHANNEL

0 1 2 3 4 5 6 7

IRQ

2 3 4 5 6 7 X

WS1

ON   OFF
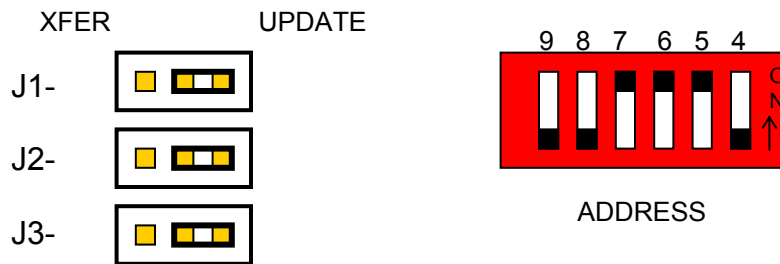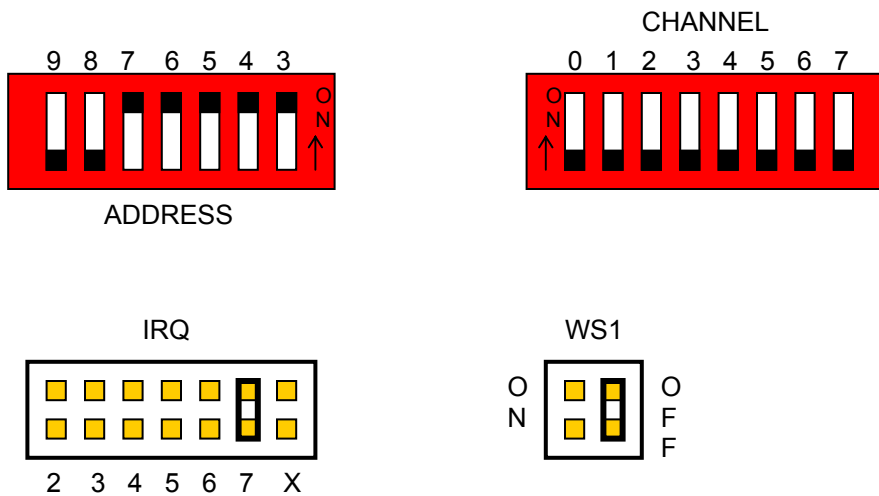
- Install the new board, replace the mounting screw and replace the computer cover.

- Install the computer in the AGT400 cabinet. Connect the video, keyboard, Analog and Digital cables, printer cables, etc. to the computer.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically. Others have to be started using the power button on the computer.

- Return MODE Key to the RUN position.

c

Detector Head Inspection
DJM – 12/18/03

Inspecting the Detector head is a simple procedure that should take less than an hour. It is recommended that this procedure be performed in a controlled environment, away from the line and on a flat surface, such as a desk or table.

Tools required: 3/16" Hex Driver   Plastic Pen
9/64" Hex Driver   11/32" Nut Driver
Ground Strap (not required but recommended)
Phillips Head Screwdriver

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- Remove the four socket head screws that attach the Detector Head to the C-frame with a 3/16" Hex Driver.

- Once the four socket head screws are removed pull the Detector free from the C-frame and unscrew the cable connector from the back of the head.

- Take the Detector Head to a location where it will be easy to work on and the parts will not be lost (preferably a desk somewhere out of the way).

- Remove the six top cover plate socket screws using a 9/64" Hex Driver. Remove the O-ring gasket if it will not stay in the groove of the Detector Head housing.

- WARNING! DO NOT TOUCH THE F.E.T. LEADS! The F.E.T. is very sensitive to static electricity; there is enough electricity in the human body to blow the circuit. It is best to wear a grounding strap while performing this procedure.

Inner Cable Connector
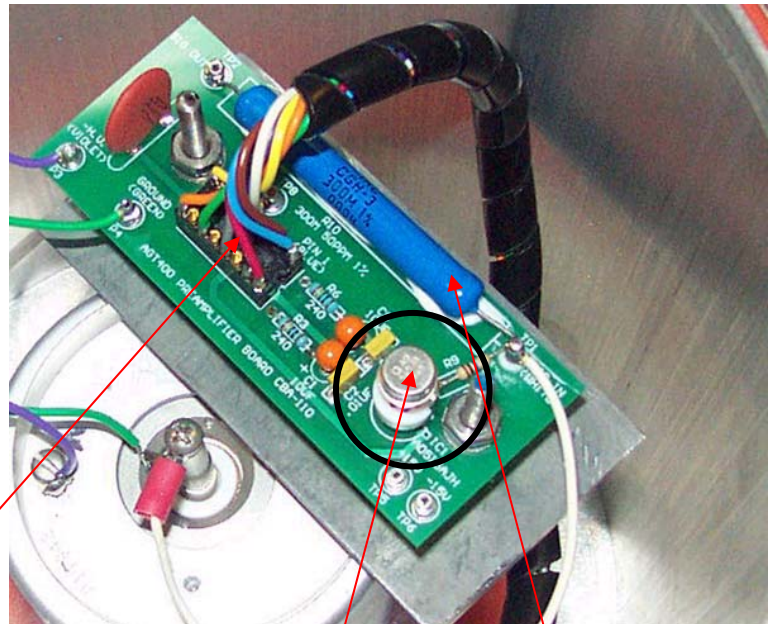
F.E.T.

300MΩ Resistor

- Inspect the blue 300MΩ Resistor, looking for broken leads. A non-conductive object should be used, such as a plastic pen, to check the leads. Do not touch this resistor or the leads with your fingers.

- Inspect the Detector Head Inner Cable Connector and ensure it is plugged in securely. If the connector is not plugged in securely, plug it in. If the connector is not plugged in at all, plug it in ensuring pin one is oriented correctly.

- Touch the edge of the Pre-Amp Board and try to wiggle it up and down. The board should be securely fastened not allowing any movement. If there is movement, use an 11/32" nut driver to tighten the two nuts that secure the board.

- Check the white wire to ensure it is not loose. If the wire is loose, tighten the screw with a Phillips Head Screwdriver.

- Insert the O-ring gasket into the Detector Head housing groove, if it does not fit, slightly stretch it to ensure a proper fit. Attach the top cover plate with the six socket screws ensuring the O-ring does not come out of the groove.

- Attach the cable connector to the back of the Detector Head. Install the Detector Head into the C-Frame using the four mounting socket screws.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically. Others have to be started using the power button on the computer.

Drive Chain Adjustment

DJM – 12/08/03

Adjusting the drive chain on the C-Frame is very simple and should only take a few minutes.

Tools Required: Adjustable Pliers   Adjustable Pliers

- Examine the movement of the C-Frame, monitoring if the chain is too loose or too tight. If the chain is hanging down and there is excess slack, the chain is too loose. If the chain does not have slack and the motor gear teeth have trouble grasping the chain as it turns, the chain is too tight.
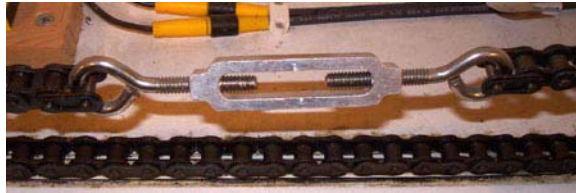
- To tighten or loosen the chain, rotate the Turnbuckle connected to the chain.

- If the chain is too loose, turn the Turnbuckle until most of the slack is gone. Test the movement of the C-Frame and tighten more if necessary.

- If the chain is too tight turn the Turnbuckle to add slack in the chain. Test the movement of the C-Frame, loosen more if necessary.

e

F.E.T. Replacement
DJM - 12/12/03

Replacing the F.E.T. is a very simple procedure that should take less than an hour. It is recommended that this procedure be performed in a controlled environment, away from the line and on a flat surface, such as a desk or table.

Tools required: 3/16" Hex Driver
           9/64" Hex Driver
           Ground Strap (not required but recommended)

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- Remove the four socket head screws that attach the Detector Head to the C-Frame with a 3/16" Hex Driver.

- Once the four socket head screws are removed pull the Detector free from the C-Frame and unscrew the cable connector from the back of the head.

- Take the Detector Head to a location where it will be easy to work on and the parts will not be lost (preferably a desk somewhere out of the way).

- Remove the six top cover plate socket screws using a 9/64" Hex Driver. Remove the O-ring gasket if it will not stay in the groove of the Detector Head housing.

- Remove the defective F.E.T. from the Pre-Amp board in the Detector Head.

- WARNING! DO NOT TOUCH THE F.E.T. LEADS! The F.E.T. is very sensitive to static electricity; there is enough electricity in the human body to blow the circuit. It is best to wear a grounding strap while performing this procedure.

F.E.T.
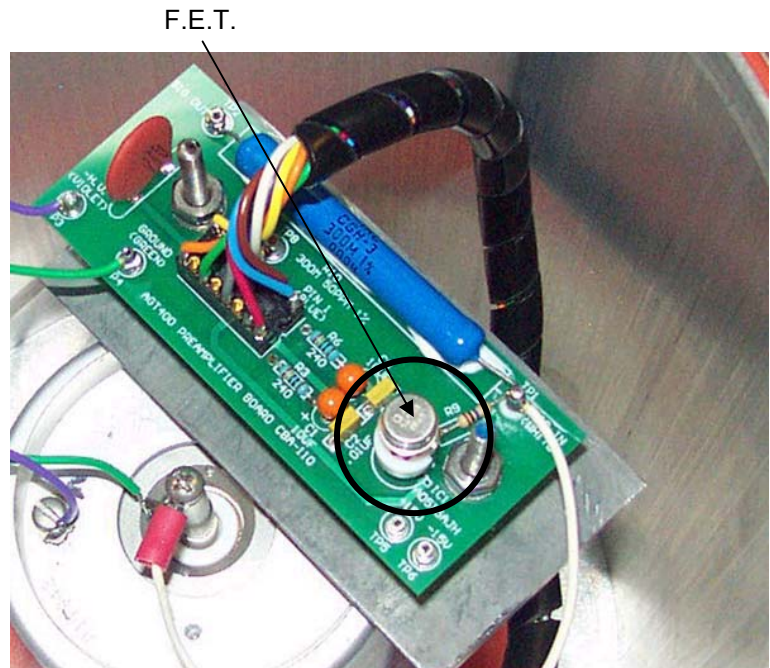
- Remove the new F.E.T. from the anti-static bag. The F.E.T. will be pressed into a piece of static foam. Grasp the F.E.T. on the outer circle to reduce the risk of touching the leads. Remove the F.E.T. keeping track of the tab.

F.E.T.
Index tab
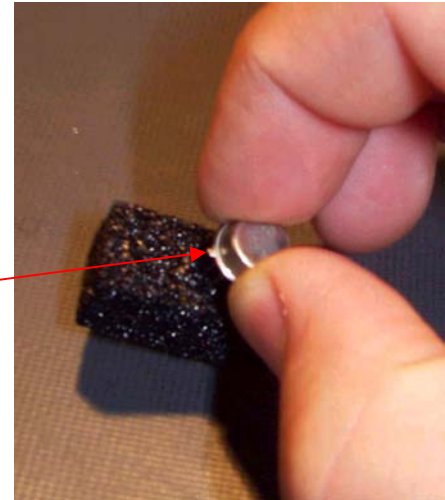
- Line up the F.E.T. index tab with the markings on the board or F.E.T. Socket. Insert each lead of the F.E.T. into the F.E.T. Socket ensuring not to bend, or touch any pins.

F.E.T. Tab
Marking on
the board

F.E.T. Index Tab
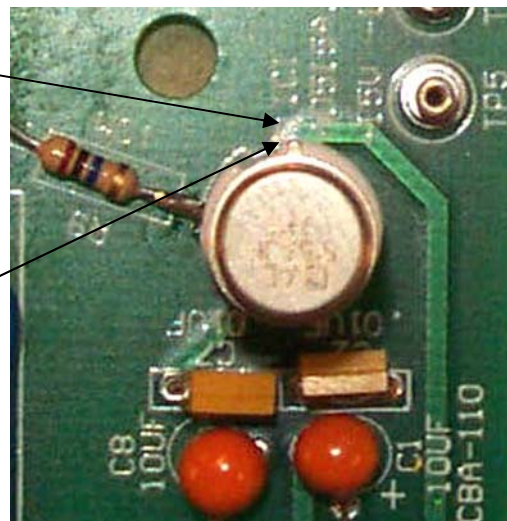
- Once all the leads are oriented correctly, firmly press the F.E.T. into the socket until it pops in place. Be careful not to press too hard or far.

- Insert the O-ring gasket into the Detector Head housing groove, if it does not fit stretch it to ensure a proper fit. Attach the top cover plate with the six socket screws making sure the O-ring does not come out of the groove.

- Attach the cable connector to the back of the Detector Head. Install the Detector Head into the C-Frame using the four mounting socket screws.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically, others have to be started using the power button on computer.

Fuse Replacement

DJM – 12/12/03

Replacing fuses on the AGT400 is very simple and should take no longer than a few minutes. There are only five fuses on the electronics shelf: three on the Opto22 Rack Assembly, one on the Opto22 Rack and one on the Multifunction board.

Tools Required: Needle Nose Pliers or a Fuse Puller
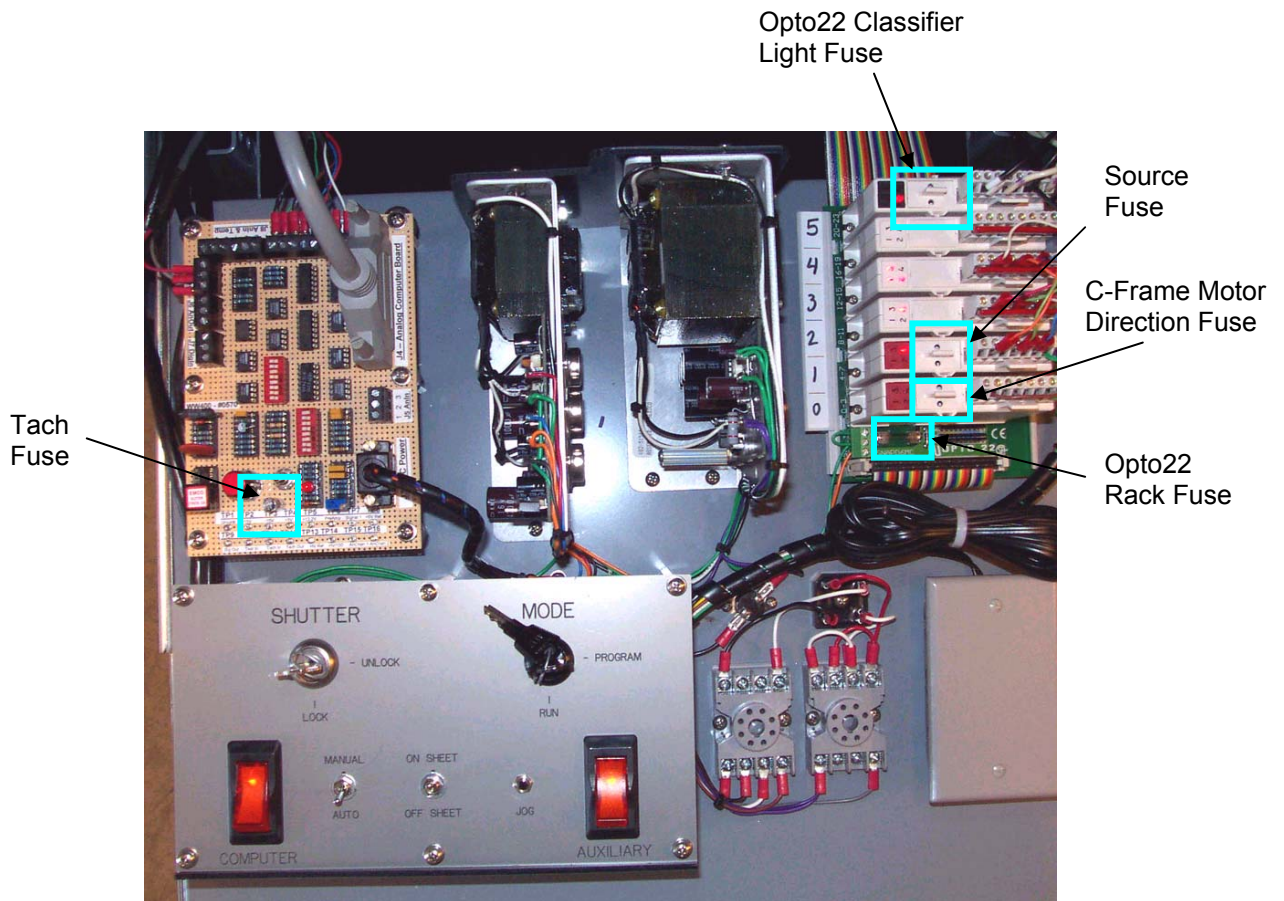
- Locate the correct fuse that needs replaced.

- Shut down the AGT400 software properly. See the procedure for Shutdown.

- To replace the Tachometer Fuse simply grasp the fuse and pull it out of its socket. Replace the fuse with a 125V 1/8 Amp Micro Fuse.

- To replace all of the Opto22 Module Fuses grasp the plastic fuse tab and pull up. The fuse holder should release from the Opto22 Module. Twist the Fuse to remove it from the holder. Replace it with a 250V 4 Amp fuse.

- To replace the Opto22 Rack Fuse grasp the fuse with needle nose pliers or a fuse puller and pull up on the fuse. Replace the fuse with a 250V 1 Amp Fuse.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some computers will start automatically, others have to be started using the power button on the computer.

- Turn the MODE key to RUN

ISOcal™

This procedure should only be used if repeated ISOcheck™ attempts do not complete successfully. ISOcal™ is a program that uses the values designated for the internal samples to calibrate the gauge. As the air value drifts over time it is recommended that the ISOcheck™ be run routinely. In circumstances where the ISOcheck™ fails because one or more of the values are off, ISOcal™ should be used.

To perform this calibration, use the following procedure:

- Ensure there is no steel between the Source and Detector heads.

- Turn the MODE Key on the Electronics Shelf to PROGRAM.

- Click the **Screen Menu** button on the Main Operating Screen.
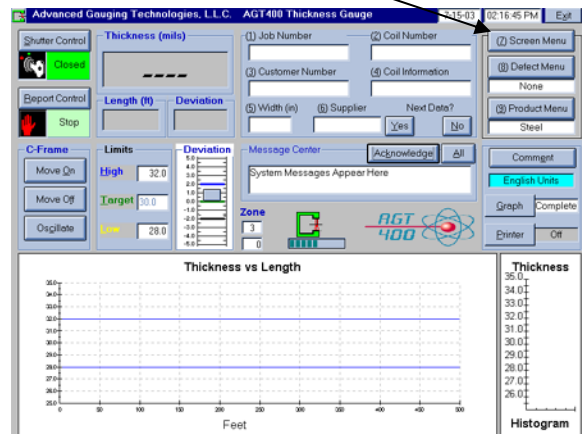
- The Screen Menu will appear. Click **Diagnostic Data**.
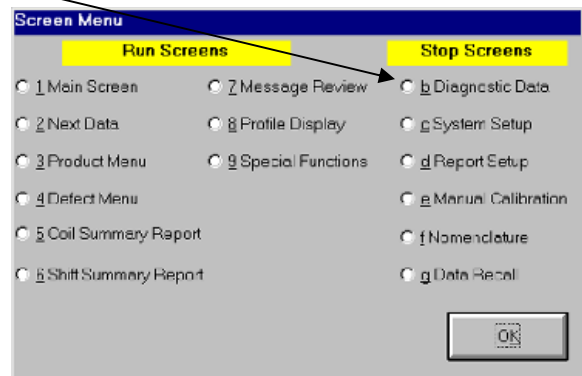
- The Diagnostic Data Screen will appear.

- Verify the shutter is closed and that Channel 0 is between 50 and 300. If it is not between these two values refer to the Basic Troubleshooting section.
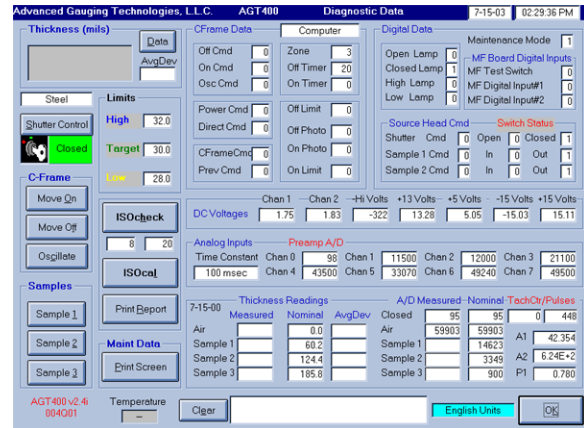
- Click the **ISOcal™** Button and there will be a message in the comment box asking the user to clean off the Source Head.

- Use a clean rag to wipe any loose debris off of the Source Head, and verify it is securely mounted in the C-frame.
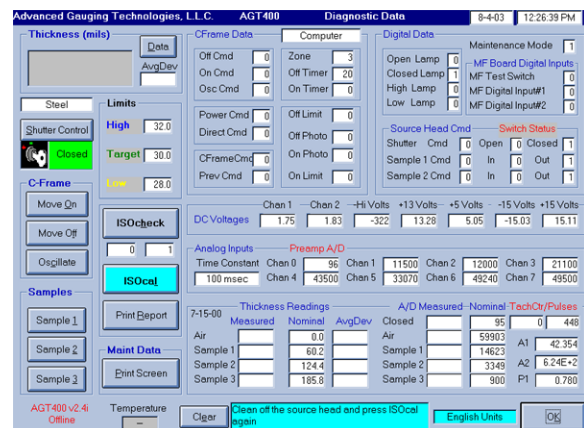
- After the Source is wiped off, click the **ISOcal™ button** for a second time. The program will begin to adjust the calibration using the internal samples.

h
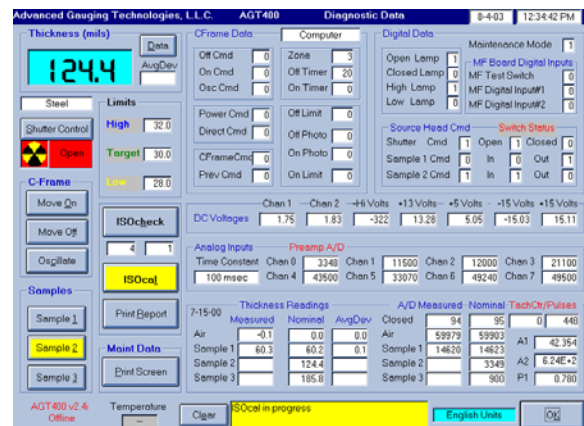
-   If the values can be adjusted the program will give an *"ISOcal completed successfully"* message.

-   A report can be printed by clicking on the **Print Report** button. ⟶
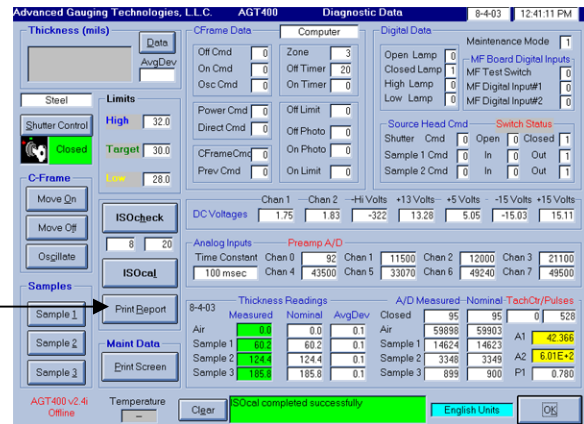
If the ISOcal™ does not complete successfully there may be a problem with the gauge. The user can click on the **Print Screen** Button and refer to the Basic Trouble Shooting section.

-   To exit the Diagnostic Data Screen click the **OK** Button.

-   Return the MODE Key to the RUN position.

ISOcheck™
DJM – 12/11/03

ISOcheck™ is a function that checks the current measurement against the last manual calibration, using internal samples contained in the Source Head.

To perform this check, use the following procedure:

- Ensure there is no steel between the Source and Detector heads.

- Turn the MODE Key on the Electronics Shelf to PROGRAM.

- Click the **Screen Menu** button on the Main Operating Screen.
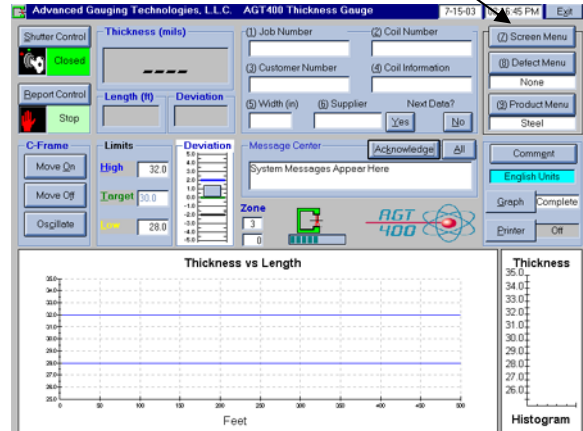
- The Screen Menu will appear. Click **Diagnostic Data**.
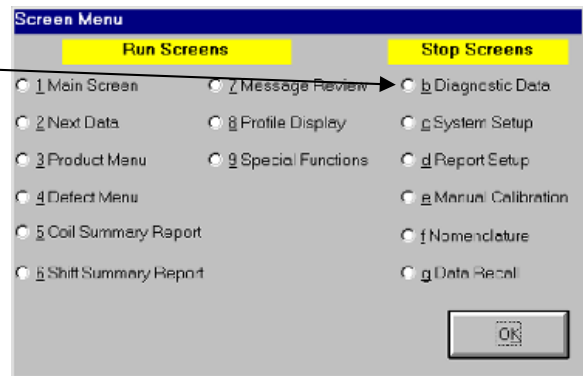
- The Diagnostic Data Screen will appear.

- Verify the Shutter is closed by observing the green shutter status indicator light.
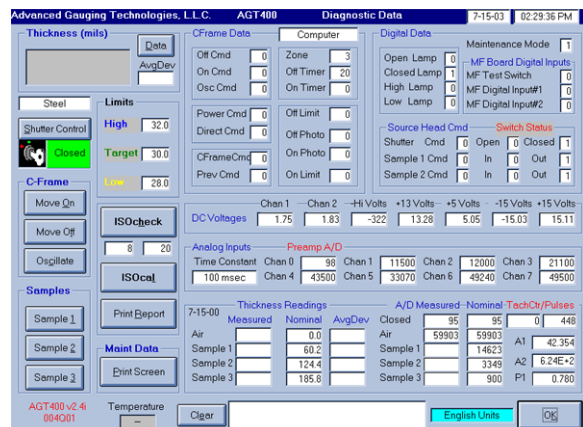
- Click on the **ISOcheck™** button and the program will ask the user to clean off the Source Head.
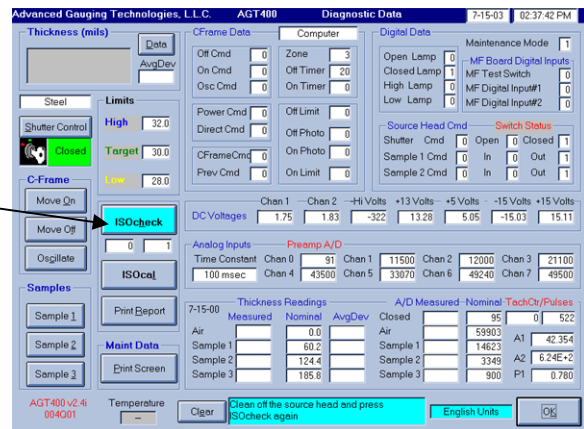
- Use a clean rag to wipe any loose debris off of the Source Head, and verify it is securely mounted to the C-Frame.

- After the Source is wiped off, click the **ISOcheck™** button a second time. The program will begin to adjust the Air measurement and compare the internal samples to the values from the last calibration.
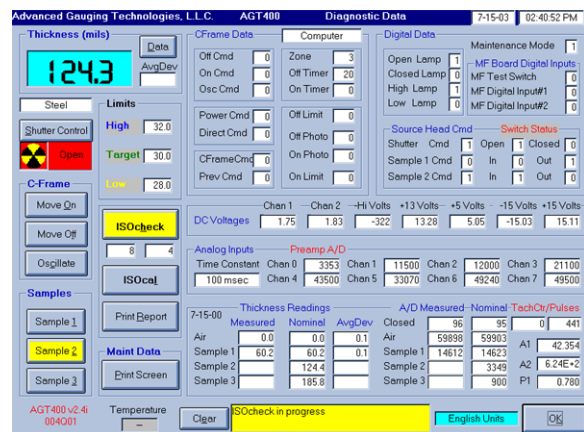
- If the sample values are in tolerance the program will give an *"ISOcheck completed successfully"* message.

- Click on the **Print Report** button to print a report.
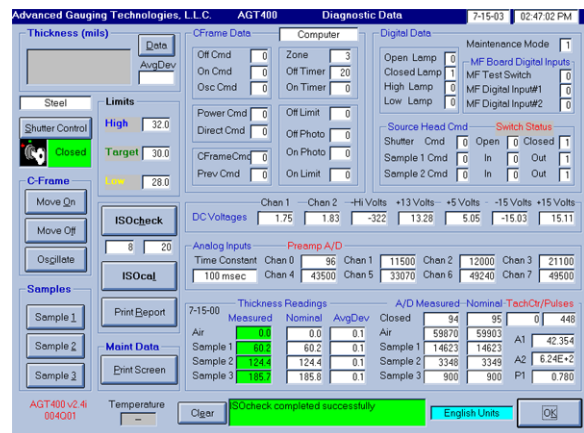
If the ISOcheck™ does not complete successfully, repeat the ISOcheck™ procedure. If ISOcheck™ fails a second time, refer to the ISOcal™ procedure or see the system message section of this manual.

- To exit the Diagnostic Data Screen Click on the **OK** button.

- Return MODE Key to the RUN position.

Keyboard Door Hinge Replacement

DJM – 10/06/03

Replacing the keyboard door hinge is a fairly simple procedure that should take no longer than ten minutes.

Tools Required: 3/32" Hex Driver   Needle Nose Pliers

- Open the keyboard door and use the needle nose pliers to remove the E-clip from the hinge pin. Once the E-clip is removed, pull the hinge pin free from the hinge and keyboard door.

- Once the pin is removed, the keyboard door should lower slightly to gain access to the hex screws that mount the hinge to the cabinet.

- Use a 3/32" hex driver to remove the two hinge mounting screws.

- Install the new hinge in the same manner as the original hinge. Mount the new hinge using the screws and the back plate.

- Once the new hinge has been mounted, raise the keyboard door and align the holes on the door with the holes on the hinge. Insert the pin through the hinge and door, and use the needle nose pliers to insert the E-clip on the pin.

