**ADVANCED DATA ANALYSIS MONITOR** 

# **WM-100A**

# **USER MANUAL**



990-879 REV N

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Revision	EO	Date	Basis of Revision
А	31282	07/10	None. Development only, not released.
В	40824	12/10	None. Original edition.
С	40994	05/11	Additional instructions and clarifications.
D	41869	03/12	Added reference notes, updated screen changes.
Е	42582	07/13	Updated I/O schematics.
F	42861	11/13	Updated to Miyachi America name and logo.
G	43482	11/14	Updated to AMADA WELD TECH name and logo.
Н	43878	09/15	Updated to AMADA WELD TECH format.
J	44602	04/17	Miscellaneous Manual Corrections + updates
K	45821	04/22	See ECO for contents of change
L	46721	08/22	Update Dimensions on Data Processing Module
М	46825	12/22	Update Images to New Chassis

#### **Revision Record**

### Your New Advanced Data Analysis Monitor (WM-100A) Shipment Contains the Following Items:

Add Screen Resolution parameter

**1.** WM-100A Processing Module

46780

**2.** WM-100A Sensor Module

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- **3.** Computer Monitor & Mouse
- **4.** Ship Kit # 4-81198-01 which includes:

11/23

Amada Weld Tech Part Number	Description
205-339	A.C. Power Cords, Monitor, 1 each
205-129	A.C. Power Cord, Data Processing Module, 1 each
525-065	Power Supply, 85 – 265 VAC, 1 each
205-337	Shielded Data Cable, 100 pin D-Type, 1 each
205-338	Shielded Data Cable, 68 pin D-Type, 1 each
250-776	Connector 8 Position, 5.08 mm spacing, 2 each
250-781	Connector 14 Position, 5.08 mm spacing, 2 each
4-35670-01 / 4-35670-02	Voltage Pickup Cables (Standard / Power Supply)
MB-400K	Toroidal Coil, 1 each
250-829	Connector 16 Position, 5.08 mm spacing, 1 each
4-41912-01	USB Drive, WM-100A Operator Manual [990-879], 1 each

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# CONTACT US

Thank you for purchasing the Amada Weld Tech WM-100A Advanced Data Analysis Monitor.

Upon receipt of your equipment, please thoroughly inspect it for shipping damage prior to its installation. Should there be any damage, please immediately contact the shipping company to file a claim, and notify us at:

AMADA WELD TECH INC. 1820 South Myrtle Avenue Monrovia, California 91016-7133 Phone: (626) 303-5676 FAX: (626) 358-8048 E-mail: info@amadaweldtech.com

The purpose of this manual is to provide the information required for proper and safe operation and maintenance of the Amada Weld Tech WM-100A.

We have made every effort to ensure that information in this manual is both accurate and adequate. If you have any questions or suggestions to improve this manual, please contact us at the phone number or addresses above.

Amada Weld Tech is not responsible for any loss or injury due to improper use of this product.

# SAFETY NOTES



- **DEATH ON CONTACT** may result if you fail to observe all safety precautions. *Lethal voltages* are present in the Power Supply.
- *Never* perform any welding operation without wearing protective safety glasses.

This instruction manual describes how to operate, maintain and service the WM-100A, and provides instructions relating to its *safe* use. Procedures described in these manuals *must* be performed, as detailed, by *qualified* and *trained* personnel.

For *safety*, and to effectively take advantage of their full capabilities, please read these instruction manuals before attempting to operate weld heads and power supplies.

Procedures other than those described in these manuals or not performed as prescribed in them, may expose personnel to electrical shock or burn hazards.

After reading these manuals, keep them for future reference.

Please note the following conventions used in this manual:

**WARNING:** Comments marked this way warn the reader of conditions which might result in *immediate death or serious injury*.

**CAUTION:** Comments marked this way warn the reader of conditions which might result in damage to the equipment.

# LIMITED WARRANTY

#### GENERAL TERMS AND CONDITIONS FOR THE SALE OF GOODS

#### 1. Applicability.

(a) These terms and conditions of sale (these "**Terms**") are the only terms which govern the sale of the goods ("**Goods**") by Amada Weld Tech Inc. ("**Seller**") to the buyer identified in the Sales Quotation and/or Acknowledgment (as each defined below) to which these Terms are attached or incorporated by reference ("**Buyer**"). Notwithstanding anything herein to the contrary, if a written contract signed by authorized representatives of both parties is in existence covering the sale of the Goods covered hereby, the terms and conditions of said contract shall prevail to the extent they are inconsistent with these Terms.

(b) The accompanying quotation of sale (the "Sales Quotation") provided to Buyer, and/or sales order acknowledgement ("Acknowledgement") and these Terms (collectively, this "Agreement") comprise the entire agreement between the parties, and supersede all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. For clarification, after the Acknowledgement is received by Buyer, the order for Goods is binding and cannot be cancelled by Buyer for any reason and the full purchase price amount set forth in the Acknowledgement shall be due and payable by Buyer to Seller pursuant to the payment schedule set forth in the Acknowledgement unless otherwise agreed to in writing by Seller. All terms and conditions contained in any prior or contemporaneous oral or written communication which are different from, or in addition to, the terms and conditions in this Agreement are hereby rejected and shall not be binding on Seller, whether or not they would materially alter this Agreement. These Terms prevail over any of Buyer's terms and conditions of purchase regardless whether or when Buyer has submitted its purchase order or such terms. Fulfillment of Buyer's order does not constitute acceptance of any of Buyer's terms and conditions and does not serve to modify or amend these Terms. Notwithstanding anything herein to the contrary, all orders for Goods must be for a minimum purchase price of \$100 or such orders will be rejected by Seller.

#### 2. Delivery.

(a) The Goods will be delivered within a reasonable time after Seller provides Buyer the Acknowledgment, subject to availability of finished Goods. Seller will endeavor to meet delivery schedules requested by Buyer, but in no event shall Seller incur any liability, consequential or otherwise, for any delays or failure to deliver as a result of ceasing to manufacture any product or any Force Majeure Event. Delivery schedules set forth in the Acknowledgment are Seller's good faith estimate on the basis of current schedules. In no event shall Seller be liable for special or consequential damages resulting from failure to meet requested delivery schedules.

(b) Unless otherwise agreed in writing by the parties in the Acknowledgement, Seller shall deliver the Goods to Seller's plant in Monrovia, CA, USA (the "**Shipping Point**") using Seller's standard methods for packaging and shipping such Goods. Buyer shall take delivery of the Goods within three (3) days of Seller's written notice that the Goods have been delivered to the Shipping Point. Buyer shall be responsible for all loading costs (including freight and insurance costs) and provide equipment and labor reasonably suited for receipt of the Goods at the Shipping Point. Seller shall not be liable for any delays, loss or damage in transit.

(c) Seller may, in its sole discretion, without liability or penalty, make partial shipments of Goods to Buyer, if applicable. Each shipment will constitute a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer's purchase order.

(d) If for any reason Buyer fails to accept delivery of any of the Goods on the date fixed pursuant to Seller's notice that the Goods have been delivered at the Shipping Point, or if Seller is unable to deliver the Goods at the Shipping Point on such date because Buyer has not provided appropriate instructions, documents, licenses or authorizations: (i) risk of loss to the Goods shall pass to Buyer; (ii) the Goods shall be deemed to have been delivered; and (iii) Seller, at its option, may store the Goods until Buyer picks them up, whereupon Buyer shall be liable for all related costs and expenses (including, without limitation, storage and insurance).

#### 3. Non-delivery.

(a) The quantity of any installment of Goods as recorded by Seller on dispatch from Seller's place of business is conclusive evidence of the quantity received by Buyer on delivery unless Buyer can provide conclusive evidence proving the contrary.

(b) Seller shall not be liable for any non-delivery of Goods (even if caused by Seller's negligence) unless Buyer gives written notice to Seller of the non-delivery within three (3) days of the date when the Goods would in the ordinary course of events have been received.

(c) Any liability of Seller for non-delivery of the Goods shall be limited to (in Seller's sole discretion) replacing the Goods within a reasonable time or adjusting the invoice respecting such Goods to reflect the actual quantity delivered.

**4. Shipping Terms.** Unless indicated otherwise in the Acknowledgment, Delivery shall be made EXW (Incoterms 2010), Shipping Point, including without limitation, freight and insurance costs. If no delivery terms are specified on the Acknowledgement, the method of shipping will be in the sole discretion of Seller. Unless directed in writing otherwise by Buyer, full invoice value will be declared for all shipments.