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Keyboard Replacement

DJM – 12/18/03

Replacing the keyboard is very simple. It should take no longer than ten minutes for this procedure.

Tools Required: Diagonal Cutters

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- If the keyboard does not work at all, try replacing the keyboard without shutting down. If a problem occurs, shutdown the AGT400 using the two circuit breakers on the Electronic Shelf.

- Unplug the defective keyboard from the back of the computer. Some keyboards have integrated touch pads so the mouse plug will have to be unplugged as well.

- Remove the defective keyboard from the keyboard tray in the AGT400 cabinet. The new keyboard will likely have an integrated touch pad if purchased from Advanced Gauging Technologies. If the user prefers to use a mouse instead of the touch pad do not connect the mouse plug from the keyboard and continue to use the original mouse. Insert the keyboard plug into the keyboard port in the rear of the computer.

- Turn on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically, others have to be started using the power button on the computer.

Limit Switch Replacement and Adjustment
DJM – 12/22/03

Replacing or adjusting the limit switches should take no longer than one hour.

Tools Required: Adjustable Wrench   Flathead Screwdriver

Limit Switch Replacement

- Use a Flathead screwdriver to remove the two screws that attach the limit switch cover plate to the limit switch. Once the limit switch cover plate is removed loosen the screw terminals and remove the two wires.

- Remove the limit switch mounting hardware by grasping the nut with a Adjustable wrench and using a Flathead screwdriver to remove the machine screw.

- Install the new limit switch the same way the defective one was removed. Reattach wires, cover plate, etc. ensuring proper adjustment.

Limit Switch Adjustment

- Remove the Limit Switch trigger from the angle iron on the C-Frame.

- Attach the trigger to the desired position, ensuring the full range of motion for the C-Frame.

- Tighten the trigger in place.

Main Computer Board Replacement
DJM – 10/15/03

WARNING: It is not recommended that our customers perform this procedure because of the complexity of the setup of our program and Main Board drivers. This procedure will briefly describe the replacement process in the event a customer has to perform it. If it is necessary that the procedure be performed please *read through and understand* all the directions before attempting.

Remove the computer from the gauge cabinet and take it to a controlled environment

- Flip the two circuit breakers on the Electronic Shelf to the off position. Unplug all the connections on the back of the computer and pull it out of the cabinet. Take the computer to a controlled environment where it is not in danger of contamination from dirt or debris.

Remove the Hard Drive

- Remove the computer cover and remove the hard drive. There are two different style computers that were used in the AGT400: PC style and Rack-mount style. The PC style will have a rack inside that holds the different drives. Remove the four screws that mount the hard drive and unplug the power cable and IDE cable. The Rack Mount style computer will have a removable drive rack that is held down by four screws. Loosen the four screws and slide the rack backward to remove it. Some of the IDE and power cables may have to be removed to get the rack out far enough to work on, depending on where the hard drive is mounted.

Install the Hard Drive as a slave on another computer to backup the coil information and Par File

- Once the Hard Drive is removed, set the jumper to the slave position. Install the Hard Drive in a working computer and set it up as a slave drive. Start up the computer, go to Windows Explorer, and open the slave drive. Open the AGT400 folder and there should be twelve folders that hold all the coil information that was stored for that gauge. Copy the twelve folders to the master hard drive. Copy two files named AGTpar2.txt and AGTID.sys to the main hard drive (if these files are hidden click on the View tab on the tool bar and open the folder options, select *Show all Files* and uncheck *Hide file extensions*).

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Install the Hard Drive in the AGT400 computer.

Install the new Main Board and double-check all connections.

Install the computer in the AGT400 cabinet. Ensure all connections are correct.

Power the up the computer

- Flip the two circuit breakers to the on position, turn the power switch on for the computer if it does not turn on automatically.

Windows® will start up and install new drivers for the new main board

- As Windows® starts up it will find the new components on the main board and install the new drivers for them. This process could take several minutes and the computer will restart several times before Windows® can start completely.

Install the drivers that came with the new main board

- The AGT400 program will start automatically, make sure the MODE key is in the Program position ad click exit twice to exit the program. There will be drivers that Windows® may not be able to find, i.e. the video driver. Insert the driver CD that came with the board. The CD should have a list of several drivers that are needed for the new board. Find the video driver and click on the setup.exe file that is under that directory. The setup program should install the drivers and restart the computer. When the computer is finished starting up, right click on the Desktop and select properties. Select the settings tab and set the screen area to 800X600 and the Colors to 24 bit True Colors.

- Double-click **My Computer**, open the **Control Panel**, select the **System Properties** – **Device Manager** Tab. Check the list, and observe any of the devices with a yellow mark next to it. If one is found, double-click on the device, then select the **Driver** tab. Click the **Update Driver** Button. Windows® will open the Update Driver Wizard. Click **Next** and Windows® will search for a better driver. Select the *Specify a Location* box and search for the driver CD. Find where the device driver is on the disk and click **OK**. Click Next to install the driver. The computer may need to restart before it can take effect. Repeat this process for each device that has a conflict.

Test Gauge Operation

- Ensure none of the coil information was lost, check the AGT400 folder. Start the AGT400 program, run a coil and check the printouts to ensure all of the information is correct.

Manual Calibration
DJM – 12/18/03

WARNING! It is *highly* recommended that a manual calibration be performed by a trained technician and with <u>N.I.S.T. traceable samples suspended at the correct pass line height and angle only</u>.

A manual calibration should be performed every six months or any time there is a change in the alignment of the measuring heads. Normally, an A.G.T. Field Service Technician using N.I.S.T. traceable samples at the time of your Semi-Annual inspection performs this service.

To perform this calibration, use the following procedure:

- Gather the calibration samples and sample holder.

- Ensure there is no steel between the Source and Detector heads.

- Turn the MODE Key on the Electronics Shelf to PROGRAM.

- Click the **Screen Menu** button on the Main Operating Screen.
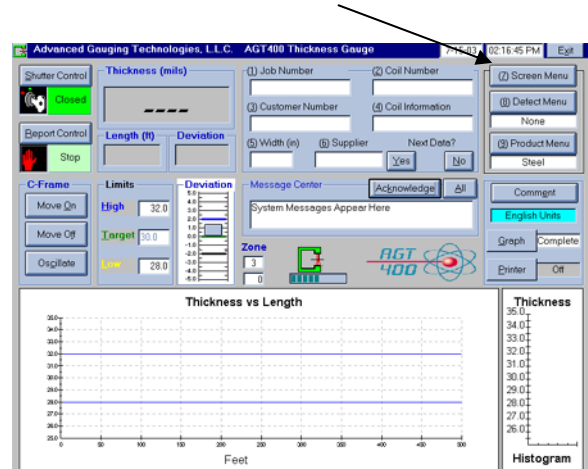
- The Screen Menu will appear. Click **Manual Calibration**.
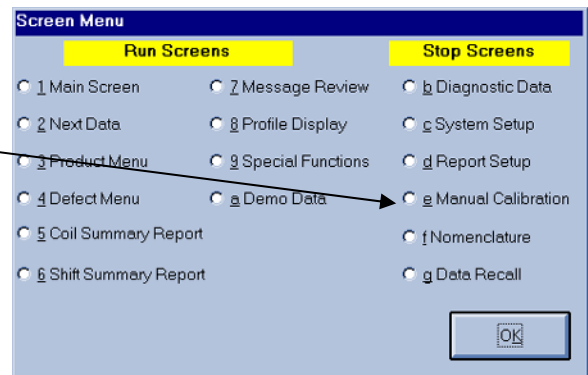
- The Manual Calibration Screen will appear.

- Verify the samples entered on the manual calibration screen match the external samples to be to be used in the procedure.

- If the sample values are not correct, check the box next to the incorrect value then click the **Rename** button. Type the correct value in the highlighted box then click **Yes**.

- To remove a sample, check the sample that needs to be removed and click **Remove Sample** button. The value will disappear from the list.

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- To add a sample click on the **Add Sample** Button. Type the new value in the highlighted box then click **Yes**. The value will appear on the list.

- Once the values match the external sample set, click on the **Calibrate** button. The program will ask the user to make sure the Source Head is clean before beginning the calibration.

- Verify the shutter is closed by checking the shutter status lights. Green means the shutter is closed.

- Use a rag to wipe any debris off of the Source Head, and verify it is securely mounted in the C-frame.

- After the Source Head is wiped off click the **Calibrate** button.

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- The program will adjust the air value and then ask the user to place sample 1 on the Source Head. Place the sample holder on the Source Head then place sample 1 on top of the sample holder. Click the **Calibrate** Button and the program will begin to measure the sample. The program records data to be used to make adjustments to the calibration curve.

- Once it is finished measuring sample 1 it will ask for sample 2 to be placed on the source head. Place sample 2 on the sample holder and Click **Calibrate**. Continue this process for the remainder of the samples.

- When it is finished measuring the last sample click **Calibrate** again. The program will ask the user to remove the sample from the source head, remove the sample and sample holder. Click **Calibrate**, and it will give a message to check the samples to include in the calculation. Check all of the samples then click **Calibrate**.

- Check the Average Percent of Deviation, if the percentage is over 0.20% there may be a problem in the calibration. Verify the sample values are entered correctly and perform a Manual Calibration again. If the calibration is, still over 0.20% refer to the Troubleshooting section of this manual.

- If the Average Percent of Deviation is 0.20% or less, click on the **Save Cal** Button.

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- The program will measure then designate values for the internal samples.

- When it is finished gathering internal sample values click the **Save Cal** Button. A report can be printed by clicking on the **Print Report Button**. Click **OK** to Exit the Manual Calibration Screen.

- Return the MODE Key to the RUN Position.

Opto22 Module Replacement

DJM – 12/11/03

Replacing an Opto22 Module is a fairly simple procedure that should take less than one hour.

Tools Required: Small Flat Head Screwdriver   Opto22 Key
                      Phillips Head Screwdriver

-   Once the defective Opto22 Module has been diagnosed, properly perform the AGT400 Shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

-   Use a small Flat Head Screwdriver to remove the wires that are inserted into the Opto22 Module. Remove the mounting screws on each side of the Opto22 Module using a Phillips Head Screwdriver.

Quick Tip – If the terminal block is in good condition, the entire block can be removed by releasing the clip and pulling on it. The terminal block can then be reinstalled once the new Opto22 Module is installed.
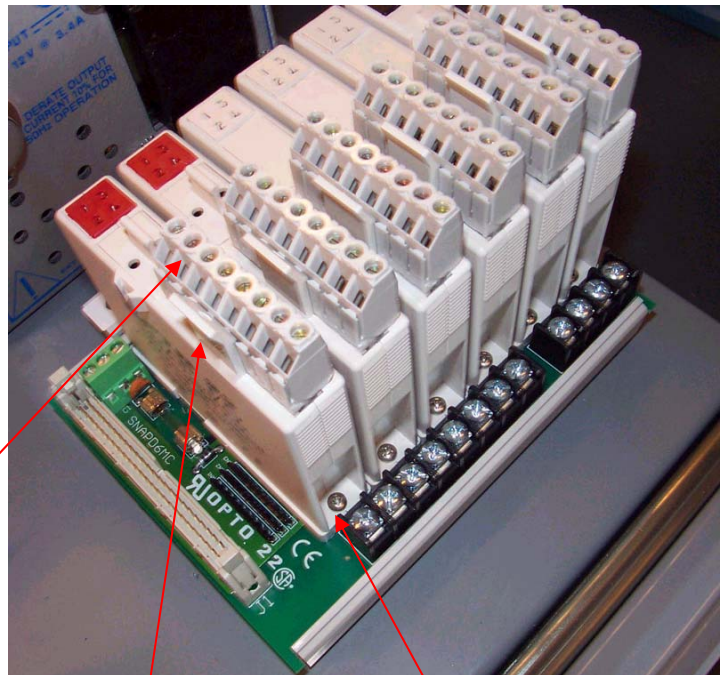
Clip   Phillips Head
                           Mounting Screws

- Once the two Phillips screws have been removed, insert the Opto22 Key into the screw hole on the side of the number label. Ensure the flat end of the Opto22 Key is facing out. Press the tool toward the Opto Module and then lift up on the Module. It should not take excessive force to remove the Module.

Opto22 Key

Interconnect
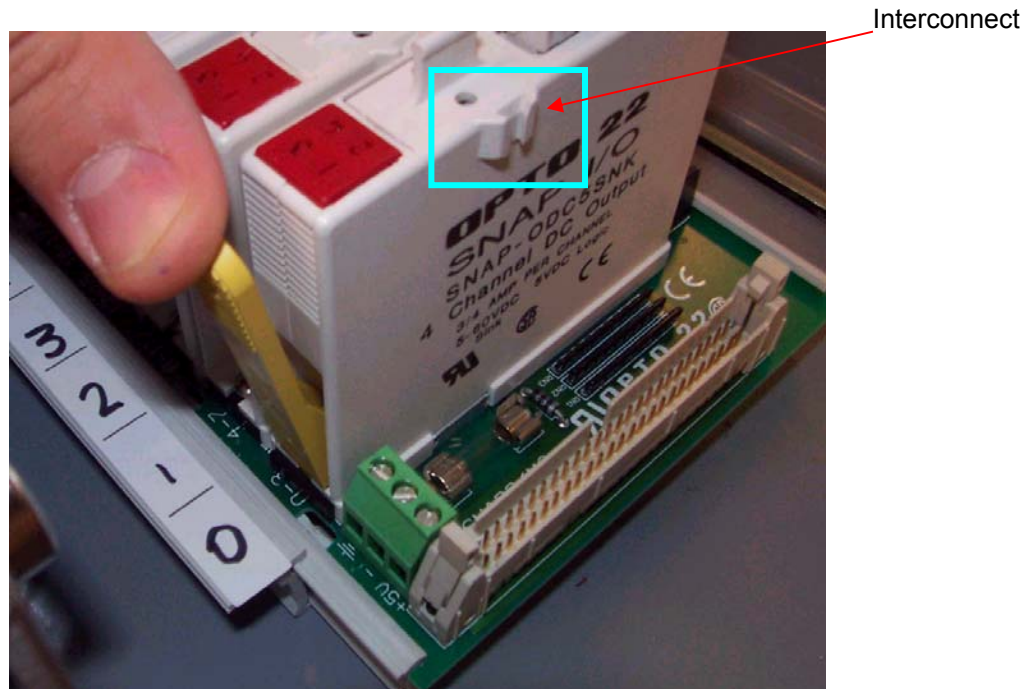
- Firmly snap the new Module in place insuring that the interlocking tabs are inserted correctly.

- Reinstall the terminal block in the new Opto22 Module if it was removed.

- Replace the two Phillips Head mounting screws and wires. Refer to the wiring diagram to ensure it is correct.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically, others have to be started using the power button on the computer.

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Photocell Replacement

DJM – 12/18/03

Replacing the photocells on the C-Frame should take no longer than one hour.

Tools Required: Adjustable Wrench   Phillips Head Screwdriver

-   Remove the defective photocell (emitter or receiver) by removing the mounting hardware. Grasp the nut with the adjustable wrench and remove the screw with the Phillips head screwdriver.

-   There will be a locking sleeve on the connector attached to the photocell cable. Pull the sleeve back to release the cable connector from the defective photocell.

-   Pull back the locking sleeve on the cable connector and insert the replacement photocell cable connector in place. After the cable connector is connected push the locking sleeve forward to lock the connector. Reinstall the photocell in the same position using the same hardware as the defective photocell.

-   Verify the correct operation of the photocell emitter by looking for a red LED.

-   Verify the correct operation of the photocell receiver by looking for two small LEDs on each. One of the LEDs should be green, indicating the receiver has power. The other LED should be yellow, indicating the receiver is receiving the emitter's signal.

Power Supply Replacement

DJM – 12/09/03

Replacing one of the DC power supplies is very simple if the user can use a soldering iron. This replacement procedure should take less than one hour.

Tools Required: Soldering Iron   Phillips Head Screwdriver
Flat Head Screwdriver
11/32" Nut Driver or an adjustable wrench

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- Write down where each wire on the power supply is located in order to reference later. Use a soldering iron to remove the wires from the defective power supply.

- Extend the Electronics Shelf as far as it will go. Insert a Phillips Screwdriver into the Phillips Head Screw that mounts the power supply to the Electronic Shelf. Loosen the nut attached to the Phillips Head mounting screw on the bottom of the Electronic Shelf. Repeat this step with the other mounting screws.

- Once the mounting screws are removed, remove the defective power supply. Some AGT400 power supplies have a plastic shield that will have to be removed. Use the Phillips Screwdriver to remove the screws that hold the shield in place.

- Install the new power supply in the same way the defective power supply was mounted. Solder the wires to the power supply, reference the list recorded earlier.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically, others have to be started using the power button.

- Click the **Screen Menu** button on the Main Operating Screen.

- The Screen Menu will appear. Click on the **Diagnostic Data** Button.

- Check the power supply voltages on the Diagnostic Data Page.
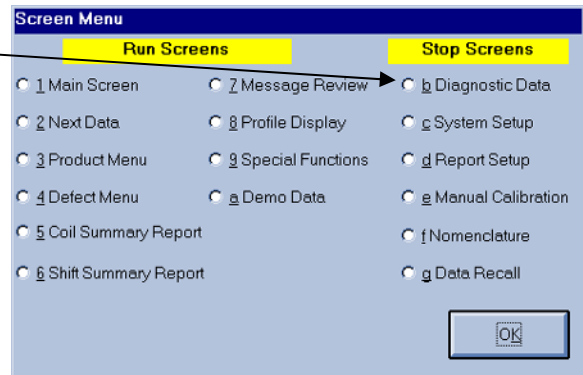
- To adjust the power supply output voltages, adjust the trim pots on the power supplies using a small Phillips Head screwdriver. Refer to the table below.

M/F Board	Diagnostic Screen			
TP2	+15.00V	±0.25	R82	on the triple output power supply
TP3	-15.00V	±0.25	R57	on the triple output power supply
TP4	+ 5.00V	±0.25	R9	on the triple output power supply
TP5	+13.20V	±0.25	R9	on the single output power supply

- Once the voltage is correct exit out of the Diagnostic Data Screen by clicking the **OK** button.

- Return MODE Key to the RUN position.

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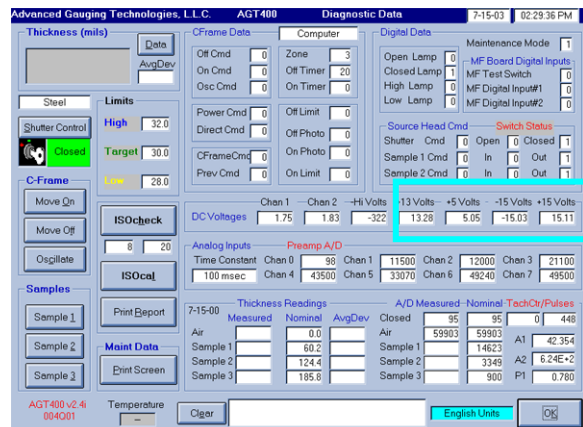
Pre-Amp Board Replacement

DJM – 12/12/03

Replacing the Pre-Amp Board in the Detector Head is a very simple process that should take less than an hour. It is recommended that this procedure be done in a controlled environment away from the line.

Tools required:
        3/16" Hex Driver   Phillips Screwdriver
        9/64" Hex Driver   Soldering Iron
        11/32" Nut Driver   Solder
        Flat Head Screw Driver   Voltmeter
        Ground Strap (**highly recommended**)

- Position the C-Frame to allow access to the Detector Head.

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- Remove the four socket head screws that attach the Detector Head to the C-frame with a 3/16" Hex Driver.

- Once the four socket head screws are removed pull the Detector free from the C-frame and unscrew the cable connector from the back of the head. Some AGT400 gauges have Detector Head isolation pads between the head and the C-Frame. Be careful not to lose the isolation pads if present.

- Take the Detector Head to a location where it will be easy to work on, perhaps a large desk or table, where parts will not be lost.

- Remove the six top cover plate socket screws using the 9/64" Hex Driver. Remove the O-ring gasket from the groove of the Detector Head housing.
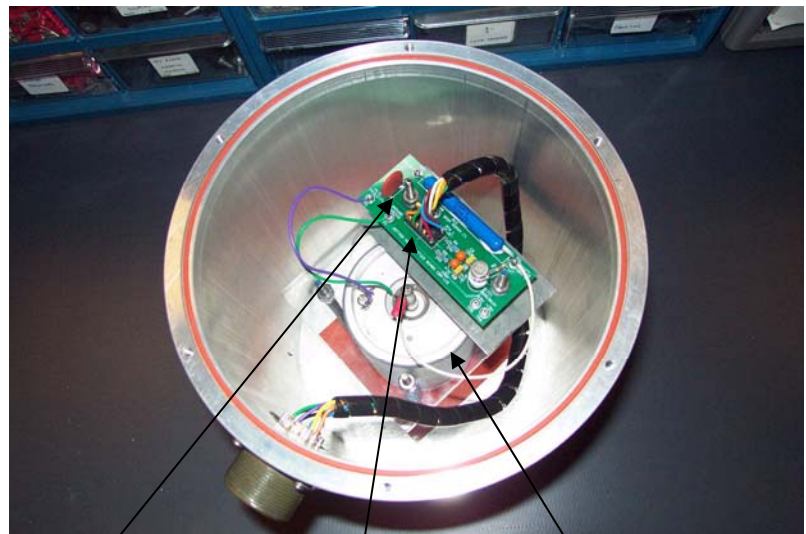
Threaded Rods   Inner Cable   Ion Chamber
                        Connector

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- Unplug the inner cable connector from the Pre-Amp board.

- Unscrew the Phillips Cap Screw at the end of the white wire.

- Remove the purple and green wires from the Ion Chamber using a soldering iron.

- Remove the two 8-32 Hex Nuts, flat washers, and lock washers that mount the Pre-Amp Board.

- Remove the defective Pre-Amp Board.

- **WARNING!** The F.E.T. on the new Pre-Amp Board Is very sensitive to static electricity. If the F.E.T. is touched there is a good chance it will become defective. It is best to use a grounding strap when performing these next steps. This procedure can be completed successfully without a grounding strap but it is not recommended. Be **very** careful not to touch the F.E.T.
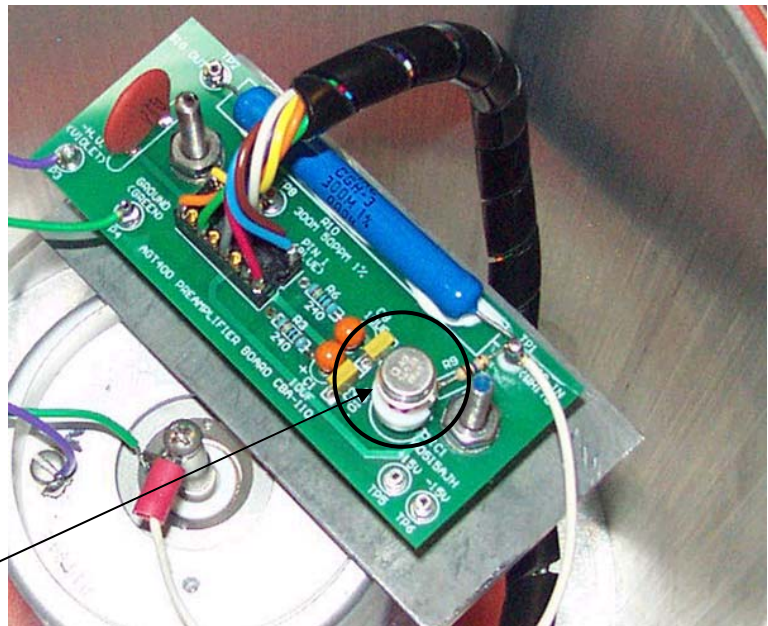
F.E.T.

- Remove the new Pre-Amp board from the anti-static bag ensuring **not** to touch the F.E.T. or the blue 300MΩ resistor.

- Attach the Pre-Amp board by sliding the two threaded rods in the Detector Head through the holes in the board.

- Place a flat washer and then a lock washer on each stud. Thread the nuts on the rods and tighten them to the board using an 11/32" Nut Driver. DO NOT OVERTIGHTEN. Tighten the nuts just enough to compress the lock washers.

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- Solder the green wire to the base of the Ion Chamber.

- Solder the violet wire to the case terminal (sometimes marked **V**).

- Screw the ring terminal connected on the white wire to the signal terminal on the Ion Chamber with the Phillips screw.

300MΩ resistor
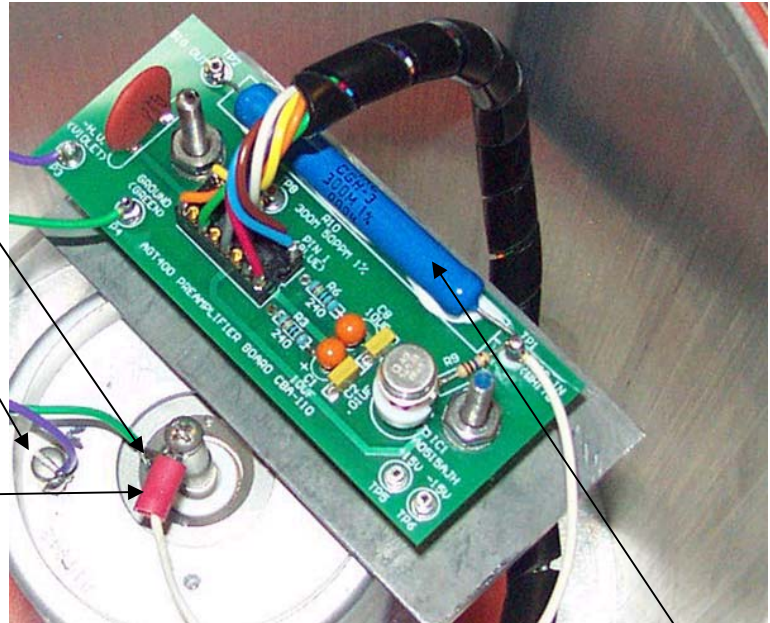
- Plug in the inner cable, ensuring to line up pin one on the connector (blue wire) and the board connector. To identify which end has pin one, locate the notch on the connector. Both connectors have a notch on one side, just line up the notches.

- There is an isopropyl alcohol swab included with the new Pre-Amp board. It is used to wipe off the 300MΩ resistor (long blue resistor). The Pre-Amp board will not function properly if there is any oil on it. Wipe the 300MΩ resistor with the swab thoroughly to clean off all finger prints and oil residue (Be sure to avoid contact with the F.E.T.).

- Insert the O-ring gasket into the Detector Head housing groove. Slight stretching of the O-ring may be required. Attach the top cover plate with the six socket screws ensuring the O-ring does not come out of the groove.

- Install the Detector Head in the C-frame, reconnect the Detector Head cable and install the four mounting socket screws in the top of the Detector. If the gauge had isolation pads, be sure to install them between the Detector Head and the C-Frame.

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- Switch on the circuit breakers on the Electronics Shelf of the gauge. Some computers will start automatically, others have to be started using the power button on the computer.

- Once the program restarts, open the Diagnostic Data screen. Check the Channel 0 voltage; ensure the value is between 80 and 200. If it is not between these two values there is a good chance the F.E.T. is blown. To verify this check the voltage between the black and the white wire on J1 (Pin 1 and 2) of the multi-function board. The voltage should be less than ±1.0mV. If the F.E.T. is blown, refer to the F.E.T. Replacement procedure.
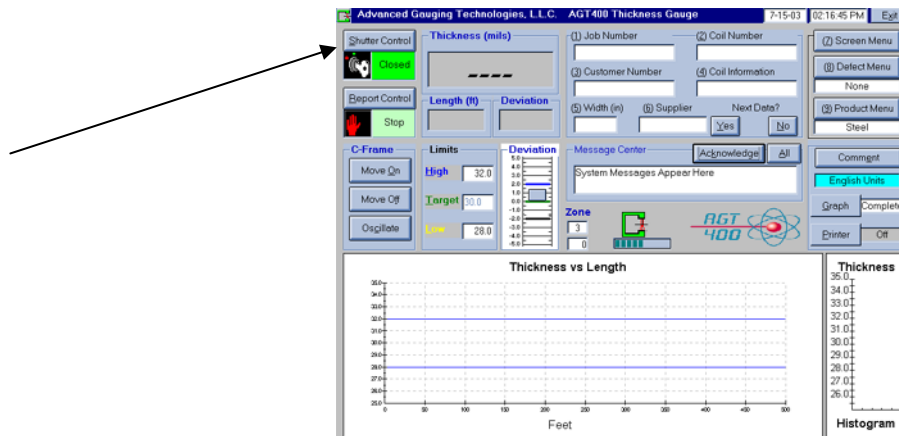
- Open the shutter and use a voltmeter to measure between TP1 (Ground) and TP9 on the Multi-function Board on the Electronics Shelf. The voltage should be 9.50VDC (± 0.1V) with no steel in the beam and the shutter open. If this voltage is off, adjust the Potentiometer VR6 on component header #6 of the Multi-Function Board using a small Flathead screwdriver. If the shutter closes automatically during adjustment, just open it again and continue the adjustment.

J1 Pin 1 and 2
Detector Signal In

Component Header #6
Potentiometer VR6
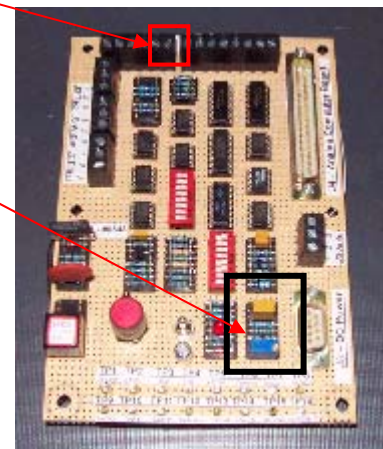
- Once the open beam voltage is 9.50VDC, let the system warm up ten minutes. Run an ISOcheck procedure to check the calibration.

- After completion of an ISOcheck, turn the MODE key on the Electronics Shelf to RUN.

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Printer Replacement
DJM – 12/12/03

Replacing the printer is a fairly simple procedure that should take less than one hour.

Tools Required: None Required

-   Properly perform the AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

-   Unplug the power cord from the UPS for the defective printer. Examine the printer data cable. If it seems to be in fairly good shape there is probably no need to replace it.

-   Remove the defective printer and install the new printer. Plug the power cord and the data cable into the new printer. Follow the directions supplied with the new printer to install the ink cartridges and paper. Turn off the power to the printer before restarting the gauge.

-   Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauge computers will start automatically, others have to be started using the power button on the computer.

-   The AGT400 software will start automatically. Exit the program by clicking the **Exit** button twice.

-   Power up the printer. Insert the software disk that came with the printer. Follow the directions to install the software.

-   Once the software installation is complete, turn the MODE key to RUN and start the AGT400 program.