5. Title and Risk of Loss. Title and risk of loss passes to Buyer upon delivery of the Goods at the Shipping Point. As collateral security for the payment of the purchase price of the Goods, Buyer hereby grants to Seller a lien on and security interest in and to all of the right, title and interest of Buyer in, to and under the Goods, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds (including insurance proceeds) of the foregoing. The security interest granted under this provision constitutes a purchase money security interest under the California Commercial Code.

6. Amendment and Modification. These Terms may only be amended or modified in a writing which specifically states that it amends these Terms and is signed by an authorized representative of each party.

#### 7. Inspection and Rejection of Nonconforming Goods.

(a) Buyer shall inspect the Goods within two (2) days of receipt ("**Inspection Period**"). Buyer will be deemed to have accepted the Goods unless it notifies Seller in writing of any Nonconforming Goods during the Inspection Period and furnishes such written evidence or other documentation as required by Seller. "**Nonconforming Goods**" means only the following: (i) product shipped is different than identified in Buyer's Acknowledgement; or (ii) product's label or packaging incorrectly identifies its contents. Notwithstanding the foregoing, for shipped Goods that require field installation, the "re-verification" terms in the Acknowledgement shall apply and for custom installations, the inspection and verification shall take place at Buyer's site immediately after the installation is completed.

(b) Seller will only accept Nonconforming Goods that are returned under Seller's Return Material Authorization procedures then in effect ("**RMA**"). Buyer shall obtain a RMA number from Seller prior to returning any Nonconforming Goods and return the Nonconforming Goods prepaid and insured to Seller at 1820 South Myrtle Avenue, Monrovia, CA 91016 or to such other location as designated in writing by Seller for the examination to take place there. If Seller reasonably verifies Buyer's claim that the Goods are Nonconforming Goods and that the nonconformance did not developed by use from Buyer, Seller shall, in its sole discretion, (i) replace such Nonconforming Goods with conforming Goods, or (ii) credit or refund the Price for such Nonconforming Goods pursuant to the terms set forth herein. Notwithstanding the foregoing, the only remedy for Nonconforming Goods that are custom systems is repair (not refund or replacement). No returns for Nonconforming Goods are allowed after thirty (30) days from the original shipping date.

(c) Buyer acknowledges and agrees that the remedies set forth in Section 7(a) are Buyer's exclusive remedies for the delivery of Nonconforming Goods. Except as provided under Section 7(a) and Section 14, all sales of Goods to Buyer are made on a one-way basis and Buyer has no right to return Goods purchased under this Agreement to Seller.

#### 8. Price.

(a) Buyer shall purchase the Goods from Seller at the prices (the "**Prices**") set forth in Seller's published catalogue literature in force as of the date of the Sales Quotation. However, the Prices shown in such catalogue literature or any other publication are subject to change without notice. Unless specifically stated to the contrary in the Sales Quotation, quoted Prices and discounts are firm for thirty (30) days from the date of the Sales Quotation. Unless otherwise stated, prices are quoted EXW (Incoterms 2010), Shipping Point. Unless otherwise stated in the Acknowledgement, if the Prices should be increased by Seller before delivery of the Goods to a carrier for shipment to Buyer, then these Terms shall be construed as if the increased prices were originally inserted herein, and Buyer shall be billed by Seller on the basis of such increased prices.

(b) All Prices are exclusive of all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any governmental authority on any amounts payable by Buyer. Buyer shall be responsible for all such charges, costs and taxes (present or future); provided, that, Buyer shall not be responsible for any taxes imposed on, or with respect to, Seller's income, revenues, gross receipts, personnel or real or personal property or other assets.

#### 9. Payment Terms.

(a) Unless otherwise provided in the Acknowledgement, if Buyer has approved credit with Seller, Buyer shall pay all invoiced amounts due to Seller within thirty (30) days from the date of Seller's invoice. If Seller does not have Buyer's financial information and has not provided pre-approved credit terms for Buyer, the payment must be made in cash with order or C.O.D. in US dollars. If Buyer has approved credit terms, the payment may be made by cash with order, wire transfer of immediately available funds, or check in US dollars. Certain products require a down payment. Any payment terms other than set forth above will be identified in the Acknowledgement. Notwithstanding anything herein to the contrary, all prepaid deposits and down payments are non-refundable. If a deposit is not received when due, Seller reserves the right to postpone manufacturing of Goods until payment is received. Seller will not be responsible for shipment delays due to deposit payment delays.