Shutdown

DJM – 12/18/03

- Turn the MODE key on the Electronics Shelf to PROGRAM and then click the **Exit** Button twice.

- The AGT400 program should close to the Windows® Desktop. Click the **Start** button at the bottom of the screen and select shut down.

- Once the computer displays that it is safe to shutdown, switch off the two circuit breakers on the Electronics Shelf.

- Note: Older systems will shutdown automatically and may not display that it is safe to shutdown. With these systems wait for the computer to fully turn off before switching off the two circuit breakers on the Electronics Shelf.

t
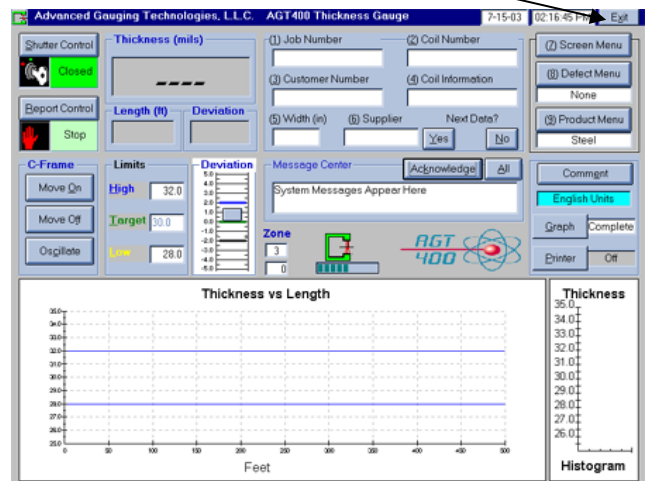
Tachometer Replacement

DJM – 12/12/03

Replacing a tachometer is a fairly simple procedure. Where and how the tachometer is mounted will greatly influence how long this procedure will take.

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- Examine how the tachometer is mounted to find out what tools will be required.

- Remove the cable that is connected to the tachometer.

- Remove the hardware that mounts the tachometer to the line.

- Replace the defective tachometer with a new one.

- Reassemble the hardware that mounts the tachometer to the line.

- Connect the tachometer cable connector to the new tachometer.

- Switch on the circuit breakers located on the Electronics Shelf of the gauge. Some gauges will start automatically. Others have to be started using the power button on the computer.

- Test the new tachometer for normal operation.

- Return MODE Key to the RUN position.

Uninterruptible Power Supply (UPS) Replacement

DJM – 12/09/03

Replacing the UPS is a fairly simple procedure that should take less than one hour. There are several different UPS models available and this procedure will give a basic explanation of how to replace a typical UPS.

Tools Required: 7/16" Wrench (For the Rack-Mounted UPS)

- Perform the proper AGT400 shutdown procedure. See the Shutdown procedure in the Maintenance section of this manual.

- There are several different UPS models that have been installed in the AGT400 systems over the years. There are two basic styles: stand-alone and rack-mount.

Stand-alone

- If the AGT400 system has a stand-alone UPS, simply unplug all the connections from the back of the defective UPS. Some UPS systems have a serial connection that is connected to the computer. Do not install the serial connection on the new UPS.

- Install the new UPS in place of the defective UPS. Connect the new UPS the same way the defective one was installed. The UPS may have to be placed on its side or under the computer for it to fit in the cabinet. Ensure the UPS is plugged into a different AC feed from the Auxiliary power.

- Press the power button on the front of the UPS and turn on the circuit breakers on the Electronics Shelf. Some computers will start automatically, others will need to be started using the power button.

- If the system has monitoring software installed, it will have to be uninstalled. Exit the AGT400 software and go to the Control Panel in Windows. Go to Add/Remove Program and remove the monitoring software. The computer may need to be rebooted before the settings will take effect.

Rack-mount

- If the system has a rack-mount style UPS installed in the cabinet, it will take a little more work to remove. There are usually four bolts mounting the UPS to the rack angles in the cabinet. Remove the four bolts with a wrench and unplug the cables from the back of the UPS. In some cases, the computer will have to be removed in order to remove the UPS.

- Install the new UPS reusing the bolts from the defective UPS.

- Plug the power cables in the back of the UPS. Ensure the UPS is plugged into a different AC feed from the Auxiliary power.

- Press the power button on the front of the UPS and turn the circuit breakers located on the Electronics Shelf of the gauge on. Some gauges will start automatically, others will need to be started using the power button on the computer.

Video Monitor Replacement

DJM – 12/22/03

Replacing the monitor is a very simple procedure that should not take longer than fifteen minutes.

Tools Required: Wire Snips   Cable Ties

- Turn the defective monitor's power off. Unplug the video cable from the back of the computer and pull the power cable from the back of the defective monitor. The video and power cables from the defective monitor will be routed through the cabinet. The cables will have to be pulled up the inside of the cabinet carefully to remove them. It may be necessary to snip cable ties to remove the cables.

- Remove the defective monitor from the cabinet and replace it with the new one. Route the new video and power cable down the side of the cabinet. Plug the video cable into the rear of the computer. Plug the power cable into the UPS.

- Turn the monitor power on and restart the computer for Windows to find the correct driver. The monitor may have to be adjusted before it works properly. If there are problems with these adjustments, refer to the instruction booklet that came with the monitor.

Confidential

SLOTTED I/4 TURN LATCHES IN WINDOW DOOR.

EMKA HINGE 1110-U3 TYP. ALL DOORS.

3/8" GASKET BETWEEN SECTIONS.

KEY LOCKING WING KNOB I/4 TURN LATCHES TYP.

I/2" EYE BOLTS

58.875

24.500

24.000

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

Revisions			
Rev#	Revision Description	MM/DD/YY	Approved By:

REAR ISOMETRIC VIEW

FRONT ISOMETRIC VIEW
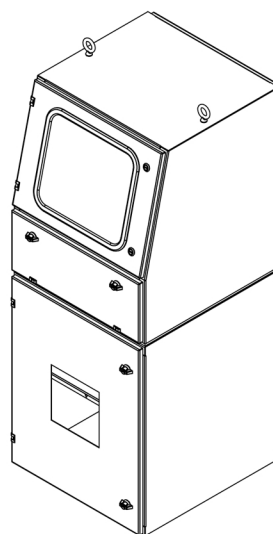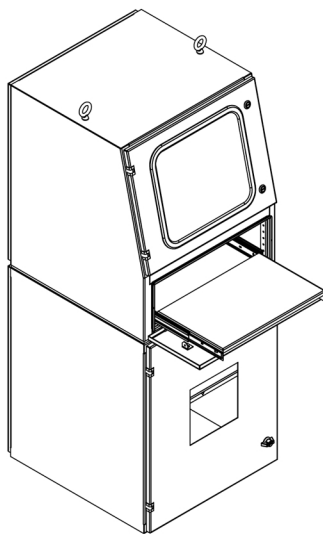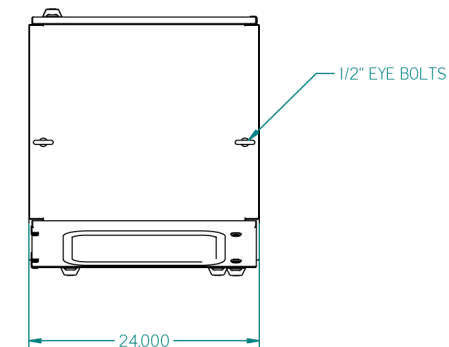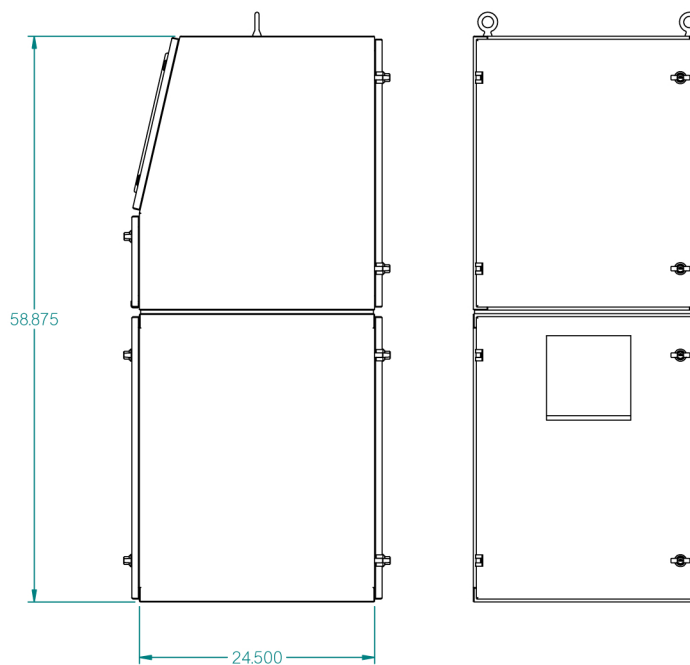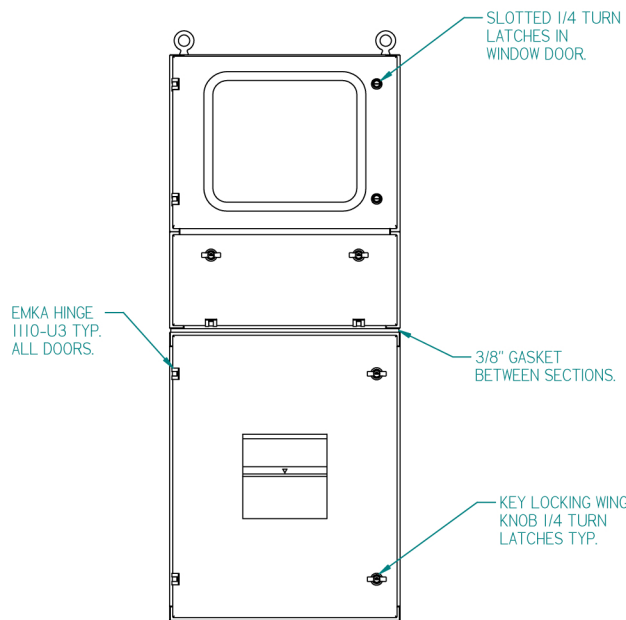
ADVANCED GAUGING TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

Main Electronics
Cabinet

SIZE A	400.050	REV O
DRAWN BY: J.P.F. 8/24/05		SHEET 2 OF 2

Confidential

CLASSIFIER LIGHT FIXTURE

SHUTTER LIGHT FIXTURE

B A   R G

OPTIONAL REMOTE COIL MAPPING TERMINALS

OPTIONAL REMOTE MONITOR

Video Monitor

Keyboard

OPTIONAL REMOTE DISPLAY METER

88888

Coil Top   Coil Bottom

Video Monitor

Keyboard

ELECTRONICS CABINET

C L

AGT 400

Detector Head

PHOTOCELL RECIEVERS

PASSLINE

PHOTOCELL EMITTERS

Source Head

18 1/4"   20 1/4"

RD CABLE   1/2" CONDUIT
RM CABLE   1/2" CONDUIT (NOTE 3)
CM CABLE   1/2" CONDUIT
SL CABLE   1/2" CONDUIT
CL CABLE   1/2" CONDUIT

AGT 400

ON SHEET LIMIT SWITCH
OFF SHEET LIMIT SWITCH

TM CABLE   1/2" CONDUIT
DM CABLE
PC CABLE   SAME 3/4" CONDUIT
SH CABLE
DH CABLE   3/4" CONDUIT

Tachometer

CUSTOMER SUPPLIED AC POWER TWO SEPARATE 5 AMP FEEDS

Note 1: C-frame should be solidly mounted with the top of the Source Head one to two inches below passline. The centerline stripe on the I-beam should be located at the centerline of the Line.

Note 2: Conduit should either be rigid or liquid-tight flexible steel conduit contact A.G.T. for alternate conduit types.

Note 3: 1/2" conduit is used when CAT-5 cable is used, 2" Conduit is used when using VGA driver cable only.

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TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

BLOCK DIAGRAM

SIZE A	400.100	REV O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

Confidential

B+13 1/4"

9 1/4"

C
L

4 5/8"

Detector
Head

AGT 400

A   A-1"

B

PASSLINE

Source
Head

10 1/4"

20 1/4"

10 1/2"

8"

8"

C

2xB+40"

11 5/8"

AGT 400

MILL OR PROCESS LINE
CENTERLINE

ON SHEET LIMIT SWITCH
OFF SHEET LIMIT SWITCH

A=8" (Typically)

B=Maximum strip width +8" (Typically)

C=Maximum strip width divide by 2+1/2" (Typically)

Note 1 - Recommend installation with passline in lower 1/3 of air gap to reduce secondary radiation effects

Note 2 - Slitting lines, C-frame must be installed before slitter head

Note 3 - Junction box and limit switches (shown on left side) can be mounted on the right at customers request

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QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

C-FRAME ASSEMBLY

SIZE A	400.150	REV 1
DRAWN BY: J.P.F. 8/22/05		SHEET 1 OF 1

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

RADIATION DETECTOR

PHOTO EYE BEAM

MATERIAL TABLE

RADIATION BEAM

2 1/4"

MATERIAL TABLE

B

A

RADIATION SOURCE

A= 2" (Typical)
B= 7" (Typical)

3/4"

NOTE 1-Dimension A should not exceed 1/3 dimension B.

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DRAWING NAME

OSCILLATING C-FRAME
RECOMMENDED CLEARANCES

SIZE A	400.151	REV O

DRAWN BY: J.P.F. 8/25/05 | SHEET 1 OF 1

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

ELECTRIC/MANUAL C-FRAME
RECOMMENDED CLEARANCES

RADIATION DETECTOR

MATERIAL TABLE

RADIATION BEAM

2 1/4"   2 1/4"

RADIATION SOURCE

MATERIAL TABLE

A= 2" (Typical)
B= 7" (Typical)

B

A

NOTE 1-Dimension A should not exceed 1/3 dimension B.

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QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

ELECTRIC/MANUAL C-FRAME
RECOMMENDED CLEARANCES

SIZE A	400.152	REV O

DRAWN BY: J.P.F. 8/25/05   SHEET 1 OF 1

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

JTB2

TO C-FRAME	Pin	TO MEC
Red Wire to Motor	1	Red wire to drive relay T-1
Brown Wire to Motor		Brown wire to drive relay T-8
White wire to c-frame (off sheet)TS1-3		White wire to Opto22 4-6
Green wire to c-frame (on sheet)TS1-4		Red wire to Opto22 4-8
Black wire to c-frame TS1-2	5	Black wire to Opto22 TS2-7 (GND)
Red wire to c-frame TS1-1		
Source connector pin A		Black/Black w/white stripe to Opto22 TS2-6
Source connector pin B		Red to N/C
Source connector pin C		Orange to Opto22 1-2
N/C	10	Red w/white stripe to N/C
Source connector pin D		Green to Opto22 1-4
Source connector pin E		Blue to Opto22 1-6
Source connector pin F		White to Opto22 3-2
Source connector pin G		Red w/black stripe to Opto22 2-2
Source connector pin H	15	Orange w/black stripe to Opto22 3-4
Source connector pin J		Green w/blackstripe to Opto22 2-4
Source connector pin K		Blue w/black stripe to Opto22 3-6
Source connector pin L		White w/black stripe to Opto22 2-6
Blue wire to on sheet limit		Green w/white stripe to Opto22 4-4
Green wire to off sheet limit	20	Blue w/white stripe to Opto22 4-2

JTB3

TO C-FRAME	Pin	TO MEC
n/c	1	Shield (green black pair) to MFIO J1-8
Detector connector S		Green wire to MFIO J1-7
Detector connector G		Black wire (green black pair) to MFIO J1-8
n/c		n/c
Yellow wire to N/C	5	Yellow wire to N/C
Black wire (yellow black pair) to N/C		Black wire (yellow black pair) to N/C
n/c		n/c
n/c		n/c
Detector connector C		White wire to MFIO J1-1
Detector connector B	10	Black wire (white black pair) to MFIO J1-2
Black wire (Red black pair) to N/C		Black wire (Red black pair) to N/C
Black wire (blue black pair) to N/C		Black wire (blue black pair) to N/C
Detector connector K		Red wire to MFIO J1-3
Detector connector M		Blue wire to MFIO J1-4
n/c	15	n/c
Detector connector A (brown wire) / Detector connector L (black wire)		Brown, Black wire (brn blk pr) to MFIO J1-5
n/c		Five remaining shield wires to MFIO J1-6
n/c		n/c
n/c		n/c
n/c	20	n/c

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QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

C-FRAME JUNCTION BOX LAYOUT

SIZE		REV
A	400.153	O

DRAWN BY: J.P.F. 2/28/07 — SHEET 1 OF 1

Confidential

ON ~ 85° F
OFF ~ 70° F

COOLING FAN

TO TRIPLE OUTPUT POWER SUPPLY
COM 4 1

TO SINGLE OUTPUT POWER SUPPLY
COM 4 1

TO OPTO BOARD
11 12

SPEED CONTROL 1000 W 120 VAC

LOAD
EMI 1
L: 2x2.9 mh
C: 0.1 uf (x2)
Y: 2x.33 pf
LINE

LOAD
EMI 2
L: 2x2.9 mh
C: 0.1 uf (x2)
Y: 2x.33 pf
LINE

1   8
POWER RELAY R1

MOV
MOV
MOV

MOV
MOV
MOV

CB1

CB2

Chassis

ACTBU
ACTBL

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

GND GRN or YEL/GRN

LINE BLK or BRN

NEUT WHT or BLU

LINE BLK or BRN

LINE BLK or BRN

NEUT WHT or BLU

GND GRN or YEL/GRN

NOTE: CB1 5 AMP LABELED AS COMPUTER
CB2 5 AMP LABELED AS AUXILIARY

COMPUTER AC IN from UPS

AC OUT CPU POWER

AUXILIARY AC IN from EXTERNAL AC

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DRAWING NAME

AC TERMINAL STRIP WIRING

SIZE A	400.200	REV O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

Confidential

OPTO 22
FIELD TB

12
11

4
2
1
3

TRANSFORMER   REGULATED OUTPUTS

VIO
GRN

+
−

12 VDC 3.4 AMP
(ADJUST TO 13.2 VDC)

2
1

BLK
WHT
WHT
BLK

12 LINE
7   NEUTRAL
2   GND
8   NEUTRAL
10 LINE

GRN

ACTBU

J3

9
8
4
3
2
1

MULTIFUNCTION
BOARD
9 PIN DSUB
(FEMALE)

4
2
1
3

TRANSFORMER   REGULATED OUTPUTS

WHT
BLK

+
−
+
COM
−

+5 V (ORG)
GND (GRN)
+15 V (RED)
GND (GRN)
−15 V (BLU)

TRIPLE OUTPUT
+5 VDC 2 AMP
+15 VDC 0.4 AMP
−15 VDC 0.4 AMP

+5
−
GND

OPTO 22
POWER TB

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION
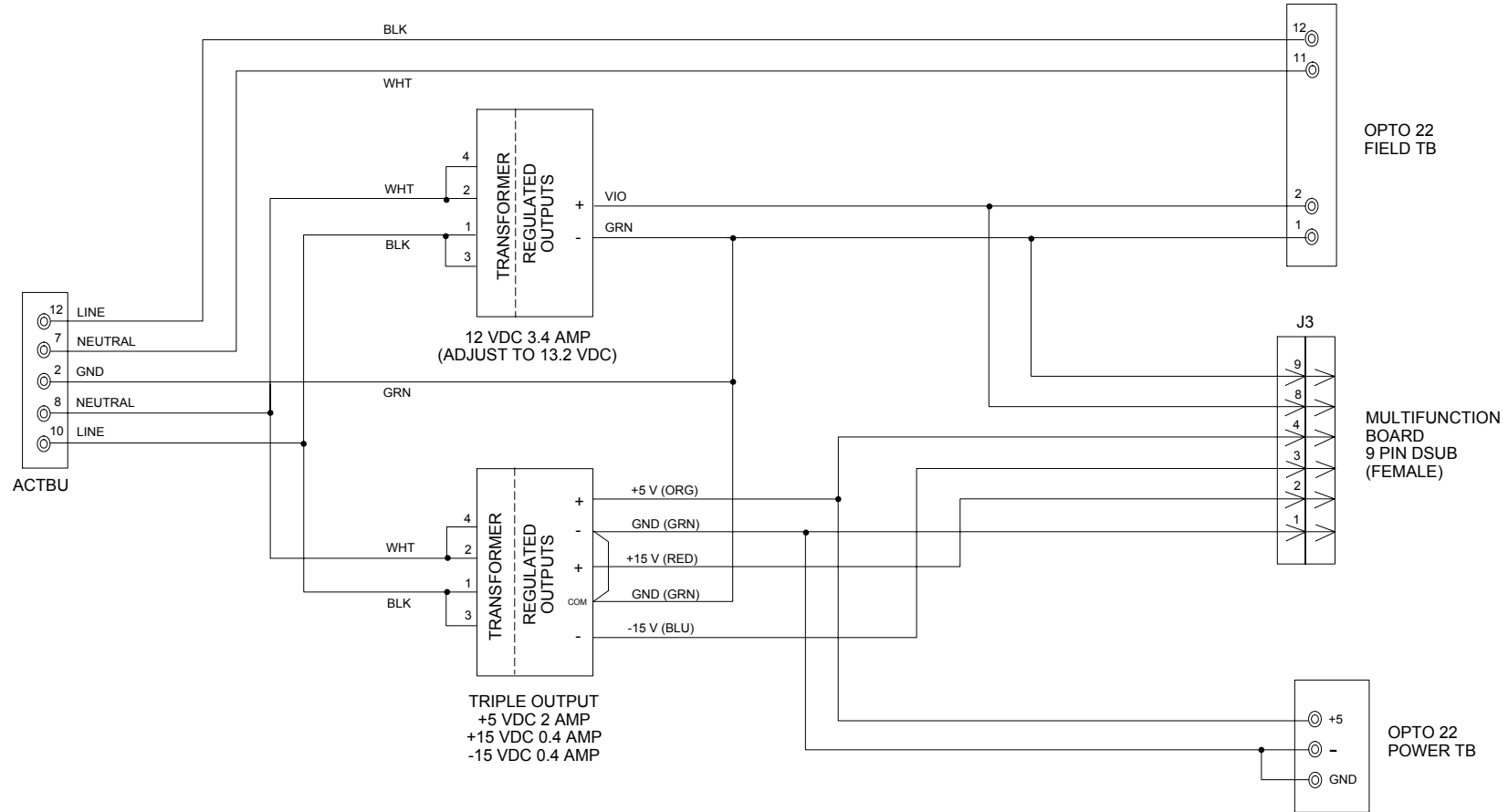
DRAWING NAME

DC POWER
SUPPLY WIRING

SIZE A	400.250	REV O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

OPTO OUTPUT MODULE 0

DIRECTION
ON SHEET/OFF SHEET

POWER
ON/OFF

MODULE 0-4

MODULE 0-2

AC NEUTRAL
ACTBU-16U

AC LINE
ACTBU-13U

SPEED
CONTROL
1000 W
120 VAC

N/C

N/C

POWER
RELAY
R1

OPTO22
MODULE 3-8

COMPUTER/
MANUAL
SWITCH

OPTO22 TS2-4
+13 V

+13 V

MANUAL
DIRECTION
ON SHEET/OFF SHEET

RECTIFIER

MANUAL JOG
BUTTON

C-FRAME
JUNCTION BOX
JTB-2

DIRECTION
RELAY
R2

C-FRAME
DRIVE
MOTOR

90 VDC
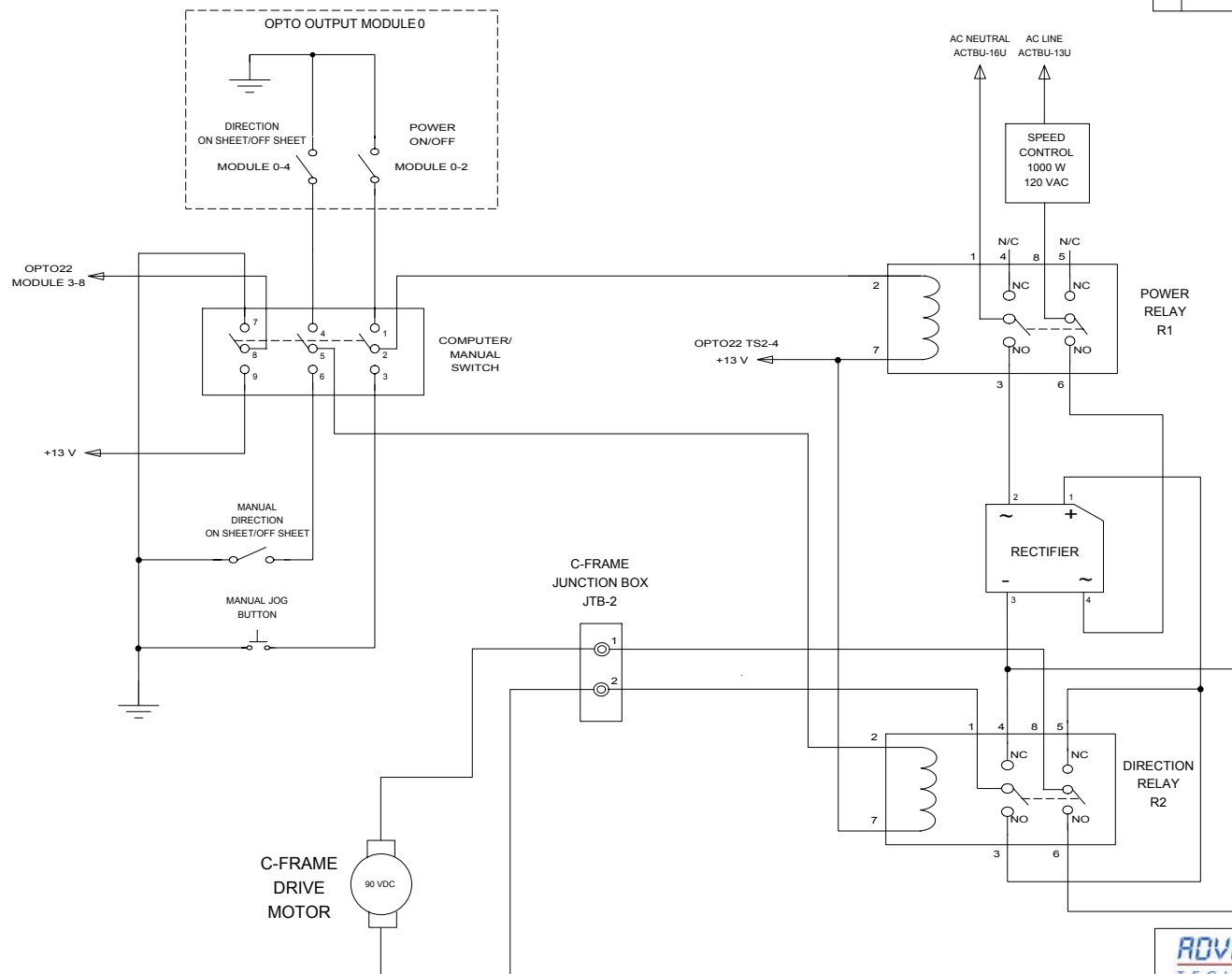
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DRAWING NAME

C-FRAME DRIVE
SCHEMATIC

SIZE A	400.300	REV O
DRAWN BY: J.P.F. 12/15/03		SHEET 1 OF 1

Confidential

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

AGT400 Electronics Cabinet

C-FRAME JUNCTION BOX JTB-2

AGT400 SOURCE HEAD

OPTO 22 RACK

SOURCE HEAD BULKHEAD CONNECTOR

SOURCE HEAD INNER CABLE

DSUB 25 SOURCE RING

OPTO TS-6 (+13.2 VDC)   BLK/WHT   6   JUMPER WIRE
                         BLK   7   A   BLK   1   BLK
                                              BLK/WHT
MODULE 3-2   WHT   13   F   WHT   6   GRN   NO   S1 SHUTTER CLOSED
SPARE   RED   8   B   RED   2   N/C   NC
MODULE 2-2   RED/BLK   14   G   RED/BLK   7   BLU   NO   S2 SHUTTER OPEN
SPARE   RED/WHT   10   N/C NC
MODULE 3-4   ORG/BLK   15   H   ORG/BLK   8   VIO   NO   S3 SAMPLE #1 OUT
                                                                        N/C   NC
MODULE 2-4   GRN/BLK   16   J   GRN/BLK   9   GRY   NO   S4 SAMPLE #1 IN
                                                                        N/C   NC
MODULE 3-6   BLU/BLK   17   K   BLU/BLK   10   WHT   NO   S5 SAMPLE #2 OUT
                                                                        N/C   NC
MODULE 2-6   WHT/BLK   18   L   WHT/BLK   11   ORG   NO   S6 SAMPLE #2 IN
                                                                        N/C   NC
MODULE 1-2   ORG   9   C   ORG   3   WHT   SHUTTER SOL.
MODULE 1-4   GRN   11   D   GRN   4   WHT   SAMPLE #1 SOL
MODULE 1-6   BLU   12   E   BLU   5   WHT   SAMPLE #2 SOL

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QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

SOURCE HEAD INTERCONNECT

SIZE		REV
A	400.400	O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

BULKHEAD
SOCKET
CONNECTOR

DSUB 25
SOURCE
RING

A — BLK — 1 — BLK
BLK/WHT
F — WHT — 6 — GRN — NO — S1 SHUTTER CLOSED
B — RED — 2 — N/C — NC
G — RED/BLK — 7 — BLU — NO — S2 SHUTTER OPEN
— N/C — NC
H — ORA/BLK — 8 — VIO — NO — S3 SAMPLE #1 OUT
— N/C — NC
J — GRN/BLK — 9 — GRY — NO — S4 SAMPLE #1 IN
— N/C — NC
K — BLU/BLK — 10 — WHT — NO — S5 SAMPLE #2 OUT
— N/C — NC
L — WHT/BLK — 11 — ORG — NO — S6 SAMPLE #2 IN
— N/C — NC
C — ORG — 3 — WHT — SHUTTER SOL.
D — GRN — 4 — WHT — SAMPLE #1 SOL
E — BLU — 5 — WHT — SAMPLE #2 SOL
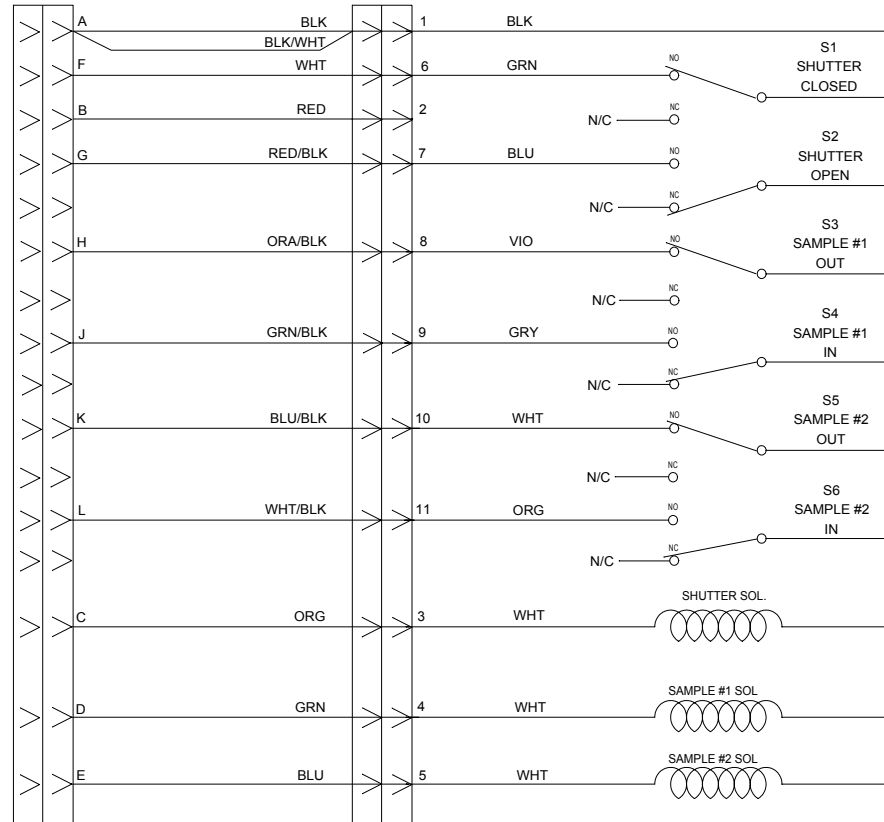
NOTES:

1. ALL SWITCHES SHOWN IN SOLENOID DE-ENERGIZED STATE

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

SOURCE HEAD
SCHEMATIC

SIZE A	400.450	REV O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

Confidential

AGT400
Electronics Cabinet

MULTI-FUNCTION
CIRCUIT BOARD

J1

C-FRAME
JUNCTION BOX
JTB-3

19-PIN BULKHEAD
SOCKET PLUG

16-PIN DIP
SOCKET PLUG

TP2
SIG OUT

R10
300MΩ 50 PPM 1%

TP4   TP1

U1
AD549JH

R9
10M Ω

C11
.02uF
1000V

TP3
-HV

WHT   ANODE (SIGNAL)

GRN   GUARD RING (GROUND)

VIO   OUTER WALL (-HV)

ION CHAMBER

Signal									
SIGNAL 1 (WHT)	9	(WHT)	C	C	(WHT)	4	SIG. OUT	6	
SIGNAL RET. 2 (BLK)									
SPARE (YEL)	5	(NC)	D	D	(ORG)	9			
SPARE (BLK)	6	(NC)	E	E	(YEL)	8			
GND 5 (BRN)	16	(BRN)	A	A	(BRN)	2	GND		
(BLK)	10	(BLK)	B	B	(GRY)	13	SIG. RET		
(SHLD)	1								
GND 8 (BLK)	3	(BLK)	G	G	(GRN)	11	HV. RET		
-HV 7 (GRN)	2	(GRN)	S	S	(VIO)	6	-HV		
+15VDC 3 (RED)	13	(RED)	K	K	(RED)	16	+15		
SPARE (BLK)	11	(NC)							
	16	(BLK)	L	L	(BLK)	15	GND		
-15VDC 4 (BLU)	14	(BLU)	M	M	(BLU)	1	-15		
SPARE (BLK)	12	(NC)							
OTHERS SHIELDS 6 (SHLD)	17	(NC)							

R3
240Ω

C1
10uF

C2
.01uF

TP5
+15 V

C8
10uF

C7
.01uF

R6
240Ω

TP6
-15 V

Advanced Gauging
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

DETECTOR HEAD
INTERCONNECT

SIZE A	400.500	REV O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

Confidential

TP2
SIG OUT

R10
300MΩ 50 PPM 1%

TP4   TP1

WHT   ANODE (SIGNAL)

BULKHEAD
SOCKET PLUG

16-PIN DIP
SOCKET PLUG

SIG. OUT

U1
AD549JH

R9
10MΩ

GRN   GUARD RING (GROUND)

TP3
-HV

VIO   OUTER WALL (-HV)

C	4	4
D	9	
E	8	
A	2	2 GND
B	13	13 SIG. RET
G	11	11 HV. RET
S	6	6 -HV
K	16	16 +15
L	15	15 GND
M	1	1 -15

ION CHAMBER

C11
.02uF
1000V

R3
240Ω

C1
10uF

C2
.01uF

TP5
+15 V

C8
10uF

C7
.01uF

R6
240Ω

TP6
-15 V

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

DETECTOR HEAD
SCHEMATIC

SIZE		REV
A	400.550	O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

Confidential

ON SHEET
RECEIVER

BANNER
Q19SN6RQ

OFF SHEET
RECEIVER

BANNER
Q19SN6RQ

INNER C-FRAME TERMINAL BLOCK

C-FRAME JUNCTION BOX
JTB2

TURCK
PN 4Z-6/S90
ID E2522

BRN
WHT
BLU

BRN
WHT
BLU

+13 v   1

GND   2

SIG   3

SIG   4

10K Ω   10K Ω

JUMPER
WIRE

7

6

GRN

5

BLK

3

WHT

4

RED

TURCK
PN 4Z-6/S90
ID E2522

BRN
BLU

BRN
BLU

BANNER
Q19EQ

BANNER
Q19EQ

ON SHEET
EMITTER

OFF SHEET
EMITTER

ELECTRONICS SHELF MULTIFUNCTION BOARD

MFIO
BOARD
J2

+13 V

TACHOMETER   300 PPR

PWR   B

SIG   D

GND   A

RED   1

WHT   2

BLK   3

SHLD

F1
.125 amp
13.5 V

SIG IN

ADVANCED GAUGING
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QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME
TACHOMETER
PHOTOCELL
INTERCONNECT

SIZE A	400.600	REV O
DRAWN BY: J.P.F. 12/22/03		SHEET 1 OF 1

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:
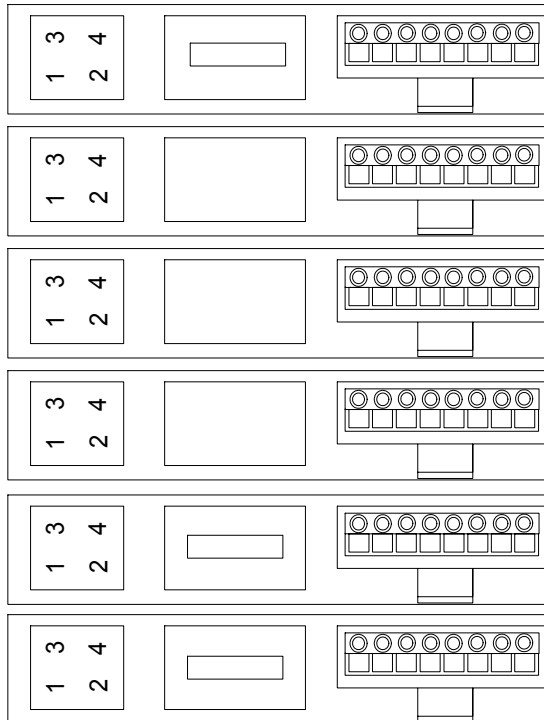
MODULE 5
AC OUTPUT
TO LIGHTS
(BLACK TOP)

1 Shutter Open Lamp Command
2 Shutter Closed Lamp Command
3 Classifier High Lamp Command
4 Classifier Low Lamp Command

MODULE 4
DC INPUTS
FROM C-FRAME
(WHITE TOP)

1 Off Sheet Limit Switch
2 On Sheet Limit Switch
3 Off Sheet Photo Eye
4 On Sheet Photo Eye

MODULE 3
DC INPUTS
FROM SOURCE
(WHITE TOP)

1 Shutter Closed Switch
2 Sample 1 Out Switch
3 Sample 2 Out Switch
4 C-frame in Manual Mode

MODULE 2
DC INPUTS
FROM SOURCE
(WHITE TOP)

1 Shutter Open Switch
2 Sample 1 In Switch
3 Sample 2 In Switch
4 Mode Switch in Program

MODULE 1
DC OUTPUTS
TO SOURCE
(RED TOP)

1 Shutter Command
2 Sample 1 Command
3 Sample 2 Command
4 Report Start

MODULE 0
DC OUTPUTS
TO C-FRAME
(RED TOP)

1 Power Relay Command
2 Direction Relay Command
3 Not Used
4 Not Used
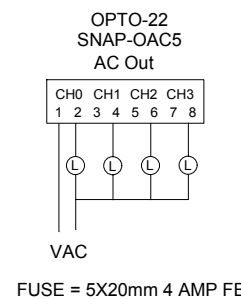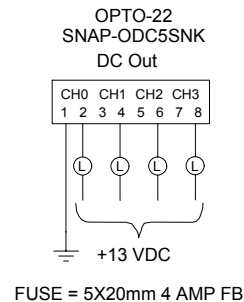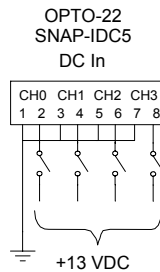
OPTO-22
SNAP-IDC5
DC In

CH0 CH1 CH2 CH3
1 2 3 4 5 6 7 8

+13 VDC

OPTO-22
SNAP-ODC5SNK
DC Out

CH0 CH1 CH2 CH3
1 2 3 4 5 6 7 8

+13 VDC

FUSE = 5X20mm 4 AMP FB

OPTO-22
SNAP-OAC5
AC Out

CH0 CH1 CH2 CH3
1 2 3 4 5 6 7 8

VAC

FUSE = 5X20mm 4 AMP FB

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QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

OPTO22 MODULE
LAYOUT (TOP VIEW)

SIZE A	400.700	REV O

DRAWN BY: J.P.F. 12/22/03 | SHEET 1 OF 1

DETECTOR HEAD SIGNAL PROCESSING
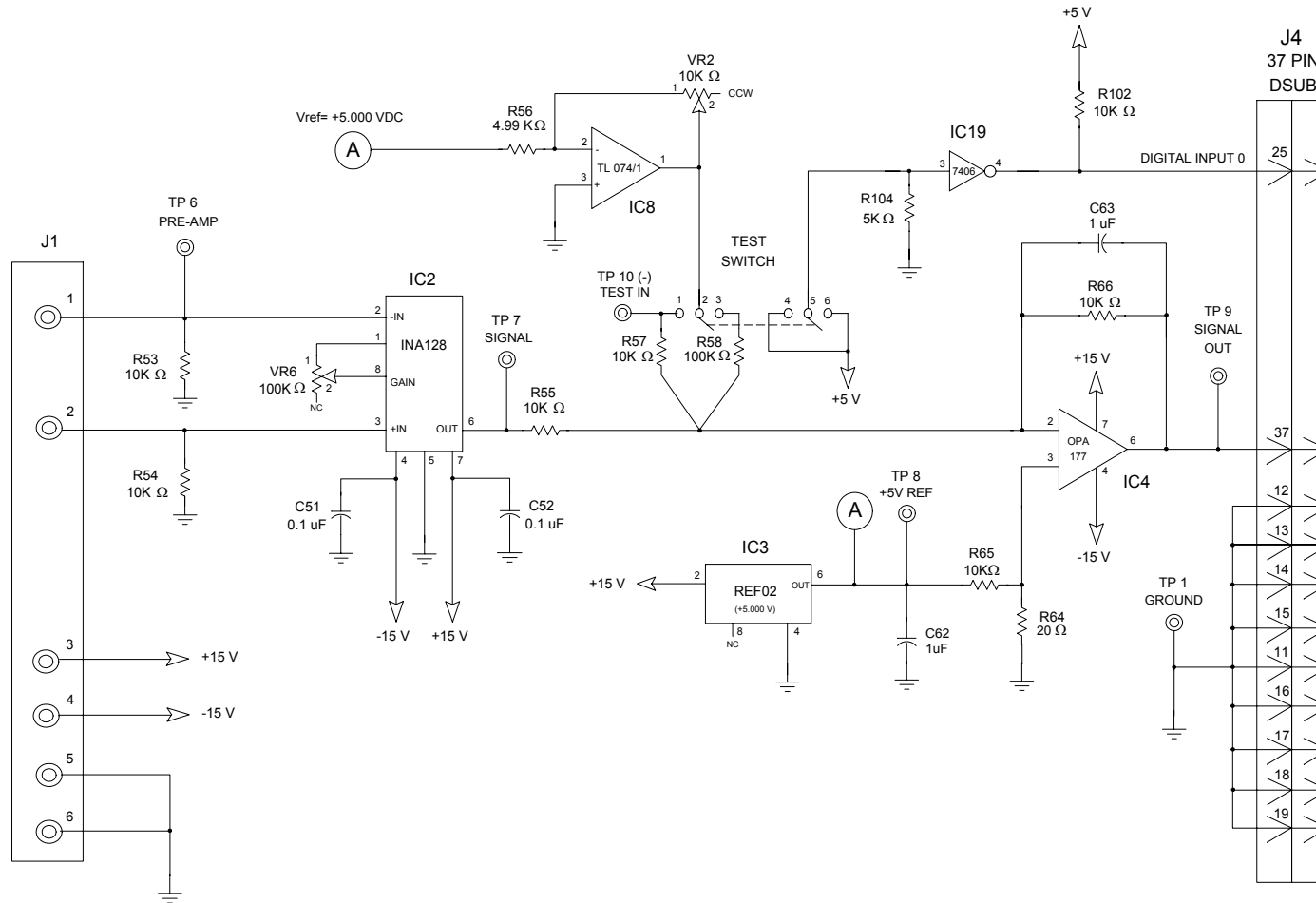
+5 V

R102
10K Ω

J4
37 PIN
DSUB

VR2
10K Ω
CCW
1 2

Vref= +5.000 VDC

R56
4.99 KΩ

IC19
7406
3 4

DIGITAL INPUT 0

25

A

TL 074/1
2 −
3 +
1
IC8

R104
5K Ω

C63
1 uF

TP 6
PRE-AMP

J1

IC2
INA128

TP 7
SIGNAL

TP 10 (−)
TEST IN

TEST
SWITCH

R66
10K Ω

TP 9
SIGNAL
OUT

1

−IN 2

+15 V

37

R53
10K Ω

VR6
100K Ω
1
2
NC

1
GAIN
8

R55
10K Ω

R57
10K Ω

R58
100K Ω

2
OPA
177
3
7
6
IC4

2

+IN 3   OUT 6

+5 V

−15 V

R54
10K Ω

4 5 7

C51
0.1 uF

C52
0.1 uF

TP 8
+5V REF

A

12

13

−15 V   +15 V

IC3

14

3

+15 V

2
REF02
(+5.000 V)
OUT 6

R65
10KΩ

TP 1
GROUND

15

4

−15 V

8
NC

4

C62
1uF

R64
20 Ω

11

16

5

17

6

18

19

POWER SUPPLY DIAGNOSTICS

Revisions			
Rev#	Revision Description	MM/DD/YY	Approved By:
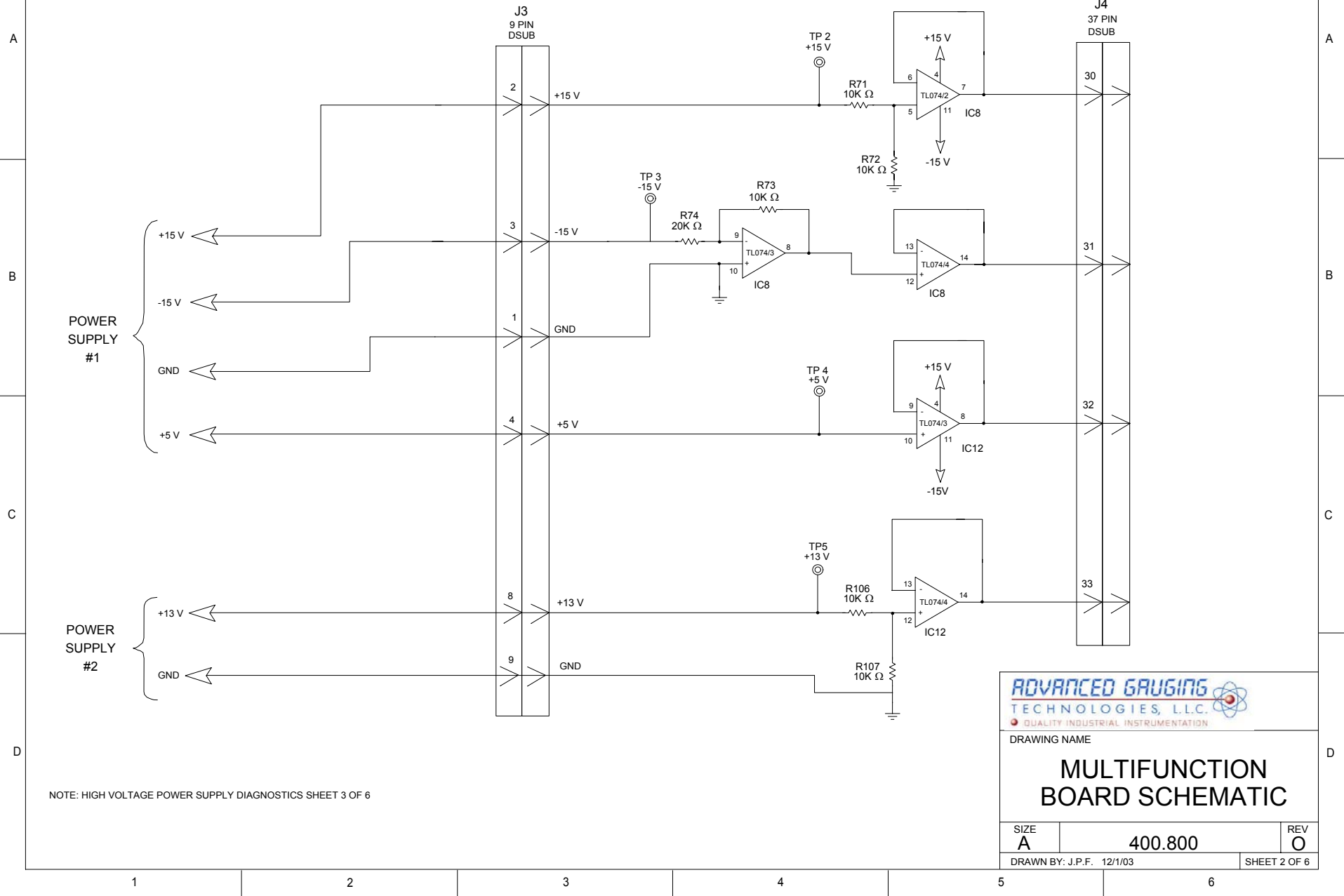
J3
9 PIN
DSUB

J4
37 PIN
DSUB

TP 2
+15 V

+15 V

R71
10K Ω

TL074/2
IC8

R72
10K Ω
-15 V

TP 3
-15 V

R73
10K Ω

R74
20K Ω

TL074/3
IC8

TL074/4
IC8

TP 4
+5 V

+15 V

TL074/3
IC12

-15V

TP5
+13 V

R106
10K Ω

TL074/4
IC12

R107
10K Ω

POWER
SUPPLY
#1

+15 V
-15 V
GND
+5 V

POWER
SUPPLY
#2

+13 V
GND

J3 pins: 2 +15 V, 3 -15 V, 1 GND, 4 +5 V, 8 +13 V, 9 GND

J4 pins: 30, 31, 32, 33

NOTE: HIGH VOLTAGE POWER SUPPLY DIAGNOSTICS SHEET 3 OF 6

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

MULTIFUNCTION
BOARD SCHEMATIC

SIZE		REV
A	400.800	O
DRAWN BY: J.P.F. 12/1/03		SHEET 2 OF 6

Revisions			
Rev#	Revision Description	MM/DD/YY	Approved By:

TACHOMETER INPUT CIRCUIT

+13 V

TP11
TACH IN
300 PPR

+5 V

+5 V

R1O1
10K Ω

+5 V

TP12
TACH
QA OUT(÷2)
150 PPR

J2

S3-3

S3-1

1
2
3

TACH SIGNAL IN

F1
0.125 A
125 V

D108
1N4739A
9.1 V 1W
ZENER

7406

IC19

14

7

1

2

IC11

14 INPUT A

7493

5   QA   12
INPUT B   1
11   QD

2   3   6   7   10

D105
LED (÷16)
18.75 PPR

R103
511 Ω

J4

2

37 PIN
DSUB
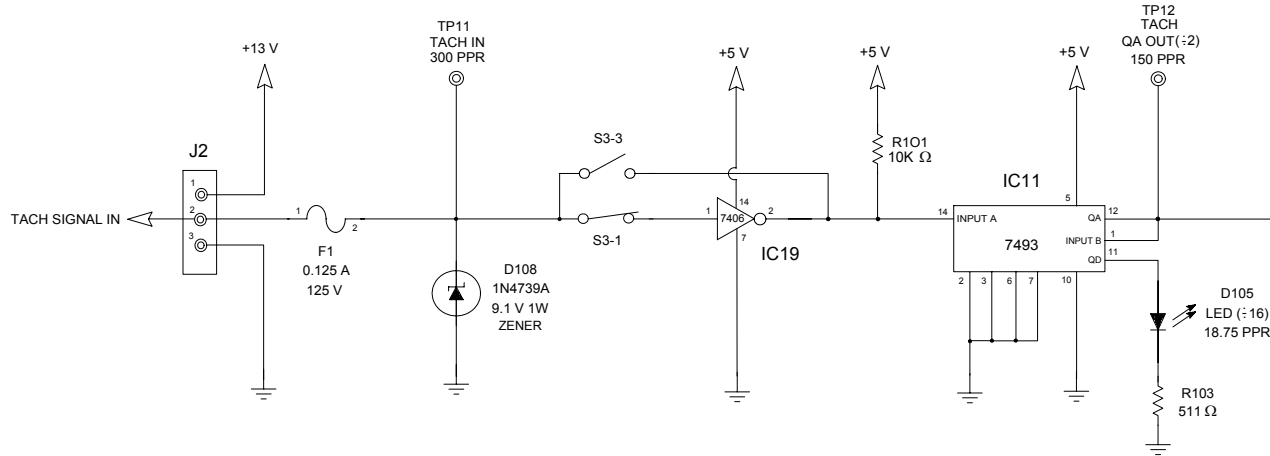
TACHOMETER CONFIGURATION

(IC25)	S3-1	S3-3
NORMAL	ON	OFF
STAMCO	OFF	ON

HIGH VOLTAGE POWER SUPPLY

TP13
HV REF

R131
100Ω 3W

+13 V

D132
1N4730A
3.9 V 1W
ZENER

COMPONENT
HEADER 14

Q05

2   +   3
7   12
IN   OUT
DC TO HVDC
CONVERTER
5   9
1   +   4

J1

8   GND

R134
2.2MΩ

C138
0.02uF

7   -HV

R136
22K Ω

R135
2.2MΩ

6

7
TL074/2

5

IC12

J4

34

37 PIN
DSUB

TP14
HV ÷100
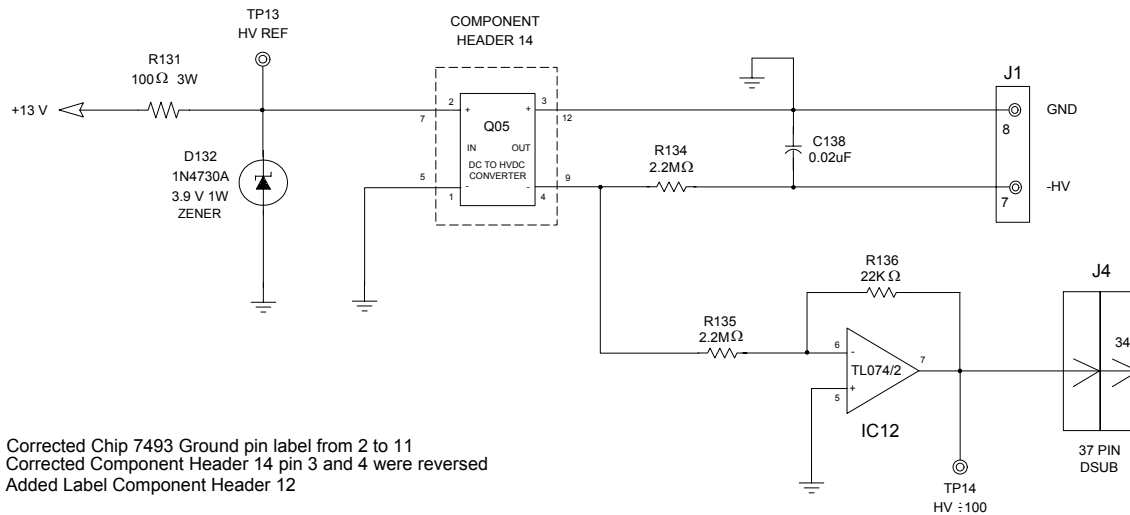
REV 1, J.P.F. 8/3/05, Corrected Chip 7493 Ground pin label from 2 to 11
REV 2, J.P.F. 8/3/05, Corrected Component Header 14 pin 3 and 4 were reversed
REV 3, J.P.F. 8/3/05, Added Label Component Header 12

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QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

MULTIFUNCTION
BOARD SCHEMATIC

SIZE		REV
A	400.800	O
DRAWN BY: J.P.F. 12/15/03		SHEET 3 OF 6

Confidential

BUFFERED ANALOG OUTPUTS

FROM D/A BOARD
37 PIN CONNECTOR

J5

+15 V   IC15
OPA 177

J6

THICKNESS
0-5 VDC   RED   1

THICKNESS OUT

-15 V

S2-3   R243 0Ω
S2-4   R244 15.4K Ω

R241
10k Ω

S2-1

GROUND   BLK   3

GROUND

+15 V   IC16
OPA 177

DEVIATION
+/- 5 VDC   WHT   2

DEVIATION OUT

-15 V

S2-5   R245 0Ω
S2-6   R246 2.7K Ω
S2-7   R247 10K Ω
S2-8   R248 15.4K Ω

R242
10k Ω

S2-2
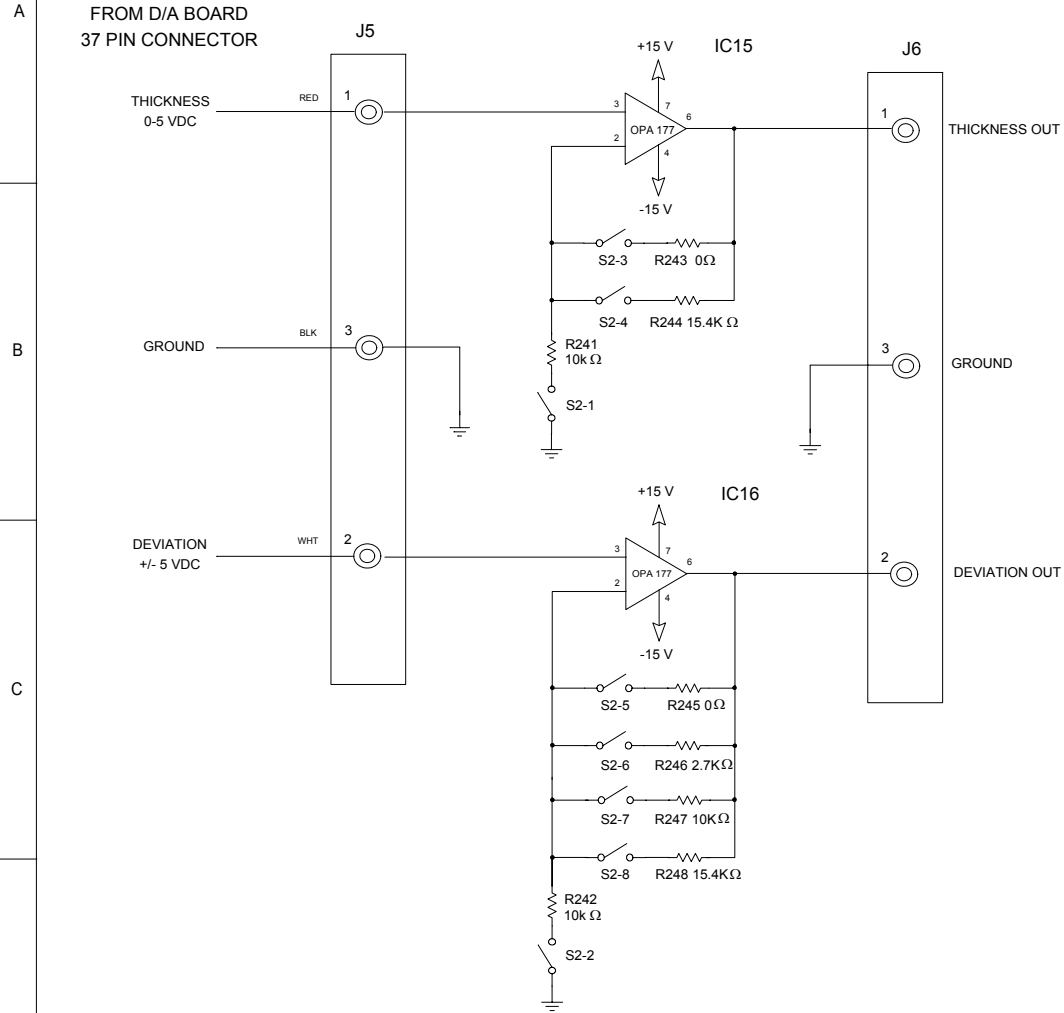
ANALOG THICKNESS CONFIGURATION IC23			THICKNESS RANGE	VOLTAGE (J6-1)	R241	R243/244
S2-1	S2-3	S2-4				
OFF	ON	OFF	0-0.400"	0-4.00 VDC	OPEN	0 Ω
ON	OFF	ON	0-10 mm	0-10 VDC	10K Ω	15.4K Ω