(b) In Seller's sole discretion, Seller may access Buyer interest on all late payments at the lesser of the rate of 1.5% per month or the highest rate permissible under applicable law, calculated daily and compounded monthly. Buyer shall reimburse Seller for all costs incurred in collecting any late payments, including, without limitation, attorneys' fees. In addition to all other remedies available under these Terms or at law (which Seller does not waive by the exercise of any rights hereunder), Seller shall be entitled to suspend the delivery of any Goods if Buyer fails to pay any amounts when due hereunder and such failure continues for ten (10) days following written notice thereof.

(c) Buyer shall not withhold payment of any amounts due and payable by reason of any set-off of any claim or dispute with Seller, whether relating to Seller's breach, bankruptcy or otherwise.

#### 10. Intellectual Property; Software License.

(a) To the extent that any Goods provided under this Agreement contains software, whether pre-installed, embedded, in read only memory, or found on any other media or other form ("**Software**"), such Software and accompanying documentation are licensed to Buyer, not sold and shall remain the sole and exclusive property of Seller or third party licensors of Seller. Seller grants Buyer a non-exclusive license to use the Software solely as provided in and in connection with the use of the Goods in which such Software is contained and in accordance with any applicable user documentation provided with such Goods and subject to the provisions of this Agreement. Certain of Seller's Goods may include third party software such as computer operating systems. Licenses to such third party software are subject to the terms and conditions of any applicable third party software license agreements. Unless identified in the Acknowledgement, no license is granted by Seller with respect to such third party software products that may be provided with the Goods (if any). Seller makes no warranties regarding any third party software that may accompany the Goods or otherwise and such software is explicitly included in the definition of Third Party Products below.

(b) Buyer shall not copy, modify, or disassemble, or permit others to copy, modify, or disassemble, the Software, nor may Buyer modify, adapt, translate, reverse assemble, decompile, or otherwise attempt to derive source code from the Software. Buyer shall not transfer possession of the Software except as part of, or with, the Goods, and each such transfer shall be subject to the restrictions contained herein. Buyer may not sublicense, rent, loan, assign or otherwise transfer the Software or documentation, and Buyer shall retain on all copies of the Software and documentation all copyright and other proprietary notices or legends appearing therein or thereon. Seller may terminate this license upon written notice for any violation of any of the terms of this license or any material breach of any provision of this Agreement. Buyer shall immediately discontinue use of the Software upon any termination of this license or Agreement. This license shall terminate upon any termination of the Agreement.

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(d) If Buyer is the United States Government or any agency thereof, each of the components of the Software and user documentation are a "commercial item," and "computer software" as those terms are defined at 48 C.F.R. 2.101, consisting of "commercial computer software" and "commercial computer software documentation," as such terms are used in 48 C.F.R. 12.212. Consistent with 48 C.F.R. 12.212 and 48 C.F.R. 227.7202-1 through 227.7202-4, all United States government Buyers acquire only those rights in the Software and user documentation that are specified in this Agreement.

**11. Installation and Other Services.** Seller shall provide installation services ("**Installation Services**") to Buyer if set forth in the Acknowledgment. If Installation Services are provided for in the Acknowledgment, Buyer will prepare the location for the installation consistent with Buyer's written specifications and Buyer will install necessary system cable and assemble any necessary equipment or hardware not provided by Seller, unless agreed otherwise in writing by the parties. For Goods that will be operated on or in connection with Buyer supplied hardware or software, Buyer is responsible for ensuring that its hardware and software conform with Seller minimum hardware and software requirements as made available to Buyer. Seller shall provide other field services, such as maintenance visits and field repairs (the "**Other Services**" and together with the Installation Services, the "**Services**") if set forth in the Acknowledgment.

#### 12. Limited Warranty.

(a) Subject to the exceptions and upon the conditions set forth herein, Seller warrants to Buyer that for a period of one (1) year from the date of shipment ("Warranty Period"), that such Goods will be free from material defects in material and workmanship.