ANALOG DEVIATION CONFIGURATION IC23					PAR FILE SETTINGS	DEVIATION RANGE	VOLTAGE (J6-1)	R242	R245/R246 R247/R248
S2-2	S2-5	S2-6	S2-7	S2-8					
OFF	ON	OFF	OFF	OFF	10 mils/V	+/-50 mils	+/- 5 VDC	OPEN	0 Ω
ON	OFF	OFF	ON	OFF	10 mils/V	+/-50 mils	+/-10 VDC	10K Ω	10K Ω
ON	OFF	ON	OFF	OFF	10 mils/V	+/- 1 mm	+/- 5 VDC	10K Ω	2.7K Ω
ON	OFF	OFF	OFF	ON	10 mils/V	+/- 1 mm	+/-10 VDC	10K Ω	15.4K Ω
OFF	ON	OFF	OFF	OFF	2 mils/V	+/-10 mils	+/- 5 VDC	OPEN	0 Ω
ON	OFF	OFF	ON	OFF	2 mils/V	+/-10 mils	+/-10 VDC	10K Ω	10K Ω
ON	OFF	ON	OFF	OFF	2 mils/V	+/-0.2 mm	+/- 5 VDC	10K Ω	2.7K Ω
ON	OFF	OFF	OFF	ON	2 mils/V	+/-0.2 mm	+/-10 VDC	10K Ω	15.7K Ω
OFF	ON	OFF	OFF	OFF	3.937 mils/V	+/-19.658 mils	+/- 5 VDC	OPEN	0 Ω
ON	OFF	OFF	ON	OFF	3.937 mils/V	+/-19.685 mils	+/-10 VDC	10K Ω	10K Ω
OFF	ON	OFF	OFF	OFF	3.937 mils/V	+/-0.5 mm	+/- 5 VDC	OPEN	0 Ω
ON	OFF	OFF	ON	ON	3.937 mils/V	+/-0.5 mm	+/-10 VDC	10K Ω	10K Ω

R241 through R248 are chosen for the desired units and scalling, all resistors are 1%, 1/4W, and 100 PPM/Celcius degree
0 Ω indicates an electrical short

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

MULTIFUNCTION
BOARD SCHEMATIC

SIZE A	400.800	REV O
DRAWN BY: J.P.F. 12/15/03		SHEET 4 OF 6

Confidential

ANALOG and TEMPERATURE INPUTS

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

J8

IC20

TP 15

J4

+IN

CHANNEL 1

1

R225
10KΩ

S3-5

3 +IN
INA128
OUT 6

36
ANALOG
INPUT 1
0-10VDC

-IN

2

S3-6

R226
10KΩ

2 -IN

4 5 7

-15 V   +15 V

S3-7

IC21

TP 16

+IN

CHANNEL 2

3

R227
10KΩ

3 +IN
INA128
OUT 6

35
ANALOG
INPUT 2
0-10VDC

-IN

4

S3-8

R228
10KΩ

2 -IN

4 5 7

37 PIN
DSUB

-15 V   +15 V

GROUND

6

3

3
AD22100

TEMPERATURE
SENSOR

1   4

VREF= +5.000 VDC

A

TEMPERATURE
OUT

5

R222
1K Ω

2

14

Vout = 1.375 + 0.22 x °C

C221
0.1uF

COMPONENT
HEADER 22
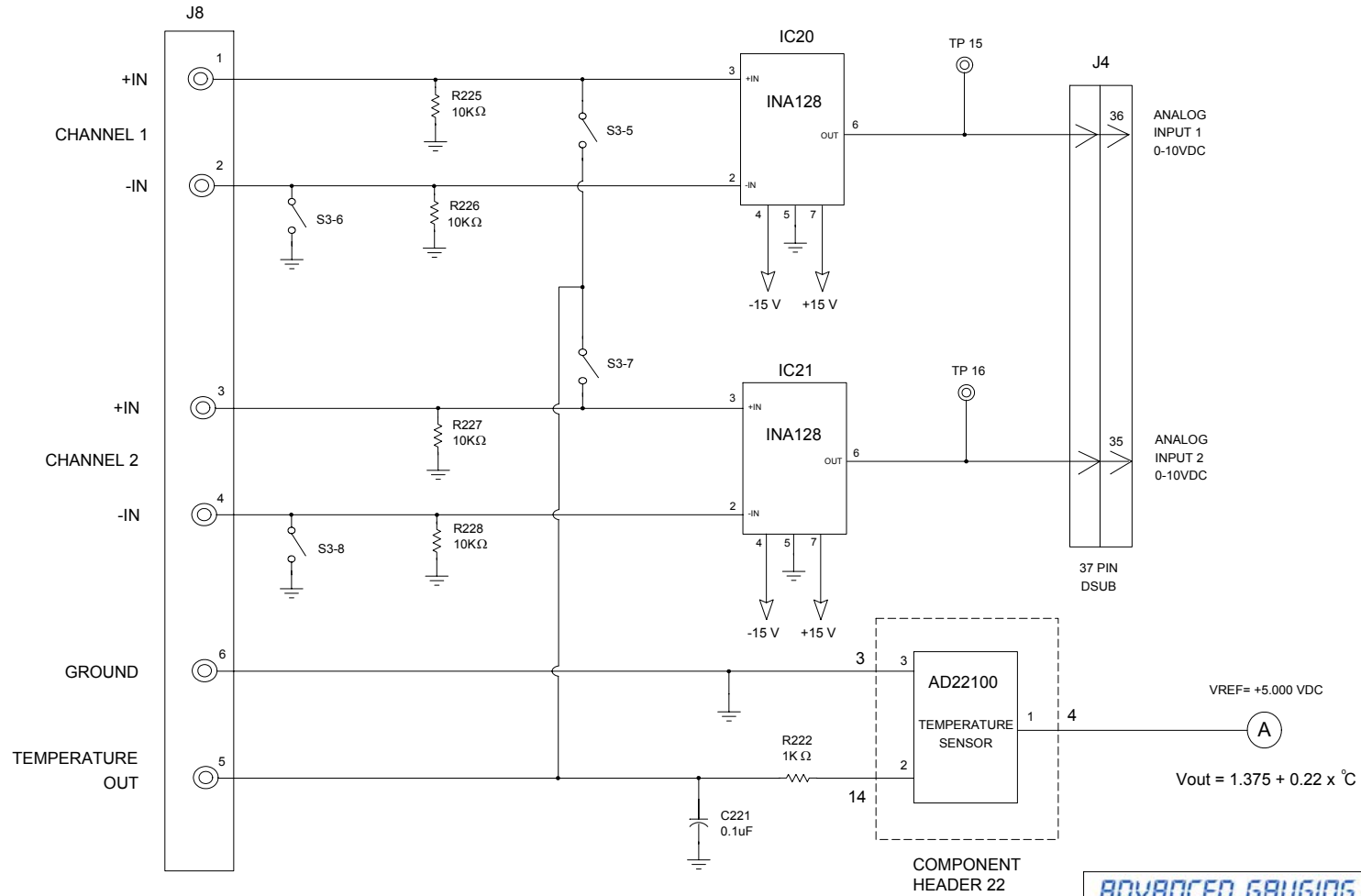
REV 1, J.P.F. 8/3/05, Corrected INA128 Pins 6 and 7

TEMPERATURE INPUT CONFIGURATION

IC25	S3-5	S3-6	S3-7	S3-8
NOT USED	OFF	OFF	OFF	OFF
ANALOG CH 1	ON	ON	OFF	OFF
ANALOG CH2	OFF	OFF	ON	ON
BOTH	ON	ON	ON	ON

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

MULTIFUNCTION
BOARD SCHEMATIC

SIZE A	400.800	REV O
DRAWN BY: J.P.F. 12/15/03		SHEET 5 OF 6

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AUXILIARY DIGITAL INPUTS

IC18

J4

J7

AUTO DATA
GATHERING
INPUT
SEE NOTE 1

GROUND

AUTO DATA
ENTRY
INPUT
SEE NOTE 1

R173
511

R174
511

VCC

VO1

VO2

GND

8

7

6

5

R176
10k

R179
10k

C171
0.1uF

29   PC BUS +5VDC

26   DIGITAL IN #1

27   DIGITAL IN #2

28   PC BUS DIGITAL GND

37 PIN
DSUB

NOTE 1: J.P.F. 2/13/13, Maximum input voltage not to exceed +5.5 VDC

REV 1, J.P.F. 8/3/05, Added capacitor C171 to circuit due to IC manufacture change. Older systems may not have this capacitor

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

MULTIFUNCTION
BOARD SCHEMATIC

SIZE A	400.800	REV 1
DRAWN BY: J.P.F. 12/15/03		SHEET 6 OF 6

Confidential

J8 J1

J2 CH 17 CH 7 CH 8 CH 12 J4

J6 CH 18 CH 15 CH 11 CH 2

J7 CH 16 CH 3

CH 20 CH 23 CH 19 CH 4

CH 21

CH 13 CH 22 CH 24 CH 25 CH 5 J5

CH 14 VR2 S1 CH 10 CH 6 J3
F1

TP1 2 3 4 5 6 7 8
○ ○ ○ ○ ○ ○ ○ ○
TP9 10 11 12 13 14 15 16
○ ○ ○ ○ ○ ○ ○ ○

J1 Detector Head
J2 Tachometer
J3 DC Power
J4 Analog Computer Board
J5 Analog Input
J6 Analog Output
J7 Digital Input
J8 Analog Input & Temperature

F1 Tachometer Input Fuse
S1 Test Switch
VR2 Test Voltage Adjust

CH2   IC INA128P
CH3   IC REF02AP
CH4   IC OPA177GP
CH5   Component Header #5
CH6   Component Header #6
CH7   Component Header #7
CH8   IC TL074ACN
CH10 Component Header #10
CH11 IC 74LS93N
CH12 IC TL074ACN
CH13 Component Header #13
CH14 Component Header #14
CH15 IC OPA177GP
CH16 IC OPA177GP
CH17 Component Header #17
CH18 IC 2630
CH19 IC NTE7406
CH20 IC INA128P
CH21 IC INA128P
CH22 Component Header #22
CH23 S2 DIP Switches
CH24 Component Header #24
CH25 S3 DIP Switches

TP1   Ground
TP2   +15 Volts
TP3   -15 Volts
TP4   +5 Volts
TP5   +13.2 Volts
TP6   PreAmp
TP7   Signal 1
TP8   +5.000V Reference
TP9   Signal Out
TP10   Test Input
TP11   Tach Input
TP12   Tach Out
TP13   High Voltage Reference
TP14   High Voltage /100
TP15   Analog Channel 1 Input
TP16   Analog Channel 2 Input

NOTE: REFER TO 400.800 SHEET 4 OF 6 FOR DIP SWITCH SETTINGS

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TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

MUTIFUNCTION BOARD
LAYOUT (TOP VIEW)

SIZE		REV
A	400.850	O
DRAWN BY: J.P.F. 12/8/03		SHEET 1 OF 1

Confidential

ELECTRONIC SHELF
POWER PANEL

MANUAL/JOG
PUSHBUTTON

AUTO/MANUAL
SWITCH

ON/OFF SHEET
SWITCH

BRN

BRN

GRN

GRY

GRY

POWER
RELAY R1

DIRECTION
RELAY R2

VIO

VIO

GRN

GRN

VIO

GRN

13 V   13 V GND
REGULATED
POWER
SUPPLY

OPTO
TS2

N/C
N/C
N/C
N/C

4 AMP

OPTO22 MODULE 0

BRN

GRY
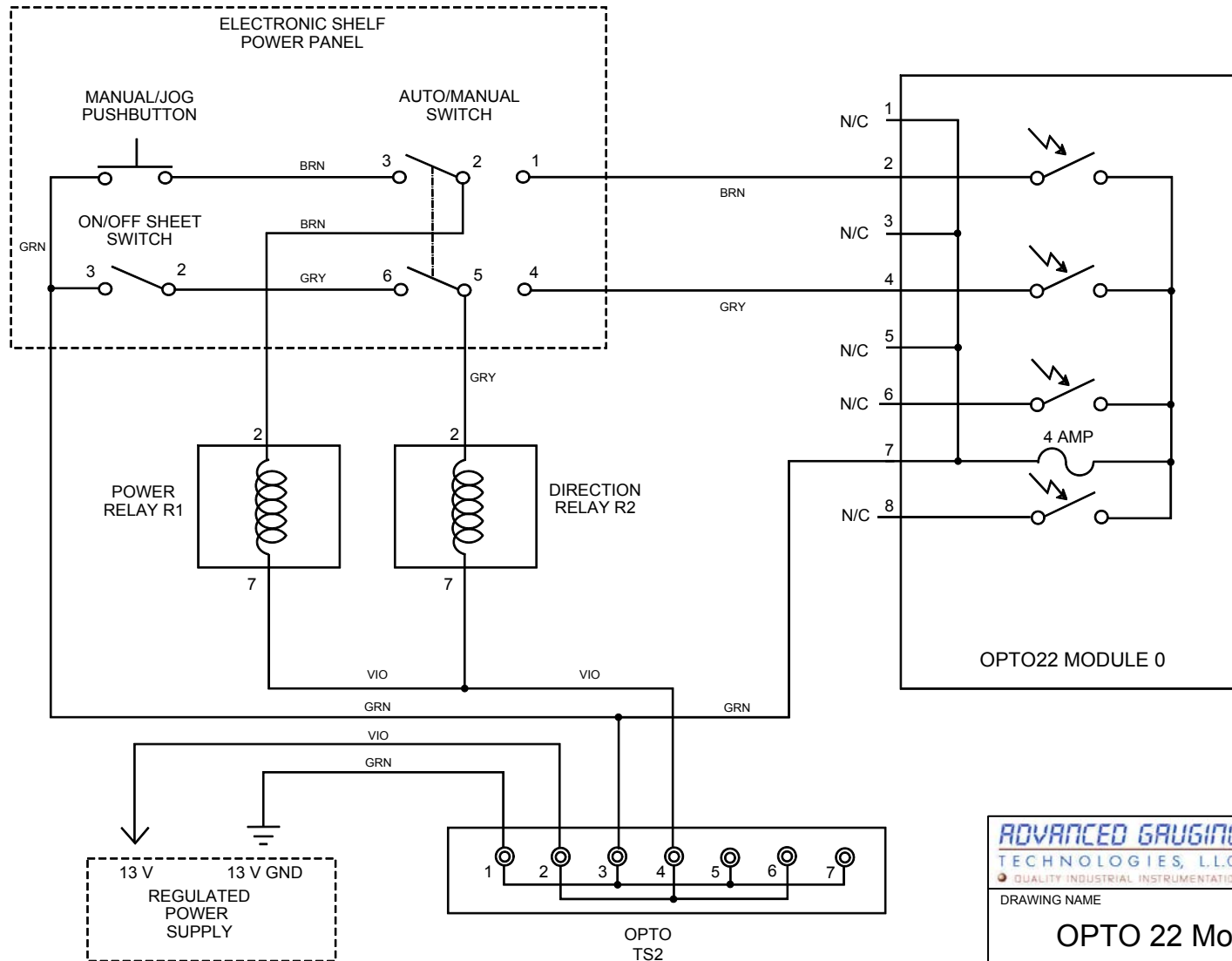
ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

OPTO 22 Module 0
C-frame Drive Schematic

SIZE A	400.900	REV O

DRAWN BY: J.P.F.   2/28/07   SHEET 1 OF 1

Confidential

Revisions

Rev#	Revision Description	MM/DD/YY	Approved By:

SOURCE RING

SOURCE HEAD BULKHEAD CONNECTOR

C-FRAME JUNCTION BOX JTB2

DSUB 25

ELECTRONIC SHELF POWER PANEL SUTTER KEY SWITCH

SHUTTER SOLENOID

SAMPLE 1 SOLENOID

SAMPLE 2 SOLENOID

ORA ORA ORA

GRN GRN GRN

BLU BLU BLU

BLK & BLK w/ WHT stripe

BLK & BLK w/ WHT stripe

N/C 1
2
N/C 3
4
N/C 5
6
7
8

4 AMP

OPTO22 MODULE 1

GRN

GRN

GRN

VIO

GRN

510 Ω

VIO

BLK & BLK w/ WHT stripe

13 V   13V GND

REGULATED POWER SUPPLY

1   2   3   4   5   6   7

OPTO TS2
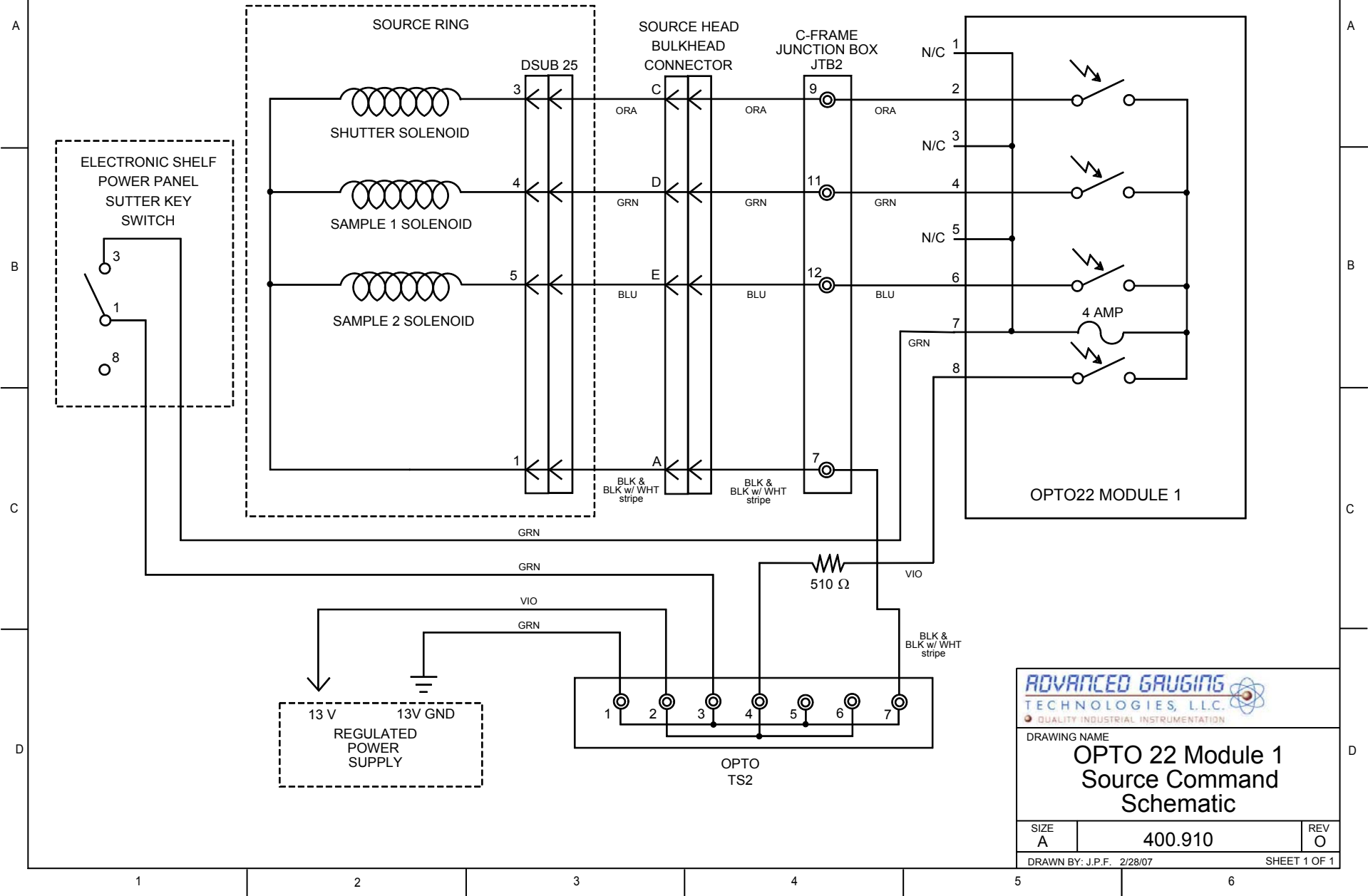
ADVANCED GAUGING TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME
OPTO 22 Module 1 Source Command Schematic

SIZE		REV
A	400.910	O

DRAWN BY: J.P.F. 2/28/07   SHEET 1 OF 1

Confidential

SOURCE RING

SOURCE HEAD
BULKHEAD
CONNECTOR

C-FRAME
JUNCTION BOX
JTB2

ELECTRONIC SHELF
POWER PANEL
MODE KEY
SWITCH

DSUB 25

SHUTTER OPEN
SWITCH

SAMPLE 1 IN
SWITCH

SAMPLE 2 IN
SWITCH

7   G   14
RED w/ BLK stripe   RED w/ BLK stripe   RED w/ BLK stripe

9   J   16
GRN w/ BLK stripe   GRN w/ BLK stripe   GRN w/ BLK stripe

11   L   18
WHT w/ BLK stripe   WHT w/ BLK stripe   WHT w/ BLK stripe

1   A   7
BLK & BLK w/ WHT stripe   BLK & BLK w/ WHT stripe   BLK & BLK w/ WHT stripe

OPTO22 Module 2

YEL
VIO
GRN
VIO
GRN

13 V   13 V GND

REGULATED
POWER
SUPPLY

OPTO
TS2

1 2 3 4 5 6 7

ADVANCED GAUGING
T E C H N O L O G I E S , L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME

OPTO 22 Module 2
Source Switch Schematic

SIZE A	400.920	REV O

DRAWN BY: J.P.F. 2/28/07   SHEET 1 OF 1

Confidential

SOURCE RING

SOURCE HEAD
BULKHEAD
CONNECTOR

C-FRAME
JUNCTION BOX
JTB2

ELECTRONIC SHELF
POWER PANEL
MANUAL/AUTO
SWITCH

DSUB 25

9

8

7

SHUTTER CLOSED
SWITCH

6

F

WHT

WHT

13

WHT

1

2

3

SAMPLE 1 OUT
SWITCH

8

H

ORA w/ BLK
stripe

ORA w/ BLK
stripe

15

ORA w/ BLK
stripe

4

5

SAMPLE 2 OUT
SWITCH

10

K

BLU w/ BLK
stripe

BLU w/ BLK
stripe

17

BLU w/ BLK
stripe

6

7

8

6

7

1

A

BLK &
BLK w/ WHT
stripe

BLK &
BLK w/ WHT
stripe

BLK &
BLK w/ WHT
stripe

OPTO22 Module 3

WHT

VIO

GRN

VIO

GRN

13 V   13 V GND

REGULATED
POWER
SUPPLY

1   2   3   4   5   6   7

OPTO
TS2

DRAWING NAME

OPTO22 Module 3
Source Switch Schematic

SIZE A	400.930	REV O

DRAWN BY: J.P.F.   2/28/07

SHEET 1 OF 1

Confidential

C-FRAME
JUNCTION BOX
JTB2

C-FRAME I-BEAM

BLU — C-FRAME OFF SHEET LIMIT SWITCH — BLU 20 — BLU w/ WHT Stripe

GRN — C-FRAME ON SHEET LIMIT SWITCH — GRN 19 — GRN w/ WHT Stripe

C-FRAME UPPER ARM

C-FRAME ON SHEET PHOTO CELL

C-FRAME OFF SHEET PHOTO CELL

WHT 4
WHT 3
BLU 2
BRN 1

10KΩ   10KΩ

WHT 3 — WHT
GRN 4 — RED
BLK 5 — BLK
BLU GRN 7 — BLK & BLK w/ WHT Stripe
RED 6

1
2
3
4
5
6
7
8

OPTO22 Module 4

13 V   13 V GND
REGULATED
POWER
SUPPLY

1 2 3 4 5 6 7

OPTO
TS2

DRAWING NAME

OPTO 22 Module 4
Photocell/Limits Schematic

SIZE A	400.940	REV O

DRAWN BY: J.P.F. 2/28/07   SHEET 1 OF 1

Confidential

N/C 1

Shutter OPEN indicator (red)   2

N/C 3

Shutter CLOSED indicator (green)   4

N/C 5

High Limit Classifier indicator (blue)   6

7   4 AMP

Low Limit Classifier indicator (amber)   8

R

G

B

A

OPTO22 MODULE 5

BLK

WHT

BLK

9   10   11   12

OPTO22
TS3

ACTBU
14
120 VAC

ACTBU
16
NEUTRAL

ELECTRONIC SHELF
TERMINAL STRIP

ADVANCED GAUGING
TECHNOLOGIES, L.L.C.
QUALITY INDUSTRIAL INSTRUMENTATION

DRAWING NAME
OPTO 22 Module 5
Indicator Light Schematic

SIZE A	400.950	REV O

DRAWN BY: J.P.F. 2/28/07   SHEET 1 OF 1

Background Radiation
SAC - 12/9/03

	Dose Equivalent
Natural Sources	(mrem)
Inhaled Radon	200
Potassium-40	40
Other Terrestrial	28
Cosmic	<u>28</u>
Sub-Total	**296**
Man Made Sources	
Diagnostic X-rays/Nuclear Medicine	53
Water, Building Materials	13
Smoke Detectors, Natural Gas	0.4
Other	
Occupational, Fallout, etc.	<u>1</u>
Total	**363**
If you smoke add another	**1300**
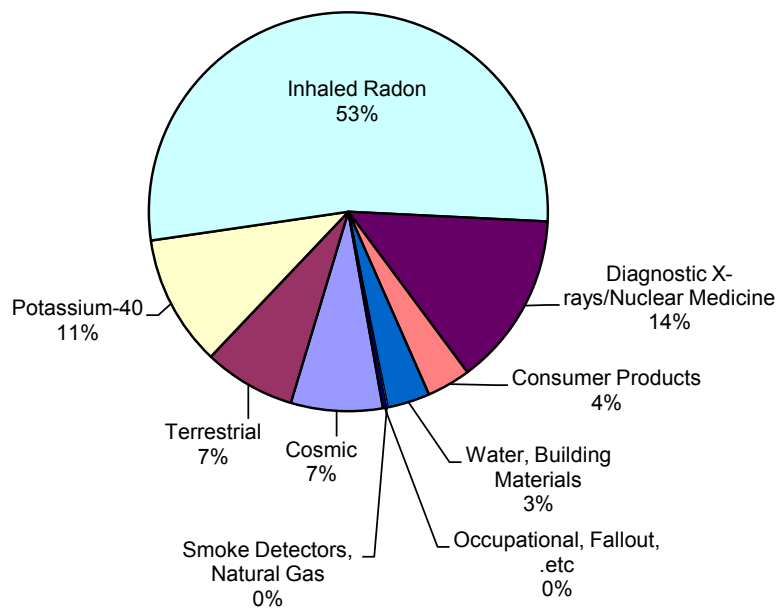
Product Menu Examples

Listed below are some of the most common materials measured with the AGT400, along with the corresponding Gain, Offset and Density settings. These settings are not precise and may vary slightly from gauge to gauge depending on a multitude of factors such as passline height, passline angle, alloy variations, etc. Use these as a guideline or 'starting point' when you need to add products to the Product Menu.

Product	Gain	Zero	Density
Carbon Steel			
Uncoated Steel	1.000	0.00	0.284
Cold-rolled Steel	1.000	0.00	0.284
Hot-rolled Steel	1.000	0.00	0.284
H.R.P.O. Steel	1.000	0.00	0.284
Coated Steel			
G30 Galvanized	1.000	-0.20	0.284
G40 Galvanized	1.000	-0.27	0.284
G60 Galvanized	1.000	-0.40	0.284
G90 Galvanized	1.000	-0.60	0.284
Galvannealed	1.000	0.00	0.284
T1-25 Aluminized	1.000	+1.00	0.284
T1-40 Aluminized	1.000	+1.60	0.284
Tin Plate	1.000	-0.43	0.284
Long Terne	1.000	-1.44	0.284
Stainless Steel			
201 Stainless	1.010	0.00	0.284
301 Stainless	1.007	0.00	0.284
304 Stainless	1.000	0.00	0.285
316 Stainless	0.939	0.00	0.284
321 Stainless	1.011	0.00	0.284
409 Stainless	1.054	0.00	0.284
430 Stainless	1.060	0.00	0.284
430 237A Stainless	1.060	1.10	0.284
430 A1630B Stainless	1.060	0.63	0.284
434 Stainless	1.027	0.00	0.284
436 Stainless	1.015	0.00	0.284

Brass and Copper

110 ETP Copper	0.657	0.00	0.323
122 Copper	0.572	0.00	0.323
220 Brass	0.662	0.00	0.306
230 Red Brass	0.657	0.00	0.316
260 Cartridge Brass	0.664	0.00	0.306
260 Tinned Brass	0.664	-0.90	0.306
332 Copper	0.659	0.00	0.316
510 Phosphor Bronze	0.647	0.00	0.316
752 Brass	0.664	0.00	0.306

Titanium

40KSI-YS Titanium	2.818	0.00	0.163

System Messages

Following is a list of some of the system messages most likely to be encountered when using the AGT400 Thickness Gauge & S.P.C. Reporting System. AGT400 system messages may appear during program start, in the Message Center of the Main Screen or in various text boxes.

A1<0

A problem is indicated with the least squares fitting procedure portion of the calibration procedure, usually caused by one or more bad data points. See troubleshooting procedure for ISOcal™ Unsuccessful.

A1<0 and divide by 0

A problem is indicated with the least squares fitting procedure portion of the calibration procedure, usually caused by one or more bad data points. See troubleshooting procedure for ISOcal™ Unsuccessful.

A/D reading too low -- restart the calibration with a new sample

A particular sample appears to be out of order. The samples should be ordered from thinnest to thickest, and their A/D values must be ordered from largest to smallest. Most likely, the entered value for a particular sample is incorrect. To correct this problem, carefully choose one or more new samples and restart the calibration. If you're still unsuccessful, see troubleshooting procedure for ISOcal™ Unsuccessful.

Bad thickness data -- turn off the Test switch on the Multifunction Board

The Test switch on the Multifunction Board was left in one of the ON positions. Switch it to the center (OFF) position.

Calibration curve has a maximum

A problem is indicated with the least squares fitting procedure portion of the calibration procedure, usually caused by one or more bad data points. See troubleshooting procedure for ISOcal™ Unsuccessful.

Calibration failed

The calibration has failed in the least squares fitting part of the procedure. See troubleshooting procedure for or ISOcal™ Unsuccessful

Calibration file missing

The AGT400 calibration file (AGTCal1(mmdd@time).txt) is missing. Contact A.G.T. for further assistance.

Can't move frame while Data Diagnosis is in progress

C-frame movement functions are not available during the first ten seconds (approximately) after the AGT400 software is initialized. Wait a few seconds and command the C-frame to move again.

Can't move in from the 'off' limit

From the off sheet limit switch, the C-frame can only be moved in the On Sheet direction.

Can't move out from the 'in' limit

From the on sheet limit switch, the C-frame can only be moved in the Off Sheet direction.

Can't read the calibration file

The AGT400 calibration file (AGTCal1(mmdd@time).txt) is incorrect or missing. Contact A.G.T. for further assistance.

Check diagnostics for A/D values -- closed A/D and Preamp A/D

The system has experienced a series of invalid thickness readings. Perform an ISOcheck™ procedure.

Check shutter keyswitch or source head switches for shutter

Shutter is commanded to open, but shutter open microswitch is not returning the proper signal. See troubleshooting procedure for Shutter Inoperable.

Check source head switches for sample 1

Sample 1 was commanded to open or close, but sample microswitch(es) are not returning the proper signal(s). See troubleshooting procedure for Internal Sample(s) Inoperable.

Check source head switches for sample 2

Sample 2 was commanded to open or close, but sample microswitch(es) are not returning the proper signal(s). See troubleshooting procedure for Internal Sample(s) Inoperable.