(b) Notwithstanding the foregoing and anything herein to the contrary, the warranty set forth in this Section 12 shall be superseded and replaced in its entirety with the warranty set forth on **Exhibit A** hereto if the Goods being purchased are specialty products, which include, without limitation, laser products, fiber markers, custom systems, workstations, Seller-installed products, non-catalogue products and other custom-made items (each a "**Specialty Product**").

(c) EXCEPT FOR THE WARRANTY SET FORTH IN SECTION 12(A), SELLER MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE GOODS (INCLUDING ANY SOFTWARE) OR SERVICES, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.

(d) Products manufactured by a third party and third party software ("**Third Party Product**") may constitute, contain, be contained in, incorporated into, attached to or packaged together with, the Goods. Third Party Products are not covered by the warranty in Section 12(a). For the avoidance of doubt, **SELLER MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO ANY THIRD PARTY PRODUCT, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.** Notwithstanding the foregoing, in the event of the failure of any Third Party Product, Seller will assist (within reason) Buyer (at Buyer's sole expense) in obtaining, from the respective third party, any (if any) adjustment that is available under such third party's warranty.

(e) Seller shall not be liable for a breach of the warranty set forth in Section 12(a) unless: (i) Buyer gives written notice of the defect, reasonably described, to Seller within five (5) days of the time when Buyer discovers or ought to have discovered the defect and such notice is received by Seller during the Warranty Period; (ii) Seller is given a reasonable opportunity after receiving the notice to examine such Goods; (iii) Buyer (if requested to do so by Seller) returns such Goods (prepaid and insured to Seller at 1820 South Myrtle Avenue, Monrovia, CA 91016or to such other location as designated in writing by Seller) to Seller pursuant to Seller's RMA procedures and Buyer obtains a RMA number from Seller prior to returning such Goods for the examination to take place; and (iii) Seller reasonably verifies Buyer's claim that the Goods are defective and that the defect developed under normal and proper use.

(f) Seller shall not be liable for a breach of the warranty set forth in Section 12(a) if: (i) Buyer makes any further use of such Goods after giving such notice; (ii) the defect arises because Buyer failed to follow Seller's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods; (iii) Buyer alters or repairs such Goods without the prior written consent of Seller; or (iv) repairs or modifications are made by persons other than Seller's own service personnel, or an authorized representative's personnel, unless such repairs are made with the written consent of Seller in accordance with procedures outlined by Seller.

(g) All expendables such as electrodes are warranted only for defect in material and workmanship which are apparent upon receipt by Buyer. The foregoing warranty is negated after the initial use.

(h) Subject to Section 12(e) and Section 12(f) above, with respect to any such Goods during the Warranty Period, Seller shall, in its sole discretion, either: (i) repair or replace such Goods (or the defective part) or (ii) credit or refund the price of such Goods at the pro rata contract rate, provided that, if Seller so requests, Buyer shall, at Buyer's expense, return such Goods to Seller.

(i) THE REMEDIES SET FORTH IN SECTION 12(H) SHALL BE BUYER'S SOLE AND EXCLUSIVE REMEDY AND SELLER'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTY SET FORTH IN SECTION 12(A). Representations and warranties made by any person, including representatives of Seller, which are inconsistent or in conflict with the terms of this warranty, as set forth above, shall not be binding upon Seller.

#### 13. Limitation of Liability.

(a) IN NO EVENT SHALL SELLER BE LIABLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES, LOST PROFITS OR REVENUES OR DIMINUTION IN VALUE, LOSS OF INFORMATION OR DATA, OR PERSONAL INJURY OR DEATH ARISING IN ANY WAY OUT OF THE MANUFACTURE, SALE, USE, OR INABILITY TO USE ANY GOODS, SOFTWARE OR SERVICE, ORARISING OUT OF OR RELATING TO ANY BREACH OF THESE TERMS, WHETHER OR NOT THE POSSIBILITY OF SUCH DAMAGES HAS BEEN DISCLOSED IN ADVANCE BY BUYER OR COULD HAVE BEEN REASONABLY FORESEEN BY BUYER, REGARDLESS OF THE LEGAL OR EQUITABLE THEORY (CONTRACT, TORT OR OTHERWISE) UPON WHICH THE CLAIM IS BASED, AND NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE.

(b) IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED THE TOTAL OF THE AMOUNTS PAID TO SELLER FOR THE GOODS SOLD HEREUNDER.