Check the Zip Drive

A necessary file has been deleted or moved. Try restarting the computer, restore the file from the Recycle Bin, check Zip disk, check Zip drive or network connection (if applicable) or contact A.G.T. for further assistance.

Coil data exceeds storage capability

Coil run time may have exceeded the maximum time of 67 minutes, or the computer may need to be rebooted.

Curve has a maximum and A1<0

A problem is indicated with the least squares fitting procedure portion of the calibration procedure, usually caused by one or more bad data points. See troubleshooting procedure for ISOcal™ Unsuccessful.

Curve has a maximum and divide by 0

A problem is indicated with the least squares fitting procedure portion of the calibration procedure, usually caused by one or more bad data points. See troubleshooting procedure for ISOcal™ Unsuccessful.

Curve has a maximum + A1<0 + divide by 0

A problem is indicated with the least squares fitting procedure portion of the calibration procedure, usually caused by one or more bad data points. See troubleshooting procedure for ISOcal™ Unsuccessful.

Divide by 0

A problem is indicated with the least squares fitting procedure portion of the calibration procedure, usually caused by one or more bad data points. See troubleshooting procedure for ISOcal™ Unsuccessful.

Error: 6 Overflow

Coil run time may have exceeded the maximum time of 67 minutes, or the computer may need to be rebooted.

Error: 13 Type mismatch

The file in question has an incorrect format. Contact A.G.T. for further assistance.

Error: 48 Error in loading file

A necessary file has been deleted or moved. Try restarting the computer, restore the file from the Recycle Bin or contact A.G.T. for further assistance.

Error: 52 Bad file name or number

A necessary file has been deleted or moved. Try restarting the computer, restore the file from the Recycle Bin, check Zip drive or network connection (if applicable) or contact A.G.T. for further assistance.

Error: 53 File not found

A necessary file has been deleted or moved. Try restarting the computer, restore the file from the Recycle Bin, check Zip drive or network connection (if applicable) or contact A.G.T. for further assistance.

Error: 57 Disk not ready or unavailable – check disk

A hard disk read or write is called and an error occurs while reading or writing to the disk. Check Zip drive or network connection (if applicable) or contact A.G.T. for further assistance.

Error: 68 Disk not ready or unavailable – check disk

A hard disk read or write is called and an error occurs while reading or writing to the disk. Check Zip drive or network connection (if applicable) or contact A.G.T. for further assistance.

Error: 71 Disk not ready or unavailable – check disk

A hard disk read or write is called and an error occurs while reading or writing to the disk. Check Zip drive or network connection (if applicable) or contact A.G.T. for further assistance.

Error: 72 Disk not ready or unavailable – check disk

A hard disk read or write is called and an error occurs while reading or writing to the disk. Check Zip drive or network connection (if applicable) or contact A.G.T. for further assistance.

Frame drive power turned off after timeout

The C-frame was commanded to Move On, Move Off or Oscillate, and a period of time elapsed without the AGT400 receiving feedback that the frame had traversed across the strip. The 'Frame Motor Maximum On Cycles' item in the Parameter File is set to a number, typically 30 seconds (shown as 600 50-millisecond increments). If C-frame movement is commanded and this amount of time is exceeded without the proper digital inputs from the C-frame limit switches or photocells, this message will appear. See the procedures for C-frame Won't Move or C-frame Speed Incorrect.

Free Hard Disk Space = xx Mb.

The free hard disk space < 100 Mb. at the end of a shift. Delete some of your oldest data, and restart the computer.

Free Zip Disk Space = xx Mb.

The free Zip disk space is running low at the end of a shift. Replace the Zip disk and restart the computer.

ISOcal failed

See troubleshooting procedure for ISOcal™ Unsuccessful

ISOcal failed due to head switches

Shutter and/or sample microswitches are not returning the proper signal(s). See troubleshooting procedure for Shutter Inoperable or Internal Sample(s) Inoperable.

ISOcheck failed

See troubleshooting procedure for ISOcheck™ Unsuccessful.

ISOcheck failed due to head switches

Shutter and/or sample microswitches are not returning the proper signal(s). See troubleshooting procedure for Shutter Inoperable or Internal Sample(s) Inoperable.

Negative thickness readings, check pre-amp

The system is either in need of calibration, or may be experiencing excessive detector head signal. Perform an ISOcheck™ procedure.

Parameter file missing -- call maintenance!

The AGT400 parameter file (AGTpar2.txt) was missing when the program started. Acknowledge the message, go to the System Setup screen, and perform the Restore Par procedure.

The data in your serial number file is incorrect

The parallel port security dongle is not communicating properly with the AGT400 software. See the procedure for Software Inoperable.

You have attempted to run an improperly installed program

One or more of the AGT400 security files may be corrupted or missing. Contact A.G.T. for further assistance.

Your serial number file has been lost or corrupted.

One or more of the AGT400 security files may be corrupted or missing. Contact A.G.T. for further assistance.

Wrong calibration file format

The AGT400 calibration file (AGTCal1(mmdd@time).txt) is incorrect. Contact A.G.T. for further assistance.

Replacement Parts
SAC - 10/30/03

Following is a list of common replacement parts for the AGT400 Thickness Gauge & S.P.C. Reporting System.

Electronics Cabinet Filter (fiber mesh)

6-3/4" square, A.G.T. part number FIL-410

Electronics Cabinet Filter (wire screen)

6-3/4" square, A.G.T. part number FIL-420

Indicator Lamps (shutter or classifier)

G.E. Survivor 60A/S-130V, order code 40325, A.G.T. part number LMP-410
Life expectancy = 3,000 hours @ 130V or 8,300 hours @ 120V

Opto22 Fuses (AC and DC out modules)

4 amp, 250V micro fuse, 5 x 20 mm., A.G.T. part number FUS-420

Opto22 Fuse (rack circuit board)

1 amp, 250V micro fuse, 5 x 20 mm., A.G.T. part number FUS-410

Printer Ink Cartridge (black)

H.P. inkjet print cartridge, item number 45 or 51645A (fits printer models 890, 895, 960, 970, 990 and 6122), A.G.T. part number INK-410

Printer Ink Cartridge (color)

H.P. inkjet print cartridge, item number 23 or C1823D (fits printer models 890 and 895), A.G.T. part number INK-420

Printer Ink Cartridge (color)

H.P. inkjet print cartridge, item number 78 or C6578A (fits printer models 960, 970, 990 and 6122), A.G.T. part number INK-430

Printer Paper

Letter size (8.5" x 11"), white, 20 to 24 lb.

Tachometer Fuse

1/8 amp, 125V micro fuse, A.G.T. part number FUS-440

Zip Disk

100Mb, PC format, A.G.T. part number ZIP-420

S.P.C. Definitions
SAC – 11/5/03

Average (X Double Bar or XBB) = footage weighted average of all the readings in a coil (see note)

Note: our value of XBB may be slightly different (but statistically more correct) than what some customers are used to seeing. We don't just take the average, we weight our readings by the amount of footage that reading is for. For example, reading 1 is .030" and is made 2 feet into the coil (2 feet measured). Then the line speeds up. Reading 2 is .036" and is made 6 feet into the coil (4 feet measured). Reading 3 is .033" and is made 8 feet into the coil (2 feet measured). A simple average (.030" + .036" + .033")/3 works out to .033", but our footage weighted (.030 x 2 + .036" x 4 + .033" x 2)/(2 + 4 + 2) gives .03375"

Note: on AGT400 Coil Reports, outliers and/or coil ends may be excluded from this calculation. If only outliers are excluded, the ^ symbol will appear on the Coil Report screen and printout. If only coil ends are excluded, the ' symbol will appear on the Coil Report screen and printout. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report screen and printout.

Average – Target = average thickness less target thickness

Capability Ratio (CR) = 100/CP, shown as a percent (see note)

Note: CP and CR measure whether the observed variation in the product falls within the range of specifications. An 'in spec' product will have CP greater than 1 (or CR less than 100%). An 'out of spec' product has CP less than 1.

Capability versus Limits (CPK) = the lesser of (High limit – XBB)/(3*sigma) and (XBB – Low limit)/(3*sigma) (see note)

Note: CPK should always be smaller than CP. This is important where the High and Low limits cannot be changed, or are asymmetric. CPK gives a 'worse case' scenario since it always shows the process to be less capable than CP. It is possible to have a negative value of CPK when the mean is outside the specification limits.

e

Coil Ends = footage at the start and end of a coil, equal to half of the Minimum Coil Length, which can be adjusted on the System Setup Screen (see note)

Note: if only coil ends are excluded from the AGT400 S.P.C. calculations, the ' symbol will appear on the Coil Report screen and printout. If both coil ends and outliers are excluded, the * symbol will appear on the Coil Report screen and printout.

CP (process capability) = (High limit – Low limit)/(6* sigma) (see note)

Note: CP and CR measure whether the observed variation in the product falls within the range of specifications. An 'in spec' product will have CP greater than 1 (or CR less than 100%). An 'out of spec' product has CP less than 1.

CPK (capability versus limits) = the lesser of (High limit – XBB)/(3*sigma) and (XBB – Low limit)/(3*sigma) (see note)

Note: CPK should always be smaller than CP. This is important where the High and Low limits cannot be changed, or are asymmetric. CPK gives a 'worse case' scenario since it always shows the process to be less capable than CP. It is possible to have a negative value of CPK when the mean is outside the specification limits.

CR (capability ratio as a percent) = 100/CP (see note)

Note: CP and CR measure whether the observed variation in the product falls within the range of specifications. An 'in spec' product will have CP greater than 1 (or CR less than 100%). An 'out of spec' product has CP less than 1.

High (Upper Tolerance Limit) = the High limit as entered by the Operator (see note)

Note: High and Low limits are the process specifications.

Length = length of coil as measured by AGT400 footage counter

LCL (Lower Control Limit) = XBB - 3*sigma (see note)

Note: UCL and LCL are measures of the process 'spread'. Technically speaking, these are the 'natural limits'. Therefore this is the full range of values that may be observed except for readings due to some non-statistical cause.

Low (Lower Tolerance Limit) = the Low limit as entered by the Operator (see note)

Note: High and Low limits are the process specifications.

Lower Control Limit (LCL) = XBB - 3*sigma (see note)

Note: UCL and LCL are measures of the process 'spread'. Technically speaking, these are the 'natural limits'. Therefore this is the full range of values that may be observed except for readings due to some non-statistical cause.

Lower Tolerance Limit (Low) = the Low limit as entered by the Operator (see note)

Note: High and Low limits are the process specifications.

Outliers = any thickness readings in excess of three standard deviations from the mean thickness of the coil (see note)

Note: if only outliers are excluded from the AGT400 S.P.C. calculations, the ^ symbol will appear on the Coil Report screen and printout. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report screen and printout.

Process Capability (CP) = (High limit – Low limit)/(6* sigma) (see note)

Note: CP and CR measure whether the observed variation in the product falls within the range of specifications. An 'in spec' product will have CP greater than 1 (or CR less than 100%). An 'out of spec' product has CP less than 1.

R Bar = 3* sigma

Sigma (standard deviation) = $\sqrt{\text{sum} ((X_i - XBB)^2/(Nreadings - 1))}$ where X_i are the individual readings and Nreadings is the total number of readings for a coil (see note)

Note: this is the key number for understanding process variation.

Note: on AGT400 Coil Reports, outliers and/or coil ends may be excluded from this calculation. If only outliers are excluded, the ^ symbol will appear on the Coil Report screen and printout. If only coil ends are excluded, the ' symbol will appear on the Coil Report screen and printout. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report screen and printout.

S.P.C. = statistical process & control

Standard Deviation (sigma) = $\sqrt{\text{sum}((X_i - XBB)^2/(N_{readings} - 1))}$ where X_i are the individual readings and $N_{readings}$ is the total number of readings for a coil (see note)

Note: this is the key number for understanding process variation.

Note: on AGT400 Coil Reports, outliers and/or coil ends may be excluded from this calculation. If only outliers are excluded, the ^ symbol will appear on the Coil Report screen and printout. If only coil ends are excluded, the ' symbol will appear on the Coil Report screen and printout. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report screen and printout.

Target = the Target as entered by the Operator

TMW Ratio = Low limit/average

UCL (Upper Control Limit) = XBB + 3*sigma (see note)

Note: UCL and LCL are measures of the process 'spread'. Technically speaking, these are the 'natural limits'. Therefore this is the full range of values that may be observed except for readings due to some non-statistical cause.

Upper Control Limit (UCL) = XBB + 3*sigma (see note)

Note: UCL and LCL are measures of the process 'spread'. Technically speaking, these are the 'natural limits'. Therefore this is the full range of values that may be observed except for readings due to some non-statistical cause.

Upper Tolerance Limit (High) = the High limit as entered by the Operator (see note)

Note: High and Low limits are the process specifications.

Weight = weight of coil calculated from measured length, measured thickness and density as entered on the Product Menu screen

X Double Bar (XBB or average) = footage weighted average of all the readings in a coil (see note)

Note: our value of XBB may be slightly different (but statistically more correct) than what some customers are used to seeing. We don't just take the average, we weight our readings by the amount of footage that reading is for. For example, reading 1 is .030" and is made 2 feet into the coil (2 feet measured). Then the line speeds up. Reading 2 is .036" and is made 6 feet into the coil (4 feet measured). Reading 3 is .033" and is made 8 feet into the coil (2 feet measured). A simple average (.030" + .036" + .033")/3 works out to .033", but our footage weighted (.030 x 2 + .036" x 4 + .033" x 2)/(2 + 4 + 2) gives .03375"

Note: on AGT400 Coil Reports, outliers and/or coil ends may be excluded from this calculation. If only outliers are excluded, the ^ symbol will appear on the Coil Report screen and printout. If only coil ends are excluded, the ' symbol will appear on the Coil Report screen and printout. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report screen and printout.

XBB (X Double Bar or average) = footage weighted average of all the readings in a coil (see note)

Note: our value of XBB may be slightly different (but statistically more correct) than what some customers are used to seeing. We don't just take the average, we weight our readings by the amount of footage that reading is for. For example, reading 1 is .030" and is made 2 feet into the coil (2 feet measured). Then the line speeds up. Reading 2 is .036" and is made 6 feet into the coil (4 feet measured). Reading 3 is .033" and is made 8 feet into the coil (2 feet measured). A simple average (.030" + .036" + .033")/3 works out to .033", but our footage weighted (.030 x 2 + .036" x 4 + .033" x 2)/(2 + 4 + 2) gives .03375"

Note: on AGT400 Coil Reports, outliers and/or coil ends may be excluded from this calculation. If only outliers are excluded, the ^ symbol will appear on the Coil Report screen and printout. If only coil ends are excluded, the ' symbol will appear on the Coil Report screen and printout. If both outliers and coil ends are excluded, the * symbol will appear on the Coil Report screen and printout.

<u>Specifications</u>

SAC – 10/6/03

Thickness Range
.007" - .250" steel
.001" - .018" uranium
.001" - .025" platinum
.001" - .027" gold
.001" - .033" tungsten
.001" - .039" silver
.001" - .041" lead
.001" - .046" cadmium
.001" - .046" bismuth
.001" - .049" tin
.002" - .061" molybdenum
.002" - .079" barium
.003" - .098" zirconium
.004" - .153" cesium
.005" - .166" copper or brass
.005" - .178" nickel
.005" - .194" zinc
.009" - .340" chromium
.013" - .400" vanadium
.019" - .400" titanium
.088" - .400" aluminum

Air Gap
2" - 8" (7" typical)

Nominal Response Time
10 – 1,000 milliseconds

Calibration Accuracy
$\pm$ 0.2 mils or $\pm$ 0.20% (whichever is greater)

Precision (noise)
0.12% for .120" steel
@ 250 milliseconds time constant
@ 90% confidence level (typical)

Radiation Source
Am241 - 1 Curie

Radiation Detector
Ionization Chamber - 3" diameter (4.5" optional)

Central Processing Unit
Intel Pentium III or equivalent

Software
Visual Basic 5.0 operating in Windows98SE®

f

Parameter File (AGTPar2.txt)

The Parameter File is a database of settings and information used by the AGT400 program. It includes configuration information (e.g. whether zip drive is present, a network drive, a coil mapping terminal, etc.), calibration information, and settings such as the time constant, nomenclature, etc. The Parameter File (Parfile) is called "AGTPar2.txt". The current Parfile is version 2.4i (dated 1/23/03). The current AGT400 program is version 2.4i (also dated 1/23/03)

The Parfile has changed over time as additional features have been added to the AGT400 program. The previous versions of the Parfile format are 2.2c, 2.2i, 2.2j, 2.2k, 2.2l, 2.2m, 2.2n, 2.3b, 2.4a, 2.4c, 2.4e, 2.4f, and 2.4i.

THE AGT400 PROGRAM IS FULLY BACKWARD COMPATIBLE. Any version of the AGT400 program will read Parfiles from earlier versions of the program. The Parfile format was not changed with every version of the AGT400 program. For example, AGT400 versions 2.4f,2.4g, and 2.4h all used Parfile version 2.4f. THE AGT400 PROGRAM IS NOT FORWARD COMPATIBLE. For example, version 2.4f of the AGT400 program will not read a type 2.4i Parfile correctly; the v2.4i Parfile includes new information and formatting that the AGT400 version 2.4f is not programmed to read.

When the AGT400 program starts, it reads the Parfile from the system folder C:\AGT400 and immediately saves a copy to a folder called C:\AGT400\Parfiles. The saved copy is called AGTPar2(yymmdd@hhmm).txt. E.g., AGTPar2(030114@1622).txt was saved to the Parfiles folder on Jan. 3, 2003 at 4:22 PM. These saved copies provide a useful history of changes in the Parfile, and provide an additional level of backup if the working Parfile is corrupted or lost. The Parfile itself is written to C:\AGT400 with its normal name "AGTPar2.txt" whenever the user exits the AGT400 program. It is also written out whenever the user leaves the Product Menu (but not during data gathering), The Defect Menu (but not during data gathering), the Diagnostic Screen, the System Setup Screen, the Report Setup Screen, the Nomenclature Screen and the Manual Calibration Screen. ("Data gathering" means accumulating thickness, length, defect, and other data after the Report Control button on the Main Screen has been pushed, and before the end of the coil.) An additional backup of the Parfile is done after every external calibration (Manual Calibration Screen.) The AGT400 program writes a file called "AGTPar2X.txt" to the C:\AGT400 folder. This file is used to save the calibration parameters just after the external calibration, before they are modified by an ISOcal procedure.

When the program first starts it sets all the variables that are found in the Parfile to default values using a subroutine in the program called "Altpar." Next it looks for and reads the Parfile. If the Parfile is missing, or there are errors in the Parfile type (e.g. 2.4i is the current Parfile type) an error message is sent to the Main Screen. The program will run correctly, but it will have the default values, not the current values (of the calibration parameters for example). All the data will have to be entered again or restored. There are two ways to restore the data.

1) This method can be used without leaving the program (an advantage), but it does not restore all the data (a disadvantage). When an external calibration is done the program writes a backup of the Parfile to the system path C:\AGT400. This Parfile is called AGTPar2x.txt. If the current Parfile is not found the backup Parfile can be restored by using the "Restore Par" button on the System Setup Screen. This restores most (but not all) of the data. Data saved in the Parfile between the last external calibration and the current date must be re-entered.

2) This method requires leaving the program and using Windows Explorer to restore the Parfile (a disadvantage) but it restores the most recent Parfile data from the previous time the user exited the program.

To use method (2) first exit the program. Start Windows Explorer and open the folder called C:\AGT400\Parfiles. The most recent Parfile will usually be at the end of this folder and will have a name like "AGTPar2(030119@1400).txt" The numbers in parentheses are the date of the Parfile, yymmdd (in this example January 19, 2003) and the time hhmm (2:00 PM). Copy this file to the AGT400 system folder C:\AGT400. Now delete the current Parfile "AGTPar2.txt" and rename the copied Parfile to "AGTPar2.txt". Then restart the program.

If the format of the Parfile has been corrupted the data will be wrong and the program will not run correctly. In this case you must exit the program and restore the Parfile manually as in case 2 just above.

The Parfile can also be edited off line as a text file by a field engineer. Using Windows Explorer double click on AGTPar2.txt. Make your changes and save them when you leave the editing program. DO NOT CHANGE THE STRUCTURE OR FORMAT of the Parfile when editing it as a text file. Blank lines must be left blank or the AGT400 program will not read the file correctly. CHANGE ONLY NUMBERS AND TEXT, AND MAKE SURE NOT TO INCLUDE ANY ADDITIONAL COMMAS, TABS OR LINE FEEDS. Commas, tabs, and line feeds are used as "end of field" identifiers when the AGT400 program reads the Parfile. Adding any of these characters will change the structure of the Parfile and cause the AGT400 program to misread the file. If you need to use separators in comments use the following characters: /   -   =   :   [ ]   ( )

Many of the Parfile data items are set directly by users of the program. These include the items on the Product Menu, the Defect Menu, the System Setup Screen, the Report Setup Screen, the Nomenclature Screen, and the Special Functions Screen. Some information is set indirectly; they are values measured by the program (e.g. the air and shutter closed A/D readings) or calculated by the program (e.g. the calibration constants). Some information (e.g. the system serial number) is written out in the Parfile for diagnostic purposes. Still other information is set manually in the Parfile itself, e.g. configuration information (e.g. the Zip drive path letter), demo program status, etc.

The table below this text section shows a Parameter File with the values for all the parameters. Except as noted the values are the default values. Column 1 is the line number, Column 2 is the actual data in the ParFile, Column 3 shows the variable type, Column 4 shows whether the variable is for input to the program or is something the program measures and writes out, Column 5 is a description of the variables and data. ONLY COLUMN 2 ACTUALLY APPEARS IN THE PARFILE. The other columns are included for this document. THE ACTUAL NUMBERS OF LINES IN A PARAMETER FILE may vary because the number of products, defects, calibration samples, etc. may vary. WHEN LOCATING AN ITEM IN THE PARFILE refer to the section headings and comment lines. In this document the words "parameter" and "variable" are often used interchangeably.

Large numbers of comments are included in the Parfile itself to help understand the purpose of various data items. Comment lines that begin major data sections start with "***" and are called "headings". Comment lines for individual data items or groups of related data items begin with ">". These heading and comment lines are string variables, but they do not begin and end with quotation marks. Items that begin and end with quotations marks are string variables that are parameters in the program.

For example: >Zip Drive Path   is the comment line that tells you what the data parameter on the next line is, while   "D:\"   is the actual data, the Zip drive path.

IN MOST CASES THE COMMENT IN THE PARFILE ITSELF EXPLAINS THE PURPOSE OF A VARIABLE. THESE COMMENTS IN THE PARFILE HAVE NOT BEEN DUPLICATED IN THE COMMENT COLUMN.

The variable types are string, integer (2 byte, +/- 32,767), long (long integer, 4 byte, above +/- 32,767), and single (single precision floating point, decimal). String data is shown in quotation marks. Numeric data is shown without quotation marks. When you edit the Parfile and change a variable it is important to know if it is an integer, long integer or floating point variable. DON'T PUT A DECIMAL POINT IN AN INTEGER VARIABLE -- you will get an error "type mismatch" when the program tries to read the file. The decimal may be omitted from a floating point number. (e.g. -- 43.0 or 43 are both correct.) Floating point numbers may also be written in exponential format (e.g. 1.5128E-02 = .015128, 1.4375E03 = 1437.5)

Where more than one variable appears on a line the variables are separated by commas. Lines may include any mixture of string, integer, or floating point variables. There is no comma at the end of a line.
The descriptions of the variables show where in the program the variable is set. Most (but not all) of the entries in the first part of the file are set directly in the Parfile, and not in the AGT400 program. The first part of the Parfile has the heading

*** Parameters primarily set in this file (all in English Units)
>   -------------------------- (thicknesses in mils = .001 inch)

Most (but not all) the entries in the second part of the file are set in the AGT400 program. The second part of the Parfile has the heading:

*** Parameters primarily set in the program (all in English Units)
>   -------------------------- (thicknesses in mils = .001 inch)

See the variable descriptions for more information.

Unless otherwise noted all items with dimensions are given in English units. Thickness is usually given in mils (1 mil = .001"). Variable names have been made as understandable as possible. However, some shorthand has still been used. For example, "min" and "max" are sometimes used for "Minimum" and "Maximum".

The "second language" of the AGT400 program at present is Spanish. Other languages may be added at some point in the future.

I/O types: c = comment string (a "heading" is a comment describing a section of related data), o = output variable, i = input variable, b = blank line
NO COMMAS OR TABS ARE ALLOWED IN COMMENT LINES
Blank lines have no description. However, these blank lines are essential to the program; the routine that read the Parfile expect blank lines in the sequence shown

"Var type" means "Variable type"
 strings are lines of alphanumeric data with no embedded commas or tabs
 integers may assume values to +/- 32,767
 longs may assume values to +/- (2^31) - 1 (2,147,483,647)
 singles are numbers with a decimal point in them (if the decimal point is
   omitted, the number is read still read correctly). E.g. 7 = 7.0

On lines where data is read in by the AGT400 program a blank string is shown by
"". THESE BLANK STRINGS MUST BE PRESENT FOR THE AGT400
PROGRAM TO READ THE PARFILE CORRECTLY!! IF THEY ARE NOT
THERE THE RESULTS WILL BE UNPREDICTABLE AND ALMOST
CERTAINLY INCORRECT. E.g. on line 416 the Parfile shows the date, time and
reason for the most recent unsuccessful ISOcal. If there has been no failed
ISOcal the line will show three blank (or "null") strings,   "", "", ""
Most of the variables shown in column 2 of this table are the default settings. In
some cases more typical data has been shown. In particular the default list of
products and defects are shorter than shown in the table below. The default list
of products has 3 entries (the integer variable on line 217 is 3). The entries in
the default Product list (lines 219 to 232) are:
 Product 1 = "Galvanize G90", "<--->", "Galvanizado G90", 1., 0., .284
 Product 2 = "Galvanize G60", "<--->", "Galvanizado G60", 1., 0., .284
 Product 3 = "Other", "<--->", "Otro", 1., 0., .284

 (Product 0 = "Steel" , "<--->", "Acero" and the Product zero density are used
by the program but do not appear in this list. They appear elsewhere in the
Parfile, on lines 214 and 215)

The default list of Defects has 7 entries (the integer variable on line 239 is 7).
The entries in the default Defect list (lines 241 to 263) are
 Defect 2 = "Rust", "<--->", "Oxidacion"
 Defect 3 = "Scratches", "<--->", "Rayas"
 Defect 4 = "Pin Holes", "<--->", "Agujeros"
 Defect 5 = "Skid Marks", "<--->", "Marcas patinazos"
 Defect 6 = "Wavy Edges", "<--->", "Bordes ondulados"
 Defect 7 = "Other", "<--->", "Otro"

 (Defect 0 = "None", "<--->", "Ninguno" are used by the program but do not
 appear in this list. They appear elsewhere in the Parfile, on line 235)
 (Defect 1 = "Multiple Defects", "<--->", "Defectos Multiplos" are used by the
 program but do not appear in this list. They appear elsewhere in the Parfile,
 on line 237)

Line #	Parameter File Contents (this column contains the actual data & format of a ParFile)	var type	I/O	Description
001	*** AGT400 Parameter File, "09-25-2003","01:42:18"	3 strings	h,o,o	Heading: includes the date & time the file was written to disk
002	"2.4i"	1 string	o	The version number of the Parfile, used in the AGT400 program to determine which subroutine to use to read the Parfile, & how to set default values for new variables introduced in this Parfile
003	"AGT400 v2.4i 004Q01"	1 string	o	A line with the version number of the AGT400 program & the system serial number
004			b	
005	*** Parameters primarily set in this file (all in English Units)	1 string	h	This section describes variables usually set within the Parfile, not the program The "native" language of this Parfile is English
006	> ------------------------ (thicknesses in mils = .001 inch)	1 string	c	The "native" measuring units in the program are all in English units. If the user selects Metric units to be displayed on the screens and reports all conversions are done in the program.
007			b	
008	>Program Status [0=on-line 1=demo 2=off-line]	1 string	c	Comment describing the effects of the Program Status variable
009	0	1 integer	I	On-line mode is the normal way of operating the program. It accesses the I/O boards to get the input signals that are processed into thickness data, and generates output signals that are used to control the shutters, frame, lamps, etc.. If there are no I/O boards the program will generate error messages when it operates. The demo mode and off-line mode perform all the functions of the on-line mode except that it simulates all input signals, and does not try to produce output signals. At start-up demo and off-line modes do not automatically produce a start-up report. Demo mode looks exactly line the on-line mode, except that on the Screen Menu there is an option button that can call up the Demo Data Screen. To access functions usually dne by maintenance personnel or field engineers (e.g. exiting the AGT400 program) the "Maint" button on the Demo Data Screen should be set to "1". Off-line mode contains an expanded Data Recall Screen, and automatically opens with the Maint button set to "1"
010			b	
011	>Main Program Loop Cycle Timing ~10msec (7 to 13 msec)	1 string	c	
012	>See the file 'DD2.txt' for timing details	1 string	c	DD2.txt is written out by the program each time it starts. DD2.txt shows the timing for the first 1000 cycles through the program
013	>Average Cycle Time (msec)	1 string	c	Program cycle time
014	9.36	1 single	o	Program cycle time, measured & written by the program. This value should be about 10 msec. (The minimum allowed by the program is 8 msec. Cycle times longer than 15 msec may indicate that the operating system is performing background functions that may interfere with the operation of the AGT400.)
015			b	
016	>Zip Drive Path	1 string	c	
017	"D:\"	1 string	I	Zip drive path
018			b	
019	>AutoBackup to Zip frequency	1 string	c	
020	>[0=disabled 1=by shift 2=daily 3=weekly 4=monthly]	1 string	c	These lines control the automatic backup to the Zip drive
021	1	1 integer	I	
022	>AutoBackup hour [0 to 23]	1 string	c	
023	21	1 integer	I	
024	>AutoBackup day [1 to 7 if weekly or 1 to 28 if monthly]	1 string	c	
025	3	1 integer	I	In order to allow this function to operate in all months we only permit backup on days 1 to 28 (no backup is permitted on the 29th, 30th, or 31st day of the month)

026			b	
027	>Set Move to Zip Button Visible	1 string	c	
028	>[0=invisible 1=visible]	1 string	c	
029	0	1 integer	I	If this variable is set to "1" a "Move to Zip" button appears on the Data Recall Screen. This button allows a manual backup to the Zip drive, copying all the files from the Month directory selected to the Zip drive
030			b	
031	>Variables for the I/O Board configuration	1 string	c	
032	>These values MUST agree with the I/O Board cb.cfg file	1 string	c	
033	>A/D In : AuxDig In : AuxDig Out : Counter In : Dig In : Dig Out : D/A out	1 string	c	
034	0,0,0,0,1,1,1	7 integers	I	These variables show on which boards the various I/O functions are located; they must agree with the way the I/O boards have been installed with the Measurement Computing (ComputerBoards) software.
035			b	
036	>Local printer check [1=enabled 0=disabled]	1 string	c	
037	0	1 integer	I	This function has not been used in AGT400 versions to v2.4i, but has been included for possible later use.
038	>Printer Port [HEX string]	1 string	c	
039	"&H378"	1 string	I	The printer port (given as a hex string)
040			b	
041	>Modem Present or Not [1=present 0=not present]	1 string	c	
042	0	1 integer	I	This function has not been used in AGT400 versions to v2.4i, but has been included for possible later use.
043			b	
044	>Network Present or Not [1=present 0=not present] + Path	1 string	c	
045	0,"F:\"	1 integer, 1 string	I	In addition to writing each coil report or shift report to the C: drive of the system computer, the program checks to see if a network is present. If it is the reports are also written to the network. The "network" drive may also be the Zip drive built into the system. The program checks to see if the network drive is the same as the Zip drive
046			b	
047	>Secondary Coil Report Output format [0=not present] + Path	1 string	c	
048	<Format Definition>	1 string	c	A comment here will identify several possible secondary coil report formats In AGT400 versions to v2.4i there is only a single format
049	0,"F:\"	1 integer, 1 string	I	0 = no secondary report, 1 = a type 1 secondary report The type 1 secondary report creates a flat-file text output with a header line & a line for each data point (thickness, length position in ft, cross sheet width position in inches, & the zone/defect status word)
050			b	
051	>Secondary Shift Report Output format [0=not present] + Path	1 string	c	
052	<Format Definition>	1 string	c	A comment here will identify several possible secondary shift report formats
053	0,"F:\"	1 integer, 1 string	I	In AGT400 versions to v2.4i there are no secondary shift reports output
054			b	
055	>Coil Information Database Present or Not [1=present 0=not present]	1 string	c	The Coil Information Database allows the user to setup for production without having to enter data for every coil. The data can be entered off-line using an off-line text editor, or a demo or off-line version of the AGT400 program, or it may be entered on-line on the "Next Data" screen. When entered on the Next Data Screen the data is written out to the system folder (C:\AGT400) before exiting the AGT400 program.
056	1	1 integer	I	

057	>Coil Information Database Path	1 string	c	
058	"C:\AGT400\"	1 string	l	
059	>Coil Information Database Name	1 string	c	
060	"AGTDB2.TXT"	1 string	l	This file should be a *.txt file. If no extension is present the program will add ".txt". In fact any file name and extension will be accepted by the program as long as the file is really a text file. If the program does not find the coil database file with the name specified on this line it creates a file with the default name AGTDB2.txt
061	>Coil Information Database Type	1 string	c	
062	>99=Default Text Database (versions 2.2mnp 2.3abc 2.4a)	1 string	c	
063	> 99 Format: 3 line header + 14 lines per coil (including blank lines)	1 string	c	
064	> These lines are reserved for future expansion	1 string	c	
065	> to include other database formats	1 string	c	
066	> This line reserved for other formats	1 string	c	
067	> This line reserved for other formats	1 string	c	
068	99	1 integer	l	In AGT400 versions to v2.4i there is only one format, type "99" The format of the database is found in the file AGTDB2.txt. This file may have a different name (if it is specified above in line 60) but the format must be the same as in AGTDB2.txt. The format for type 99 is described in the comment lines #62 & 63
069			b	
070	>Output Type and scaling (Note: D/A out=5V full scale)	1 string	c	
071	> 0=none [placeholder]	1 string	c	These lines describe the scaling for analog outputs (e.g. for chart recorders or control systems)
072	> 1=analog deviation out scale (mils/ 5 volts)	1 string	c	
073	> 2=analog % deviation out scale (%/ 5 volts)	1 string	c	In AGT400 versions to v2.4i there are no digital outputs
074	> other codes as needed	1 string	c	(If digital outputs are required a digital output board with buffered outputs will be required, perhaps with additional Opto22 modules. Software for generating these outputs will also be needed.)
075	1,5	2 integers	l	e.g. the "1" here indicates a type 1 output, an analog deviation output with 5 volts = 5 mils ("1, 10" would indicate an analog output with 5 volts = 10 mils)
076			b	
077	*** Auxiliary digital inputs: Code [1=enabled 0=disabled]	1 string	c	This section describes the Auxiliary Digital inputs
078	1	1 integer	l	The Auxiliary digital inputs are used to read the "Test" switch on the multi-function
079	>Auxiliary digital inputs #0 #1 #2	1 string	c	board, and to control automatic data gathering, and automatic next coil data entry
080	>Input #0: 1 = MF board test switch status	1 string	c	
081	>Input #1: 1 = Auto Data Gathering with shutter & report control	1 string	c	
082	2 = Auto Data Gathering with shutter & report & frame control	1 string	c	
083	>For other values consult Advanced Gauging Technologies	1 string	c	
084	>Input #2: 1 = Auto Data Entry for Next Coil	1 string	c	
085	>For other values consult Advanced Gauging Technologies	1 string	c	Other uses of these inputs are possible if custom software is added to the AGT400 program
086	>Auxiliary digital input codes #0 #1 #2 (code=0 means input not used)	1 string	c	
087	1,0,0	3 integers	l	The first of these three inputs (input 0) tells the program to monitor the status of the "Test" switch on the multi-function board. It should always be set =1 unless the Test switch is broken. Knowing the status of the Test switch is a valuable diagnostic tool. (Occasionally the Test switch is left in the "On" position after it has been used by maintenance or field engineering personnel)
088			b	

089	*** Analog Channel 1 (0 to +10V)	1 string	c	This section describes the setup for Analog Input Channel 1 Analog input data is displayed on the Special Functions Screen. It can be plotted on the ISOgraph at the end of the coil, and printed on coil report ISOgraph
090	> 0=disabled 1=enabled 2=temp F 3=temp C 4=zone 5=defects	1 string	c	0= no input on Channel 1
091	> use code 0 to disable this input or 1 for user defined inputs	1 string	c	1 = an input from an external sensor
092	0	1 integer	I	Types 2 to 5 do not require an external input 2 = an input from the temperature sensor on the multi-function board in degrees F 3 = an input from the temperature sensor on the multi-function board in degrees C 4 = shows the zone of each thickness reading on the ISOgraph 5 = shows the defect type (if any) for each thickness reading on the ISO graph
093	>Channel 1 title and calibration constants --> A0 A1 A2	1 string	c	
094	>(calibration = A0 + A1*volts +A2*volts^2)	1 string	c	
095	"Elongation",0,3.67,0	1 string, 3 singles	I*	These are single precision decimal numbers despite being shown as integers in this example. The AGT400 often omits the decimal point when printing decimal numbers that are whole numbers. The Special Functions display will show 3.67 x the input voltage for "Elongation" †The default values for this line are "", 0,1.0,0 *The data on this line will be "output" by the program if the selection on line 90 is 2, 3, 4, or 5
096	>(number of decimals in the variable display: 0 to 4)	1 string	c	
097	2	1 integer	I*	*The data on this line will be "output" by the program if the selection on line 90 is 2, 3, 4, or 5
098	>Minimum and Maximum Y axis values	1 string	c	
099	0,100	2 singles	I*	These are single precision decimal numbers despite being shown as integers in this example (e.g 0,20 = 0.0, 20.0) *The data on this line will be "output" by the program if the selection on line 90 is 2, 3, 4, or 5
100			b	
101	*** Analog Channel 2 (0 to +10V)	1 string	c	This section describes the setup for Analog Input Channel 2, same as Channel 1
102	> 0=disabled 1=enabled 2=temp F 3=temp C 4=zone 5=defects	1 string	c	
103	> use code 0 to disable this input or 1 for user defined inputs	1 string	c	
104	0	1 integer	I	
105	>Channel 2 title and calibration constants --> A0 A1 A2	1 string	c	
106	>(calibration = A0 + A1*volts +A2*volts^2)	1 string	c	
107	"Temperature (F)",-78.0,80.0,0	1 string, 3 singles	I*	*The data on this line will be "output" by the program if the selection on line 104 is 2, 3, 4, or 5
108	>(number of decimals in display: 0 to 4)	1 string	c	
109	0	1 integer	I*	*The data on this line will be "output" by the program if the selection on line 104 is 2, 3, 4, or 5
110	>Minimum and Maximum Y axis values	1 string	c	
111	20,120	2 singles	I*	*The data on this line will be "output" by the program if the selection on line 104 is 2, 3, 4, or 5
112			b	
113	>Counter Limit for bad A/D readings (~10 msec@)	1 string	c	
114	100	1 integer	I	This variable is the number of successive 10 msec bad readings that must be observed before a message is generated. A single good reading resets the counter. A "bad" A/D reading is a reading that would produce a thickness value greater than the maximum possible measured thickness for this system (this thickness is entered on line 430 in the calibration data section). A "bad A/D readings" would indicate a problem in the detector head electronics
115			b	

g

116	>Shutter Lamp & Data Acquisition Control [1=by head switches 0=by command]	1 string	c	
117	1	1 integer	I	= 0 if the shutter lamps reflect the state of the shutter open/closed button = 1 if the shutter lamps reflect the state of the shutter open/closed switches in the source head
118			b	
119	>Head/Tail Scrap Code [1=enabled 0=disabled]	1 string	c	
120	0	1 integer	I	= 0 if the entry boxes for Head and Tail scrap are disabled = 1 if the boxes are enabled These check boxes are found on the "Special Functions" Scree. The scrap data is printed on the coil report in the first section of data, "Average thickness and Tolerance Data", just above the SPC data
121			b	
122	>Frame Motor Off Cycles and Maximum On Cycles (~0.05 sec/cycle)	1 string	c	These variables prevent the motor from making abrupt changes in direction, and from remaining on for a time that is much longer than the expected time to travel across the widest strip. They prevent the motor from being damaged
123	>(choose a value for the maximum 'on' time limit to prevent motor burnout)	1 string	c	
124	20,600	2 integers	I	OffCycles = The number of 1/4 second cycles that the frame dwells at the edges of the strip. The program checks this value and limits it to between 16 (4 sec) and 300(75 sec). The actual time may be longer than OffCycles/4 by as much as 25%. In this example the frame dwells at the strip edge for approximately 20/4 = 5 sec. OnCycles = The number of 1/4 second cycles that the frame can be on in a single direction before shutting off . The program checks this value and limits it to between 300(75 sec) and 6000 (1500 sec). This time should be set long enough so the frame can make a full scan of the maximum width strip, but not so long that the motor will be damaged if the motor drives the frame up against a limit. The actual time may be longer than OnCycles/4 by as much as 25%. E.g. Scanning a 120 inch wide strip at 4 inches/sec takes 30 seconds, or about 120 program cycles. Setting OnCycles substantially larger than the maximum expected value that the scanning time would take, but shorter than the time before the motor would burn out, protects the motor without affecting the operation of the system. In this example the motor may run 600/4 = about 150 seconds before shutting down.
125			b	
126	>Minimum tolerance (mils) and Minimum % tolerance	1 string	c	

127	.2,.5	2 singles	I	The minimum tolerance on the internal sample thicknesses [expressed in mils (.001"), to the nearest 0.1 mils] and the minimum per cent tolerance on the internal sample thicknesses
				These values should not be set too small.
				We recommend 0.2 as the minimum setting for the minimum tolerance.
				        NEVER SET the minimum tolerance to 0.
				We recommend 0.3 (0.3%) as the minimum setting for the percent tolerance.
				        NEVER SET the percent tolerance below 0.2%.
				Gamma ray thickness gauges can rarely measure better than 0.2%

128			b	
129	>Scaling for the coil report histogram vs. the target thickness:	1 string	c	This section controls the scaling for the coil report histogram The units used here for the sizes of the bins are a bit confusing. They are a result of the early versions of the program using a lot of integer arithmetic, and they were never changed. When entering the size of the bins you must enter an integer that corresponds to the number of tenths of a mil (e.g. 0.5 mils ➔ enter "5"). For the upper thickness range the unit used is the integral number of mils (e.g. 50 mils ➔ enter "50")

130	>Number of ranges -- DO NOT CHANGE THIS VALUE: 0 to 4	1 string	c	It chooses the size of the "bins" in the histogram according to the target thickness
131	4	1 integer	I	You must set 5 segments (0,1,2,3,4) for the coil report histogram increment
132	>Increment(unit=.1 mils) and upper thickness range(mils)	1 string	c	The minimum value of the histogram increment must be 0.2 mils (enter a "2" for this increment size). The upper thickness range in mils on each line must be at least 10 times the size of the histogram increment in mils (and typically will be much greater -- see the example below). E.g. if the minimum histogram increment were 0.5 mils the minimum range would be 5 mils. This would correspond to an entry on the first line of 5, 5
133	>(5:50 means the increment =0.5 mils --> up to a target thickness of 50 mils)	1 string	c	
134	5,50	1 integer, 1 single	I	In this example the choice of 5, 50 for range 0 means that for target settings up to 50.0 mils the size of the bins on the histogram will be 0.5 (5x0.1) mils = .0005"
135	10,100	1 integer, 1 single	I	In this example the choice 10, 100 for range 1 means that for target settings >50.0 mils and up to 100.0 mils the size of the bins on the histogram will be 1.0 mils
136	10,150	1 integer, 1 single	I	In this example the choice 10, 150 for range 2 means that for target settings >100.0 mils and up to 150.0 mils the size of the bins on the histogram will be 1.0 mils
137	10,200	1 integer, 1 single	I	In this example the choice 10, 200 for range 3 means that for target settings >150.0 mils and up to 200.0 mils the size of the bins on the histogram will be 1.0 mils
138	20,350	1 integer, 1 single	I	In this example the choice 20, 350 for range 4 means that for target settings >200.0 mils and up to 350.0 mils and above the size of the bins on the histogram will be 2.0 mils
139			b	
140	>Scaling for the deviation bar meter:	1 string	c	Scaling for the deviation bar meter in English units. In this section the thickness range is expressed as the number of mils full scale (10 = .010")
141	>Number of ranges -- DO NOT CHANGE THIS VALUE: 0 to 4	1 string	c	
142	4	1 integer	I	You must set 5 segments (0,1,2,3,4) for the deviation bar meter
143	>Ranges (mils --> use integers)	1 string	c	
144	5,10,15,20,25	5 singles	I	These values are the full scale deviation of the bar meter, depending on the difference between the target value and the high or low limit, The scaling of the bar meter also depends on what fraction of the bar meter you want deviation to fill [see line 151/152 below] The program autoscales the bar meter to make sure that the full scale deviation of the bar meter is greater than the difference between the high (or low limit) and the target multiplied by the factor in line 152 These must serve both for absolute deviation in thickness and % deviation, so choose round numbers such as 4.0, 5.0, 10., 15., 20., 25., 30., etc. To have the bar meter scale correspond exactly to the ISOgraph scale chose these values as half the values for set for the ISOgraph in the next section In this example the bar meter will have maximum deviations of either 5.0, 10.0,15.0, 20.0, 25.0 mils (or 5.0%, 10.0%, 15.0%, 20.0%, 25.0%) Conditions on the ranges you enter are 1) the minimum value cannot be less than 2.0 mils 2) the values must increase monotonically 3) the largest value must be at least 10.0 mils
145			b	

146	>Scaling for the ISOgraph Y axis:	1 string	c	Scaling for the ISOgraph Y axis in English units (10 = .010") There are 20 grid lines on the ISOgraph, scaling should be chosen to make these divisions easily readable Conditions on the scaling ranges entered in line 150: 1) the minimum value for the scaling range must be at least 4.0 (if the value entered in the Parfile is less than 4.0 the program automatically increases it to 4.0) 2) the values must increase monotonically 3) the values must be even whole numbers (this is necessary for the Main Screen histogram to work) 4) the largest value must be at least 10.0 (if the value entered in the Parfile is less than 10.0 the program automatically increases it to 10.0) All these values MUST BE EVEN to make the Main Screen histogram work Suggested possible values for the gvGraphY() array are: 4.0, 10., 20., 30.0, 40.0, 50.0, 60.0, 80.0, etc. NOTE: 5.0 mils is not good, because it makes the "bins" on the Main Screen histogram = 0.25 mils. (5.0 mils/20 grid lines = 0.25 mils per grid line) In the AGT400 program data is stored in units of 0.1 mils. The bins on the Main Screen histogram must be an even multiple of 0.1 mils.
147	>Number of ranges -- DO NOT CHANGE THIS VALUE: 0 to 4	1 string	c	
148	4	1 integer	l	
149	>Ranges (mils --> use even integers)	1 string	c	You must set 5 segments (0,1,2,3,4) for the ISOgraph Y axis
150	4,10,20,30,40	5 singles	l	These values are the range of high thickness to low thickness shown on the ISOgraph, depending on the difference between the target value and the high or low limit, The scaling of the bar meter also depends on what fraction of the ISOgraph you want deviation to fill [see line 151/152 below] The program autoscales the ISOgraph to make sure that the full scale deviation is greater than the difference between the high (or low limit) and the target multiplied by the factor in line 152
151	>Fraction of the Y axis filled by the high and low limit lines	1 string	c	This value controls how much of the ISOgraph will be filled by deviation region Adjust this number to make the graph give "good" information. E.g. the bigger the likely deviations, the smaller this value should be. [Reducing this value means more of the deviation values will be on the graph, rather than off scale at the top or bottom of the graph.]
152	.74	1 single	l	Fraction of the Y axis filled by the high and low limit lines The default value of 0.74 insures that the limit lines are always on the graph as long as the minimum ISOgraph range is 4.0 or more The main program checks this value and keeps it between 0.25 and .80 This variable also affects the deviation bar meter and the Main Screen histogram
153			b	
154	>Scale for the ISOgraph X axis (feet --> use hundreds)	1 string	c	
155	500	1 single	l	This value determines the initial scaling of the X axis of the ISOgraph (e.g. 500 feet). In the "Detail" mode the graph will display twice this number of feet. The minimum value for this parameter is 100 feet, and the program always rounds the number in this Parfile to a multiple of 100 feet.
156			b	

157	>Length offset (feet -- must be positive)	1 string	c	Offset for the coil length -- This is the distance from the encoder to the measuring heads. The offset must always be positive (if the offset in the Parfile is negative the program uses the absolute value). This value is added to the coil length at the start of a new coil. The ISOgraph will show no data (a horizontal line) from length 0 to this value plus the normal "settling time" allowed by the program at the start of a coil. The program displays thickness readings for the length of coil between the gauge heads and where the encoder is located, but no data is saved for these readings because there are no counts from the encoder.
158	>(Distance from the encoder to the measuring heads)	1 string	c	This deals with the case where the encoder is placed after the gauge location When a data gathering begins for a coil (when the Report Control button is clicked on the Main Screen) the length is initially set equal to the value of this offset.
159	0	1 single	l	
160			b	
161	>Tach noise filter	1 string	c	Filter to eliminate tach noise -- maximum length difference between readings (every 0.25 sec) This allows us to eliminate bursts of noise that can produce faulty length readings on the graphs and reports and distort the graphs. A long horizontal line on the ISOgraph is usually produced by a burst of noise on the tach wiring.
162	>Maximum delta length per second (feet)	1 string	c	The value must always be positive. The value shouldn't be too small, or real data may be eliminated. It shouldn't be too large or the filter won't be effective. Choose a value that is about 2 to 3 times the maximum distance that might be recorded in 0.25 seconds
163	100	1 single	l	
164			b	
165	>Profile Graph: inches from the edge for the first reading	1 string	c	Inches from the edge for the first measurement in the profile display
166	2	1 single	l	This should be set to correspond to where the center of the measuring heads are relative to the strip edge when the heads are stopped at the strip edge
167			b	
168	>Coil Mapping option [0=not present 1=present] and report path	1 string	c	This variable tells the program if the coil mapping option is present. (Coil mapping terminals loaded with the proper data are required for coil mapping to function correctly regardless of the setting of this variable.) Coil mapping is enabled or disabled on the Defect Menu
169	0,"C:\AGT400\CoilMap1\"	1 integer, 1 string	l	Enable/Disable and the path for the coil mapping reports If Coil Mapping is present and enabled a report that can be read by Microsoft Excel is written to this path
170	>Coil Mapping COM port [1 or 2 or ... etc]	1 string	c	
171	2	1 integer	l	The serial port (COM port) that is used for I/O with the coil mapping terminals
172	>Coil Mapping offsets (feet) [distance from the inspect to the encoder]	1 string	c	The coil mapping offset is in feet, and is subtracted from the distance when determining the location of defects. The index (1 or 2) directs us to the coil mapping terminals unit for top or bottom.
173	> [if the inspector is before the encoder the offset should be negative / positive if after]	1 string	c	These values may be positive or negative
174	> Unit 1 / Unit 2	1 string	c	This value is subtracted from the distance when determining the location of defects.
175	25,25	2 singles	l	2 values must be supplied, even if there is only one coil mapping terminal
176	>Pre-set port offsets in feet for 5 port locations [MUST HAVE 5 VALUES]	1 string	c	These are the offsets, in feet, for up to 5 port locations

177	0,20,40,60,80	5 singles	l	These allow the user to change the offset from the coil mapping terminal without stopping the program and changing the ParFile. This might be used when the system is wired to allow the inspector to plug in the coil mapping terminals at several different locations. When the program detects a change in the offset value it automatically assigns it to the Top or Bottom unit that made the change. NOTE: 5 offsets must be present in the Parfile, regardless of how many ports there actually are. To see any of the values stored for the Port offsets press "Clear", then ">Port" then a zone key (1 to 5). The first line will show ">Port >Zn". Then press "Send". The computer will send back ">Port >Zn" on the first line, and "Offset +xx ft" on the second line. The cursor will be placed after the ">Port >Zn " string on the first line, ready for input. To change the value for the Port offset of unit 1 or unit 2, press "Clear", then ">Port" then a zone key, then "End", then "Send". The computer will change to the new value of the offset and send back the opening screen message "AGT400 Coil Mapping", "Unit Number 0n", Unit Name, "Offset +xx ft ". This new data will be written out into the ParFile. When the offset changes a message is displayed on the Main Screen message center showing the unit and the new offset value.
178	>Coil Mapping unit names (English) Unit 1 / Unit 2	1 string	c	
179	"Top","Bottom"	2 strings	l	These are the names in English and Spanish that will appear on the coil mapping reports and the displays on the coil mapping terminal
180	>Coil Mapping unit names (Other) Unit 1 / Unit 2	1 string	c	
181	"Alto","Bajo"	2 strings	l	
182			b	
183	>Beam obstructions [0=not present 1=present]	1 string	c	
184	>This variable is for dealing with slotted slitter tables	1 string	c	This variable lets us deal with obstructions in the beam such as those caused by a slotted slitter line table When the variable is set to a value other than zero the "stop at on-sheet edge" logic is disabled in the frame motion subroutine. Set this parameter = 0 if there is no obstruction (the normal case). Set it = 1 if there is an obstruction
185	0	1 integer	l	
186			b	
187	*** Parameters primarily set in the program (all in English Units)	1 string	h	This section describes the setup for items set primarily from screens controlled by the line operator or by maintenance
188	> ---------------------------- (thicknesses in mils = .001 inch)	1 string	c	
189			b	
190	>Units [1 = Metric units 0=English units]	1 string	c	
191	0	1 integer	l	Sets English or Metric units. When program is started again this setting is maintained. Entered on the System Setup Screen
192			b	
193	>Time Format Type [0=AM/PM 1=24 hour]	1 string	c	
194	0	1 integer	l	Sets 12 hr+AM/PM or 24 hr format for time outputs. When program is started again this setting is maintained Entered on the System Setup Screen
195			b	
196	>Date Format Type [0=mm-dd-yy 1=dd-mm-yy]	1 string	c	
197	0	1 integer	l	Sets date format. When program is started again this setting is maintained Entered on the System Setup Screen
198			b	
199	>Printer [1=on 0=off]	1 string	c	

200	0	1 integer	I	Sets Printer On/Off. When program is started again this setting is maintained If the printer is set to "On" the reports are automatically printed at the end of the coil or shift Entered on the Main Screen
201			b	
202	>ISOgraph format [1=full coil 0=detail]	1 string	c	Sets ISOgraph format. When program is started again this setting is maintained When the ISOgraph is in Full Coil format the entire graph is displayed from the beginning of the coil to the present. When the plot reaches the right edge of the X-axis the scale of the graph is doubled. At the end of the coil the ISOgraph is re-scaled to fill as much of the graph as possible. When the ISOgraph is in Detail format it shows the most recent footage. The length shown is twice the distance entered on line 155. When the plot reaches the right edge of the X-axis the graph shifts to the left by the length shown on line 155. Entered on the Main Screen
203	1	1 integer	I	
204			b	
205	>Auto Data Gathering [1=enabled 0=disabled]	1 string	c	Auto Data Gathering is enabled on the Special Functions Screen
206	0	1 integer	I	If Auto Data Gathering is enabled the Report Control button on the Main Screen is disabled. The program looks at Auxiliary Digital input #1 on the multi-function board and gathers data according to the information on lines 81, 82 and 87 above. Normally the signal on Auxiliary Digital input #1 is zero (set to ground). When this signal becomes a one (+5 volts) the program begins gathering data as though the Report Control button has been pushed. If the value of input 1 (the second item on line 87 above) is =1 the shutter will open and data gathering begins. When the signal becomes a zero (ground, 0 volts) again the data gathering stops and the shutter closes. If the value of input 1is = 2 the frame will also start to oscillate. The frame will be retracted at the end of the coil
207			b	
208	>Auto Next Coil Data Entry [1=enabled 0=disabled]	1 string	c	Auto Next Coil Data Entry is enabled on the Special Functions Screen
209	0	1 integer	I	If Auto Next Coil Data Entry is enabled the program looks at Auxiliary Digital input #2 on the multi-function board and transfers data from the Next Coil Data file to the Main Screen according to the information on line 84 and 87 above Normally the signal on Auxiliary Digital input #2 is zero (set to ground). When this signal becomes a one (+5 volts) data from the Next Coil Data file is transferred
210	>Path and Filename for Next Coil text data	1 string	c	
211	"C:\AGT400\","AGTNEXT2.TXT"	2 strings	I	The folder where the Next Coil data file (a text file) will be found. And the name of the file with its extension (must be a *.txt file) The folder is usually the C:\AGT400 folder. However on a system connected to a network it may be easier to have the Next Coil data file appear in a network folder If the program does not find a file with the name specified here it creates a file with the default name "AGTNext2.txt" This information is entered only in the Parfile
212			b	
213	*** Product(0) Name (2 languages) & Density	1 string	h	Heading for the "Product" information that appears on the "Product Menu" screen
214	"Steel","<--->","Acero"	3 strings	I	The name of "Product 0" the default product. This product can be renamed, but not removed from the product list

#	Content	Type	Flag	Description
215	.284	1 single	I	Te density of "Product 0" in pounds per cubic inch. If the user chooses Metric units the density will be displayed in the Product Menu in gm/cm^3. However, in the Parfile the density is always in lbs/in^3 (the "native" units of the Parfile are English units) The Gain, Zero, and Density values for Product 0 cannot be changed in the program The Gain and Zero are always 1.0 and 0.0 respectively. The Density for Product 0 is set only in the Parfile
216	>Number of Product Types (must be >0 and <=11) 1 to	1 string	c	NOTE: THIS IS A TYPOGRAPHICAL ERROR IN THE PARFILE THE ACTUAL MAXIMUM NUMBER OF PRODUCTS IS 25 NOT 11
217	14	1 integer	I	The number of product type in the table in addition to "Product 0". DO NOT CHANGE THIS NUMBER IN THE PARFILE. The program writes out the correct value and reads it back in. †The default value for this entry is 3
218	>Data Table: Name (2 languages) --> Gain Zero Density	1 string	c	The table of product information follows below
219	"Galvanize G90","<--->","Galvanizado G90",1,0,.284	3 strings, 3 single	I	For each product there in entry with the Product name in English, a separator arrow string "<--->", the Product name in Spanish, the "Gain" value, the "Zero" value, and the density for that product (in lbs/in^3) Gain values must be between 0.001 and 15.0 [Normally the Gain & Zero are set by Zero values must be between +30.0 and -30.0 the spin bars on the Product Menu] Density values must be between .05 and .75 lbs/in^3 (1.38 gm/cm^3 to 20.7 g/cm^3)
220	"Galvanize G60","<--->","Galvanizado G60",1,0,.284	"	I	The calculation of the thickness for a product other than product 0 is done in the following way:
221	"Other","<--->","Otro",1,.24,.284	"	I	1. The thickness is first calculated as though the product was Product 0, t_0
222	"04","<--->","04",1,0,.284	"	I	2. The thickness for the actual product selected is then calculated using:
223	"05","<--->","05",1,0,.284	"	I	$t = Gain \times t_0 + Zero$
224	"06","<--->","06",1,0,.284	"	I	The Zero value is usually = 0.00 except for coated products
225	"07","<--->","07",1,0,.284	"	I	The Gain value will be greater than .284 lbs/in^3 for metals that are denser or more absorbing than steel (e.g. copper)
226	"08","<--->","08",1,0,.284	"	I	The Gain value will be less than .284 lbs/in^3 for metals that are less dense or less absorbing than steel (e.g. aluminum)
227	"09","<--->","09",1,0,.284	"	I	In this example there are 14 entries in the product table beyond Product 0, as indicated by the entry on line 217 †The default table of products has only 3 entries
228	"10","<--->","10",1,0,.284	"	I	
229	"11","<--->","11",1,0,.284	"	I	
230	"12","<--->","12",1,0,.284	"	I	
231	"13","<--->","13",1,0,.284	"	I	
232	"14","<--->","14",1,0,.284	"	I	
233			b	
234	*** Defect(0) Name (2 languages)	1 string	h	Heading for the "Defect" information that appears on the "Defect Menu" Screen
235	"None","<--->","Ninguno"	3 strings	I	The first Defect name entry in this section cannot be changed by within program. It is the name for the "no defect" message shown on the Main Screen when there is no defect
236	>Multiple Defect Name (2 languages)	1 string	c	
237	"Multiple Defects","<--->","Defectos Multiplos"	3 strings	I	The second Defect name entry in this section cannot be changed by within program. It is the name for the "multiple defects" message shown on the Main Screen when there are multiple defects present
238	>Number of Defect Names (must be >1 and <=26) 2 t0	1 string	c	