(c) ALL WARRANTIES SET FORTH HEREIN, DIRECT OR IMPLIED, ARE VOIDED IF THE INITIAL INSTALLATION AND START-UP OF THE SUBJECT GOOD IS NOT SUPERVISED BY AN AUTHORIZED REPRESENTATIVE OF SELLER. AFTER INSTALLATION, ANY RE-ALIGNMENT, RE-CLEANING, OR RE-CALIBRATION, PROVIDED THEY ARE NOT RELATED TO A PROVEN DEFECT IN MATERIALS OR WORKMANSHIP, SHALL BE PERFORMED BY AN AUTHORIZED REPRESENTATIVE OF SELLERAT THE CURRENT SERVICE RATES.

(d) WHERE GOODS ARE SUBJECT TO A MOVE TO ANOTHER LOCATION AFTER THE ORIGINAL INSTALLATION HAS BEEN MADE, THE WARRANTY MAY BE MAINTAINED ONLY IF SUPERVISED BY AN AUTHORIZED REPRESENTATIVE OF SELLER. SELLER, FOR A SERVICE CHARGE, WILL ARRANGE FOR AND SUPERVISE THE DISCONNECTION, TRANSPORTATION, REINSTALLATION AND START-UP OF THE EQUIPMENT. CLAIMS FOR DAMAGE IN SHIPMENT ARE THE RESPONSIBILITY OF BUYER AND SHALL BE FILED PROMPTLY WITH THE TRANSPORTATION COMPANY.

14. Return Goods Policy. Seller's products may be returned to Seller for credit within sixty (60) days of shipment subject to the following conditions.

(a) In order to return products for credit, Buyer must obtain a RMA number from Seller. Upon receipt, it must be executed by an authorized person and then returned with the Goods. Goods returned to Seller without a RMA will be returned at Buyer's expense.

(b) Goods are to be returned to Seller at 1820 South Myrtle Avenue, Monrovia, CA 91016 with Freight Prepaid. Seller will not accept collect shipments.

(c) Restocking fees will be assessed in accordance with the following schedules: (i) Goods returned within the first thirty (30) days from shipment date will be restocked less twenty percent (20%) of the amount billed on the original invoice. (ii) Goods returned over thirty (30) days of shipment but less than sixty (60) days will be restocked less thirty percent (30%) of the amount billed on the original invoice. (iii) No returns are allowed after sixty (60) days from the original shipping date.

(d) The restocking fees set forth above are the minimum fees. If a returned Good requires rework to restore it to a saleable condition, further charges will be assessed. Seller's quality assurance department will document the condition of the Goods when received by Seller and report their findings to Buyer.

(e) Notwithstanding the foregoing provisions of this Section 14, the following Goods cannot be returned, are not eligible for any credit and cannot be restocked: (i) custom or modified products and (ii) any expendable product(s) that have been used.

15. Compliance with Law and Indemnification. Buyer shall comply with all applicable laws, regulations and ordinances. Buyer shall maintain in effect all the licenses, permissions, authorizations, consents and permits that it needs to carry out its obligations under this Agreement. Buyer shall comply with all export and import laws of all countries involved in the sale of the Goods under this Agreement or any resale of the Goods by Buyer. Goods, Services and technical data delivered by Seller shall be subject to U.S. export controls. Buyer shall, and shall cause its customers to, obtain all licenses, permits and approvals required by any government and shall comply with all applicable laws, rules, policies and procedures of the applicable government and other competent authorities. Buyer will indemnify and hold Seller harmless for any violation or alleged violation by Buyer of such laws, rules, policies or procedures. Buyer shall not transmit, export or re-export, directly or indirectly, separately or as part of any system, the Goods or any technical data (including processes and Services) received from Seller, without first obtaining any license required by the applicable government, including without limitation, the U.S. government. Buyer also certifies that none of the Goods or technical data supplied by Seller under this Agreement will be sold or otherwise transferred to, or made available for use by or for, any entity that is engaged in the design, development, production or use of nuclear, biological or chemical weapons or missile technology. No Buyer information will be deemed "technical data" unless Buyer specifically identifies it to Seller as such. Buyer assumes all responsibility for shipments of Goods requiring any government import clearance. Seller may terminate this Agreement if any governmental authority imposes antidumping or countervailing duties or any other penalties on Goods. For all international shipments, Seller requires that all required Export Control documentations, including Form BIS-711 Statement by Ultimate Consignee and Purchases, are submitted by Buyer along with the purchase order. Seller reserves the right to postpone shipment until all documentations are completed and submitted to Seller. Seller will not be responsible for shipment delays due to non-compliance by Buyer of the foregoing two sentences.

**16. Termination.** In addition to any remedies that may be provided under these Terms, Seller may terminate this Agreement with immediate effect upon written notice to Buyer, if Buyer: (i) fails to pay any amount when due under this Agreement and such failure continues for ten (10) days after Buyer's receipt of written notice of nonpayment; (ii) has not otherwise performed or complied with any of these Terms, in whole or in part; or (iii) becomes insolvent, files a petition for bankruptcy or commences or has commenced against it proceedings relating to bankruptcy, receivership, reorganization or assignment for the benefit of creditors.

**17. Waiver.** No waiver by Seller of any of the provisions of this Agreement is effective unless explicitly set forth in writing and signed by Seller. No failure to exercise, or delay in exercising, any rights, remedy, power or privilege arising from this Agreement operates or may be construed as a waiver thereof. No single or partial exercise of any right, remedy, power or privilege hereunder precludes any other or further exercise thereof or the exercise of any other right, remedy, power or privilege.

**18. Confidential Information.** All non-public, confidential or proprietary information of Seller, including, but not limited to, specifications, samples, patterns, designs, plans, drawings, documents, data, business operations, customer lists, pricing, discounts or rebates, disclosed by Seller to Buyer, whether disclosed orally or disclosed or accessed in written, electronic or other form or media, and whether or not marked, designated or otherwise identified as "confidential," in connection with this Agreement is confidential, solely for the use of performing this Agreement and may not be disclosed or copied unless authorized in advance by Seller in writing. Upon Seller's request, Buyer shall promptly return all documents and other materials received from Seller. Seller shall be entitled to injunctive relief for any violation of this Section 18. This Section 18 does not apply to information that is: (a) in the public domain through no fault of Buyer; (b) known to Buyer at the time of disclosure without restriction as evidenced by its records; or (c) rightfully obtained by Buyer on a non-confidential basis from a third party.

**19. Force Majeure.** Seller shall not be liable or responsible to Buyer, nor be deemed to have defaulted or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement when and to the extent such failure or delay is caused by or results from acts or circumstances beyond the reasonable control of Seller including, without limitation, acts of God, flood, fire, earthquake, explosion, governmental actions, war, invasion or hostilities (whether war is declared or not), terrorist threats or acts, riot, or other civil unrest, national emergency, revolution, insurrection, epidemic, lock-outs, strikes or other labor disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of

adequate or suitable materials, materials or telecommunication breakdown or power outage (each a "Force Majeure Event"), provided that, if the event in question continues for a continuous period in excess of thirty (30) days, Buyer shall be entitled to give notice in writing to Seller to terminate this Agreement.

**20. Assignment.** Buyer shall not assign any of its rights or delegate any of its obligations under this Agreement without the prior written consent of Seller. Any purported assignment or delegation in violation of this Section 20 is null and void. No assignment or delegation relieves Buyer of any of its obligations under this Agreement.

**21. Relationship of the Parties.** The relationship between the parties is that of independent contractors. Nothing contained in this Agreement shall be construed as creating any agency, partnership, joint venture or other form of joint enterprise, employment or fiduciary relationship between the parties, and neither party shall have authority to contract for or bind the other party in any manner whatsoever.

22. No Third-Party Beneficiaries. This Agreement is for the sole benefit of the parties hereto and their respective successors and permitted assigns and nothing herein, express or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit or remedy of any nature whatsoever under or by reason of these Terms.

**23. Governing Law.** All matters arising out of or relating to this Agreement is governed by and construed in accordance with the internal laws of the State of California without giving effect to any choice or conflict of law provision or rule (whether of the State of California or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than those of the State of California.

#### 24. Dispute Resolution.

(a) If Buyer is an entity formed under the laws of the United States of America, or any of its states, districts or territories (**"U.S. Law**"), then any dispute, legal suit, action or proceeding arising out of or relating to this Agreement shall be adjudicated and decided in the federal courts of the United States of America or the courts of the State of California in each case located in the City of Los Angeles and County of Los Angeles, California and each party irrevocably submits to the exclusive and personal jurisdiction of such courts in any such dispute, suit, action or proceeding.