239	24	1 integer	I	The number of entries in the product list. DO NOT CHANGE THIS NUMBER IN THE PARFILE. The program writes out the correct value and reads it back in. This number is equal to the number of products displayed on the defect menu + 1 (The data array has a number of locations equal to the number of products displayed on the defect menu + 2. It goes from 0 to the value shown on line 239) The extra 2 names in the array (compared to what is shown on the defect menu) are the no defects case and the multiple defects case
240	>Defect Names (2 languages)	1 string	c	
241	"Rust","<--->","Oxidacion"	3 strings	I	For each defect there in entry with the Defect name in English, a separator arrow string "<--->", the Defect name in Spanish
242	"Scratches","<--->","Rayas"	3 strings	I	
243	"Pin Holes","<--->","Agujeros"	3 strings	I	
244	"Skid Marks","<--->","Marcas patinazos"	3 strings	I	
245	"Wavy Edges","<--->","Bordes ondulados"	3 strings	I	
246	"Laminations","<--->","Laminacion"	3 strings	I	
247	"Oil","<--->","Aceite"	3 strings	I	
248	"Scale","<--->","Modura"	3 strings	I	
249	"Mill Edges","<--->","Bordes malos"	3 strings	I	
250	"Other","<--->","Otro"	3 strings	I	
251	"D11","<--->","D11"	3 strings	I	
252	"D12","<--->","D12"	3 strings	I	
253	"D13","<--->","D13"	3 strings	I	
254	"D14","<--->","D14"	3 strings	I	
255	"D15","<--->","D15"	3 strings	I	
256	"New defect 16","<--->","New defect 16"	3 strings	I	
257	"D17","<--->","D16"	3 strings	I	
258	"D18","<--->","D17"	3 strings	I	
259	"D19","<--->","D18"	3 strings	I	
260	"New defect 20","<--->","New defect 20"	3 strings	I	
261	"D21","<--->","D21"	3 strings	I	
262	"D22","<--->","D22"	3 strings	I	
263	"Spot Defect","<--->","Defecto Instante"	3 strings	I	The final entry in the Defect list is also a special entry. It cannot be removed from the list. It is used for the "Spot" or "Instant" defect in coil mapping. The spot defect is activated by pushing the "F2" button on the coil mapping terminal. It is turned off by pushing F2 again.
264			b	
265	>Coil mapping [0=disabled 1=enabled]	1 string	c	
266	0	1 integer	i	This variable tells the program if coil mapping is enabled or disabled. In order for coil mapping to work the variable in line 169 above must indicate that coil mapping present (line 169 = 1, "Path") Entered on the Defect Menu
267			b	
268	*** Number of Nomenclature Items -- DO NOT CHANGE THIS VALUE: 1 to 9	1 string	h	Heading for the "Nomenclature" data entered on the Nomenclature Screen
269	9	1 integer	I	There are 9 nomenclature items. DO NOT CHANGE THIS NUMBER IN THE PARFILE. The program writes out the correct value and reads it back in.
270	>Nomenclature Names (2 languages)	1 string	c	The nomenclature items give the headings on the Main Screen data entry area and on the reports for job number, coil number, shift, etc. The Nomenclature Screen allows the user to have his own terminology for things like "Job Number". The user may prefer "Work Order". For "Shift" the user may prefer the word "Turn"

271	"Job","Number","<--->","Numero de","Lote"	5 strings	l	Two separate strings are used for each item in English, a separator arrow string "<--->", followed by 2 separate strings in Spanish
272	"Coil","Number","<--->","Numero de","Rollo"	5 strings	l	All lines must have 5 strings even though some items entered on the Nomenclature Screen only have 1 text box (e.g. "Shift")
273	"Customer","Number","<--->","Numero de","Cliente"	5 strings	l	
274	"Coil","Information","<--->","Datos de","Rollo"	5 strings	l	NOTE: changing the nomenclature in English does not change the Spanish entries
275	"Width","","<--->","Anchura",""	5 strings	l	To change the Spanish the user must go to the Special Functions Screen, select Spanish,
276	"Supplier","","<--->","Vendador",""	5 strings	l	then return to the Nomenclature Screen and enter the Spanish data
277	"Shift","","<--->","Turno",""	5 strings	l	
278	"Coil Summary","Report","<--->","Informe de","Rollo"	5 strings	l	
279	"Shift Summary","Report","<--->","Informe de","Turno"	5 strings	l	
280			b	
281	*** System Setup Data	1 string	h	Heading for the section with data entered mostly on the System Setup Screen
282	>Target Mode[1=halfway 2=target +/- 3=target +/-% 4=high:target:low]	1 string	c	
283	2	1 integer	l	Determines the method for setting the Target 1 = the high and low limits are entered and the target value is set halfway between the limits 2 = the target value is entered and the high and low limits are set up relative to the target in mils 3 = the target value is entered and the high and low limits are set up relative to the target as a % of the target 4 = the target value, high and low limits are all entered
284			b	
285	>Tach Mode ['Internal' or 'External'] and Internal Ticks	1 string	c	This parameter determines how the program computes the coil length. The normal setting is "External". For this setting the program reads the counts from the tachometer and converts this number to a length. The backup setting is "Internal" and is used when the tachometer is out of service for any reason, or if the program is used in the "Demo" or "Off-Line" mode when there is no tachometer. Using Internal allows the program to function even without the tachometer. However, when "Internal" is used the length reported by the program is meaningless, and even the average thickness may not be accurate, since the average thickness is calculated as a length-weighted average. (Usually, if the processing line is running smoothly, at fairly constant speeds the average thickness will be close to the true value.)
286	"External",600	1 string, 1 integer	l	The number of internal ticks determines the scaling of the ISOgraph when Internal mode is used. 600 is a recommended value for internal ticks. This value gives a simulated footage of about 1000 ft/min for a 12 inch diameter tach roll.
287			b	
288	>Time Constant (msec) and Maximum Time Constant (msec)	1 string	c	
289	100,1000	2 integers	l	The time constant in use and the Maximum Time Constant permitted (both expressed as an integer number of milliseconds). The time constant in use must be 10 milliseconds or more. It is recommended that this number always be a multiple of 10. The Maximum Time Constant permitted is 1000 (2000 msec = 2 seconds). If a value over 2000 is entered for the maximum time constant the program will reduce the value to 1000 The Maximum Time Constant is entered only in the Parfile, not in the program
290			b	
291	>Auto Time Constant Enable [1=enabled 0=disabled]	1 string	c	Enable or disable the Auto Time Constant Feature according to the table of thicknesses and time constants on lines 297 to 300
292	>(sets the time constant as a function of target thickness if enabled)	1 string	c	

293	0	1 integer	I	Enabled or disabled on the System Setup Screen
294	>Thicknesses (mils)& Time Constants (msec)	1 string	c	This table is entered only in the Parfile
295	>use the time constant from the setup screen up to the 1st thickness	1 string	c	In this example
296	>use the time constant in this table above the thickness in the table	1 string	c	The time constant from the Setup Screen (e.g. 50 msec) is used for targets <100 mils 100 msec is used for targets = 100 mils and <180 mils 150 msec is used for targets = 100 mils and <250 mils 250 msec is used for targets = 250 mils and <500 mils 300 msec is used for targets >= 500 mils The Auto Time Constant feature allows the user to be aggressive in setting the time constant low at the smaller thicknesses, knowing that it will automatically increase (and keep the noise level down) at the larger thicknesses. This is an excellent strategy, since the line is uusually moving faster at low thickness, when more spatial resolution is important (good spatial resolution is achieved with a low time constant). For thicker material the line is moving more slowly, and good spatial detail can be achieved even with a longer time constant. If Auto Time Constant is on then the Diagnostics Screen will use the longest time constant in the table when gathering data for an ISOcal, etc. This may slow down the data gathering unnecessarily. To speed things up turn off Auto Time Constant before using the Diagnostics Screen (but remember to re-enable it after you are finished with the Diagnostics Screen.)
297	100,100	2 integers	I	Thickness, time constant
298	180,150	2 integers	I	"
299	250,250	2 integers	I	"
300	300,500	2 integers	I	"
301			b	
302	>C-Frame Present [0=manual 1=oscillating 2=electric]	1 string	c	
303	0	1 integer	I	If this value is set to "0" (Manual) and no C-frame is present the 3 Main Screen buttons for moving the frame are disabled. If this value is set to "2" (Electric) the "Oscillate" button on the Main Screen is disabled
304			b	
305	>Shutter Timer Code [1=enabled 0=disabled] Type [1=photocell 0=thickness]	1 string	c	This is a safety feature that closes the shutter after a specified number of cycles through the program if the program decides that the gauge heads are not over the strip
306	1,0	2 integers	I	The first input determines if this feature is activated. The second feature determines if the program will make its decision based on signals from the photocells or a reading of a thickness close to zero. If the decision is made based on thickness, it uses the value of the minimum thickness measured (entered in line 436 below)
307	>Shutter Timer Limit Cycles (~0.25 sec/cycle)	1 string	c	

308	120		1 integer	I	This is a safety feature of the AGT400. The number of cycles set for the shutter timer limit determines how many readings (at about 0.25 seconds per reading) with no strip or sample in the beam are needed before the shutter is closed. In this example 120 off strip readings (about 30 seconds) will close the shutter. The "native" unit of the AGT400 program is program cycles, not seconds. This might confuse the gauge users, so the text box on the Setup Screen asks for seconds. The program converts from seconds to cycles for use in the Parfile and other places in the program. The actual number of seconds may be up to 25% longer than the time entered on the System Setup Screen. A time of not less than 30 seconds is recommended for this entry. A single on-strip reading will reset the counter that records the number of off-strip readings.
309				b	
310	>Pulses/Revolution & Roll Diameter (inches) & Minimum Coil Length (ft)		1 string	c	These variables provide the calibration for tachometer between pulses per revolution and the length of strip that has passed over the roll on which the tach is mounted The software corrects for the factor of 2 division on the multifunction board, so the change in the counter reading on the diagnostic display agrees with the tach output
311	300,12,50		3 integers	I	The minimum coil length reduces the number of short coils recorded. It should be set to a length somewhat shorter than the shortest coil expected on the line
312				b	
313	>Company Name and Machine Name		1 string	c	
314	"ABC Steel Company","48 Inch Slitter"		2 strings	I	Company name and the processing line (machine) name
315				b	
316	>Screen Color		1 string	c	
317	16776960		1 integer	I	This code saves the background color for the Main Screen. This variable is a long integer, and should never be set in the Parfile
318				b	
319	>Shift Start Times: 1 2 3 [hh:mm]		1 string	c	
320	"07:00","15:00","23:00"		3 strings	I	The shift start times must be in 24 hour time format. Three shift times must be entered, even if the plant only runs one or two shifts. E.g. if you are running only one shift from 6:30 AM to 4:00 PM, enter 06:30, 16:00, and any other time, 16:55. For the two shifts that you are not running, no data will be stored, and no shift reports will be produced for shifts 2 and 3.
321	>Shift messages enabled [1=enabled 0=disabled] shifts: 1 2 3		1 string	c	
322	1,1,1		3 integers	I	If the plant runs less than 3 shifts or no shift summary is needed for a particular shift set these input parameters to zero for shift 1, shift 2, or shift 3
323				b	
324	>Source Head Switch Check Code [1=enabled 0=disabled]		1 string	c	
325	1		1 integer	I	This is a safety feature. If the program finds that the actual switch readings don't agree with the condition expected it will give the operator a message. E.g. when the shutter has been commanded to the "Open" position the shutter open switch reading should be a "1" and the shutter closed reading should be a "0". If this is not the case we begin to count cycles. A single good reading resets the counter to zero.
326	>Cycles of delay before message is displayed (~0.25 sec/cycle)		1 string	c	

327	20	1 integer	I	The number of consecutive system cycles (at 0.25 sec) that the system must find before issuing a message that the source head switch positions don't agree with the system commands. Usually you would want this feature enabled. But, sometimes the shutter and samples are in the correct position and the switches, or the optoisolators are not working properly. We can disable the check by setting this value = 0 as a temporary solution until the switches or optoisolators are repaired. This variable should be set to about 20. This means the switches must read incorrectly for about 5 seconds before we get the message. In practice it may take up to 25% longer
328			b	
329	>Enable Language Options [1=enabled 0=disabled]	1 string	c	This parameter is set only in the Parfile, not in the program. If it is set to zero the languages cannot be changed in the program (they can still be changed in the Parfile.) If this variable is set to zero the frame on the Special Functions screen that has the language options does not appear.
330	1	1 integer	I	
331	>Language for Screen Displays [0=English 1=Spanish]	1 string	c	Set on the Special Functions Screen. The screens may have a language that is different from the reports.
332	0	1 integer	I	
333	>Language for Reports [0=English 1=Spanish]	1 string	c	Set on the Special Functions Screen
334	0	1 integer	I	
335			b	
336	*** Number of Report Setup Items -- DO NOT CHANGE THIS VALUE: 0 to 17	1 string	c	Heading for the section with data for the Coil Report entered on the Report Setup Screen
337	17	1 integer	I	DO NOT CHANGE THIS NUMBER IN THE PARFILE. The program writes out the correct value and reads it back in.
338	>Description & Code [1=enabled 0=disabled]	1 string	c	
339	"Length vs tolerance ",1	1 string, 1 integer	I	The text strings in this section are written out by the AGT400 program. The strings here correspond to the text on the Report Setup Screen
340	"Standard deviation ",1	1 string, 1 integer	I	
341	"Min/Max Thickness ",1	1 string, 1 integer	I	
342	"Control Limits ",1	1 string, 1 integer	I	
343	"CR ",1	1 string, 1 integer	I	
344	"CP/CPK ",1	1 string, 1 integer	I	
345	"TMW ",1	1 string, 1 integer	I	
346	"Histogram ",1	1 string, 1 integer	I	
347	"Product Distribution",1	1 string, 1 integer	I	
348	"ISOgraph ",1	1 string, 1 integer	I	
349	"Supplier ",1	1 string, 1 integer	I	
350	"Profile Graph ",0	1 string, 1 integer	I	
351	"Defect Report ",0	1 string, 1 integer	I	

352	"Shift Report ",0	1 string, 1 integer	l	This item is enabled at the top of the list of Shift Report Items on the Report Setup Screen. If this value is "1" Shift Reports will be created for printing if the "Printer" button is "on" (yellow) on the Main Screen. If it is "0" Shift Reports will not be printed even if the Printer button is on. THIS ITEM IS IN THIS SECTION (rather than the Shift Report section that begins on line 358) to maintain backward compatibility between version 2.4i and earlier versions. (Customizing the Shift Report was added in version 2.4i)
353	"Coil Report ",1	1 string, 1 integer	l	This item is enabled at the top of the list of Coil Report Items. If it is "1" Coil Reports will be created for printing if the "Printer" button is "on" (yellow) on the Main Screen. If it is "0" Coil Reports will not be printed even if the Printer button is on.
354	"Clock Time ",1	1 string, 1 integer	l	
355	"Coil Mapping Data ",0	1 string, 1 integer	l	
356	"Reverse Defect Print",0	1 string, 1 integer	l	
357			b	
358	*** Number of Shift Summary Setup Items -- DO NOT CHANGE THIS VALUE: 1 to 9	1 string	c	Heading for the section with data for the Shift Report entered on the Report Setup Screen
359	9	1 integer	l	DO NOT CHANGE THIS NUMBER IN THE PARFILE. The program writes out the correct value and reads it back in.
360	Note: Turn the shift report 'On' or 'Off' with the 'Shift Report' variable above		c	
361	>Description & Code [1=enabled 0=disabled]		c	Enabling or disabling these items allows the user to customize the Shift Summary Report to the practice followed in that company, showing only items that will be useful to them. The text strings in this section are written out by the AGT400 program. The strings here correspond to the text on the Report Setup Screen
362	"End Time ",0	1 string, 1 integer	l	The program will print either the End Time or the Run Time, but not both
363	"Run Time ",1	1 string, 1 integer	l	
364	"RBar ",1	1 string, 1 integer	l	
365	"High/Low Limits ",1	1 string, 1 integer	l	
366	"High/Low Lengths ",1	1 string, 1 integer	l	The program will only print the lengths if the limits are enabled (line 365)
367	"Tach mode ",0	1 string, 1 integer	l	
368	"Product ",0	1 string, 1 integer	l	
369	"Supplier ",0	1 string, 1 integer	l	
370	"Head/Tail Scrap ",0	1 string, 1 integer	l	
371			b	
372	>Number of Report Copies to be printed	1 string	c	
373	1	1 integer	l	The program checks this value and limits it to a number between 1 and 3
374	>Profile Graph Style [0=single 1=average 2=both]	1 string	c	
375	0	1 integer	l	0 = print the last profile only, 1 = print the average profile only, 2 = print the last profile and the average profile
376	>ISOgraph Overlay [0=none 1=analog channel 1 2=analog channel 2]	1 string	c	

377	0	1 integer	I	The program will check this value to make sure the corresponding analog input channels are present and enabled (lines 89 to 111). AT THE END OF THE COIL (not while data is being gathered) this data is overlaid on the ISOgraph displayed by the AGT400 program and is printed on the Coil Report.
378	>Report Color [0=color 1=black only]	1 string	c	
379	0	1 integer	I	The report will print in color if this value is zero. For any other value the report will print in black only. This feature was added for cases where the user will be copying the reports on copiers that don't copy blue or green lines.
380			b	
381	>Exclude 'outliers' >3 standard deviations in average 1=yes 0=no	1 string	c	
382	1	1 integer	I	Enter a "1" here to exclude thickness data values that are more than 3 standard deviations from the average value. This is a statistically valid method of rejecting data points that may have some unusual outside influence (e.g. noise bursts)
383	>Exclude footage at start/end of coil in average 1=yes 0=no	1 string	c	
384	0	1 integer	I	Enter a "1" here to exclude data at the start and end of a coil. Readings at the start and end of the coil may not be representative of the body of the coil, or they may be bad (e.g. if the passline for the head or tail of the coil is not properly controlled). The head and tail data is excluded only in the calculation of the average thickness. It is still shown on the ISOgraph. The distance omitted is half the "minimum coil length" entered on the System Setup Screen (line 311)
385			b	
386	*** Calibration Data	1 string	c	Heading for the calibration data section Much of this data is measured or calculated by the program Only the nominal thicknesses of the external calibration samples are routinely entered on the Manual Calibration screen. The tolerances for the internal samples are calculated by the AGT400 program, but the calculations can be overridden and entered here. (The tolerances for the internal samples can also be entered on the System Setup Screen.)
387	----------------	1 string	c	Note that no commas or tabs are used in comment lines in the Parfile Commas and tabs are read as "end of field" markers by the AGT400 program. All comment lines are treated as a single string.
388	>A/D Values -- Measured : Nominal : Previous	1 string	c	Lines 390 to 394 each contain 3 A/D readings The "measured" value is first recorded during the External Calibration but may be modified during an ISOcheck, ISOcal, or AutoComp The "nominal" value is the value recorded for shutter closed, air, etc. at the end of the External Calibration The "previous" value is first recorded during the External Calibration, but may be modified during an ISOcheck, ISOcal or AutoComp. The previous value allows us to revert to a previously correct calibration if an error occurs during ISOcheck, ISOcal or AutoComp. This data may also be useful in diagnosing unusual changes in the A/D values for shutter closed, air, etc. between the date of the most recent external calibration and the current date.
389	>for Shutter Closed : Air : Sample1 : Sample2 : Sample3	1 string	c	In this example the "measured" values are the default values used by the AGT400 program. They are fairly typical of what is seen in practice. The "nominal" and "previous" values are typical values rather than the default values.
390	100,95,94	3 integers	o	Shutter Closed values
391	60000,59928,59907	3 integers	o	Air values
392	14650,14612,14612	3 integers	o	Sample 1 values

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393	3350,3347,3349	3 integers	o	Sample 2 values
394	900,899,899	3 integers	o	Sample 3 values
395			b	
396	>Thickness Values -- Measured : Nominal : Previous : Tolerance (mils)			Lines 398 to 401 each contain 4 thickness values in mils The first 3 thickness values are the "measured", "nominal", and "previous" readings described above. The fourth value is the tolerance limit on the air, sample 1, etc. The tolerance values are automatically calculated on the Manual Calibration Screen, or are entered on the System Setup Screen. The minimum tolerance in mils and in percent is set on line 127. The minimum tolerance for any internal sample must be larger than the greater of the minimum tolerance in mils or the minimum tolerance percent.
397	>for Air : Sample 1 : Sample 2 : Sample 3	1 string	c	In this example the "measured", "nominal" and "previous" values are typical values rather than the default values.
398	0,0,0,.2	3 singles	o	Air values
399	61.2,60.21,60.2,.3	3 singles	o	Sample 1 values
400	126,124.31,124.3,.62	3 singles	o	Sample 2 values
401	188,185.71,185.7,.93	3 singles	o	Sample 3 values
402			b	
403	>Wait Time Counter Limit Min and Max Cycles (~0.25 sec/cycle)	1 string	c	The use of a "Wait Counter" allows the system to "settle down" before gathering data. It includes time for the shutter and samples to physically move into place, and the digital filters in the program to respond fully to a change in the input signal. The Wait Counter is used when the shutter is first opened on the Main Screen, for AutoComp on the Product Menu, for Data gathering, ISOcheck, and ISOcal on the diagnostic screen, and on the Calibration Screen.
404	>(the minimum and maximum delays before we start taking readings)	1 string	c	The Wait Time Counter Lim Min is the minimum number of system cycles that the system waits before starting to take readings. The Wait Time Counter Lim Max is used to scale how much waiting time there is, an it is particularly important with longer times constants, when the time constant approaches the length of the data gathering interval (0.25 seconds, 250 msec). When the time constant in use is equal to the data gathering interval the waiting time (in program cycles of about 0.25 sec) is equal to the Wait Time Counter Lim Max. Longer time constants may cause the program to increase the waiting time to a value larger than the value entered here.
405	6,20	2 integers	I	NOTE: the Wait Time Counter Lim Min and Max are set only in the Parfile, not in the program
406	>Number of readings used in Calibration & ISOcheck & Diagnostics & etc.	1 string	c	The number of readings used in gathering data on the Main Screen, for AutoComp on the Product Menu, for Data gathering, ISOcheck, and ISOcal on the diagnostic screen, and on the Calibration Screen. We recommend that this variable be set at about 20 to give a good sample, and minimize the effects of noise. Reducing this value will save a small amount of time, but it may increase the noise in the average that is calculated from these readings, making for a less reliable calibration, ISOcheck, etc. It is always better to have good statistical accuracy when there is no pressing need for fast response time
407	20	1 integer	I	
408			b	
409	>External Calibration Date and Time and Calibration File Name	1 string	c	Under normal circumstances the information in this section is not modified in the Parfile If under some unusual circumstance these values must be modified in the Parfile make sure to use the correct format for the date and time information

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410	"09-25-1999","01:00:00","AGTCal1(0901@0100).txt"	3 strings	o	These values are written out after the most recent external calibration †The default value of the Calibration File name is "", showing that there is no valid Calibration File
411	>ISOcal date and time	1 string	c	
412	"09-25-1999","02:00:00"	2 strings	o	These values are written out after the most recent ISOcal
413	>ISOcheck date and time	1 string	c	
414	"09-25-1999","03:00:00"	2 strings	o	These values are written out after the most recent ISOcheck
415	>Failed ISOcal Date and time and reason	1 string	c	
416	"","",""	3 strings	o	These values are written out after the most recent failed ISOcal This is important diagnostic information. It is printed out on the ISOcheck report.
417	>Failed ISOcheck Date and time and reason	1 string	c	
418	"","",""	3 strings	o	These values are written out after the most recent failed ISOcheck This is important diagnostic information It is printed out on the ISOcheck report.
419			b	
420	>Model type and current calibration constants: A1 A2 P1	1 string	c	These are the calibration constants
421	"Buildup Model"	1 string	o	To first order the relationship between the thickness and the measured signal detected is a declining exponential. In practice the relationship deviates slightly from an exponential. Achieving the highest possible accuracy in a thickness gauge depends on using the model that best describes the relationship. The AGT400 program uses the "Buildup Model" to deal with these second order effects. [It is possible to use a "Power Model". This would require modification of the program.] Details of the Buildup Model are described in another document. The Buildup Model uses 5 parameters -- the Shutter Closed reading, the Air reading, the A1 and A2 values given in this section, and a P1 value. The Shutter Closed reading and Air reading are measured directly during Calibration, during ISOcheck and ISOcal, and during AutoComp The A1 and A2 values are calculated from the external samples during External Calibration. They are adjusted during ISOcal using the internal samples. The P1 value is entered only in the ParFile, and should not be changed from the value given without proper supporting data. The A1 value is related to the linear absorption coefficient for the material being measured. For steel it should be approximately 42.0. The A2 value varies, depending on the material being measured, the arrangement of the measuring heads, the details of the detector head, and the range of thicknesses being measured. The P1 value currently used is 0.78
422	43,475,.78	3 singles	o	The values of A1, A2, P1 currently in use
423			b	
424	>Nominal values of calibration constants: A1 A2 P1	1 string	c	
425	42.30855,627.7186,.78	3 singles	o	The nominal values of A1, A2, P1 are determined by the most recent external calibration The default values for these parameter are equal to the default values on line 422
426	>Nominal values of average deviation and average % deviation	1 string	c	
427	1.512833E-02,1.361953E-02	2 singles	o	The values of the average deviation (in mils) and average percentage deviation between the external sample thicknesses entered on the Manual Calibration Screen and the thicknesses calculated by the AGT400 program using the best fit parameters, A1, A2, etc. determined when an external calibration was done. [NOTE: these are averages of the absolute value of the deviation and percent deviation, not standard deviations] The default values of the average deviation value = 0.1 and the average percent deviation = 0.1

428			b	
429	>Absolute maximum thickness measured (mils)	1 string	c	In this section the Maximum and Minimum thicknesses to be read by this AGT400 system are entered. While processing data for a coil of metal the program will reject measurements of thickness that fall outside this range; they are considered to be invalid ("bad") data. Reducing the Maximum thickness improves the performance of the system, subject to the considerations given below.
430	350	1 single	l	This is the maximum thickness that this AGT400 system will measure. This value cannot be more than 400.0. The program limits this value to 400.0; if a larger number is entered here the program automatically reduces it to 400.0 For systems that will only measure thinner material reducing this value will improve the performance. (The smaller the range of thicknesses the program has to measure over the more accurate it will be.) BUT NEVER MAKE THE MAXIMUM THICKNESS SMALLER THAN THE THICKNESS OF THICKEST SAMPLE USED IN THE EXTERNAL CALIBRATION OR THE SUM OF THE TWO INTERNAL SAMPLE THICKNESS (sample 3), OR SMALLER THAN THE MAXIMUM THICKNESS LIKELY TO BE MEASURED. The Maximum Thickness Measured is set only in the Parfile, not in the program
431	>Maximum calibration sample thickness entered (mils)	1 string	c	
432	240	1 single	o	This is the maximum external calibration sample thickness. It should always be less than the value in line 430. This value is set only in the Parfile, not in the program. The default value of the maximum calibration sample thickness is equal to the maximum thickness measured on line 430
433	>Maximum thickness checked by least squares fit (mils)	1 string	c	
434	350	1 single	l	This is the maximum thickness to which the least squares fitting routine in the Manual Calibration Screen will try to fit. BUT IF THIS VALUE IS LESS THAN THE VALUE OF THE THICKEST EXTERNAL CALIBRATION SAMPLE THE PROGRAM WILL CHECK UP TO THE THICKNESS OF THE THICKEST CALIBRATION SAMPLE. Reducing this value improves performance. This value should always be less than or equal to the value on line 430
435	>Minimum measured thickness (mils) [lower values are not stored]	1 string	c	Thickness measurements below this value made while gathering data for a coil are rejected.
436	2	1 single	l	This is the minimum thickness that will be measured by this gauge. It should be set close to, but not at, zero. The recommended value is 2.0 THIS VALUE IS THE THICKNESS USED BY THE SHUTTER TIMER safety feature to determine if there is no material between the source head and the detector head when that determination is made by "Thickness". See line 305 [The Shutter Timer feature may be controlled either by Thickness or by the Photocells that measure if the C-frame is over the strip] This value is set only in the Parfile, not in the program.
437			b	
438	>Number of External Calibration Samples: 1 to	1 string	c	
439	4	1 integer	l	This is the number of samples used in the most recent external calibration. Do not change this value unless you also add or delete values from the list of sample thicknesses shown below in lines 441 to 444
440	>Entered Values (mils)	1 string	c	These are the thickness values for the calibration samples entered on the Manual Calibration Screen. The program remembers the calibration samples so their thicknesses don't have to be re-entered if the calibration is repeated. The sample thicknesses in this list can be deleted, or have their thickness changed, or have samples added or deleted on the Manual Calibration Screen.
441	60	1 single	l	The AGT400 program automatically arranges the samples in order from thinnest to thickest

442	120	1 single	l	
443	180	1 single	l	
444	240	1 single	l	
445			b	
446	*** Power supply voltages -- nominal values and tolerances	1 string	h	Heading for the section with Power Supply data. The power supply values on lines 447 to 451 are typical values. The default values are zero for all the power supply voltages. This is the case before the first ISOcheck or ISOcal is performed. The default values for the tolerances as shown.
447	"Power Supply 1 ",13.28,.5	1 string, 2 singles	o	"12 V" power supply output & tolerance (e.g. +13.28 V +/- 0.5 V)
448	"Power Supply 2A",5.05,.1	1 string, 2 singles	o	5 V power supply
449	"Power Supply 2A",-15.03,.3	1 string, 2 singles	o	-15 V power supply
450	"Power Supply 2A",15.11,.3	1 string, 2 singles	o	+15 V power supply
451	"Power Supply 2A",-321.97,20	1 string, 2 singles	o	HV power supply (e.g. -321.97 V +/- 20 V)
452			b	
453	*** Spare Data Area	1 string	h	In AGT400 version v2.4i the spare data area is not used. It has been used in some previous versions
454	""	1 string	o	An output comment showing how the spares are used The variables may be either input or output, depending on how they are used
455	"","","",""	4 strings	I or o	4 string values
456	0,0,0,0	4 integers	I or o	4 integer values (+/- 32,767)
457	0,0,0,0	4 longs	I or o	4 long integer values (absolute values >32, 767)
458	0,0,0,0	4 singles	I or o	4 floating point (decimal) values (These may use exponential notation, e.g. 1.5128E-02)
459			b	
460	""	1 string	o	An output comment showing how the spares are used
461	"","","",""	4 strings	I or o	The variables may be either input or output, depending on how they are used
462	0,0,0,0	4 integers	I or o	
463	0,0,0,0	4 longs	I or o	
464	0,0,0,0	4 singles	I or o	
465			b	
466	""	1 string	o	An output comment showing how the spares are used
467	"","","",""	4 strings	I or o	The variables may be either input or output, depending on how they are used
468	0,0,0,0	4 integers	I or o	
469	0,0,0,0	4 longs	I or o	
470	0,0,0,0	4 singles	I or o	
471			b	These 2 blank lines at the end of the file are essential so that the AGT400 program reads
472			b	the Parfile correctly