(b) If Buyer is an entity formed under the laws of any country, state, district or territory other than U.S. Law, then the parties irrevocably agree that any dispute, legal suit, action or proceeding arising out of or relating to this Agreement shall be submitted to the International Court of Arbitration of the International Chamber of Commerce ("ICC") and shall be finally settled under the Rules of Arbitration of the ICC. The place and location of the arbitration shall be in Los Angeles, California, pursuant to the ICC's Rules of Arbitration and shall be finally settled in accordance with said rules. The arbitration shall be conducted before a panel of three arbitrators. Each party shall select one arbitrator and the two arbitrators so selected shall select the third arbitrator, who shall act as presiding arbitrator. Notwithstanding the foregoing, if the matter under dispute is \$500,000 or less, there shall only be one arbitrator who shall be mutually selected by both parties. If the party-selected arbitrators are unable to agree upon the third arbitrator, if either party fails to select an arbitrator, or in the case that only one arbitrator is required and the parties are unable to agree, then the International Court of Arbitration shall choose the arbitrator. The language to be used in the arbitral proceeding shall be English. The arbitrator(s) shall have no authority to issue an award that is contrary to the express terms of this Agreement or the laws of the State of California or applicable US Federal Law, and the award may be vacated or corrected on appeal to a court of competent jurisdiction for any such error. The arbitrator(s) shall be specifically empowered to allocate between the parties the costs of arbitration, as well as reasonable attorneys' fees and costs, in such equitable manner as the arbitrator(s) may determine. The arbitrator(s) shall have the authority to determine issues of arbitrability and to award compensatory damages, but they shall not have authority to award punitive or exemplary damages. Judgment upon the award so rendered may be entered in any court having jurisdiction or application may be made to such court for judicial acceptance of any award and an order of enforcement, as the case may be. In no event shall a demand for arbitration be made after the date when institution of a legal or equitable proceeding based upon such claim, dispute or other matter in question would be barred by the applicable statute of limitations. Notwithstanding the foregoing, either party shall have the right, without waiving any right or remedy available to such party under this Agreement or otherwise, to seek and obtain from any court of competent jurisdiction any interim or provisional relief that is necessary or desirable to protect the rights or property of such party, pending the selection of the arbitrator(s) hereunder or pending the arbitrator(s)' determination of any dispute, controversy or claim hereunder.

**25.** Notices. All notices, request, consents, claims, demands, waivers and other communications hereunder (each, a "Notice") shall be in writing and addressed to the parties at the addresses set forth on the face of the Acknowledgement or to such other address that may be designated by the receiving party in writing. All Notices shall be delivered by personal delivery, nationally recognized overnight courier (with all fees pre-paid), facsimile (with confirmation of transmission) or certified or registered mail (in each case, return receipt requested, postage prepaid). Except as otherwise provided in this Agreement, a Notice is effective only (a) upon receipt of the receiving party, upon confirmation of delivery by nationally recognized overnight courier or upon forty-eight (48) hours after being sent by certified or registered mail (as applicable), and (b) if the party giving the Notice has complied with the requirements of this Section 25.

**26.** Severability. If any term or provision of this Agreement is invalid, illegal or unenforceable in any jurisdiction, such invalidity, illegality or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

**27. Survival.** Provisions of these Terms which by their nature should apply beyond their terms will remain in force after any termination or expiration of this Order including, but not limited to, the following provisions: Compliance with Laws, Confidentiality, Governing Law, Dispute Resolution, Survival, and the restrictions on Software in Sections 10(b), (c) and (d).

# CHAPTER 1 Description

# **Section I: Overview**

## Features

The AMADA WELD TECH Advanced Data Analysis Monitor (WM-100A) is a versatile instrument providing a range of weld monitoring capabilities and processes. It has a comprehensive set of I/O connecting it to the weld process. An array of screens display weld information for CURRENT, VOLTAGE, POWER, RESISTANCE, WELD FORCE/PRESSURE, DISPLACEMENT, and ALTERNATE SENSOR along with other critical aspects of welding applications.



Designed for maximum flexibility and ease of operation, you can select from a large variety of parameters to monitor specific aspects of your welding process, yet selecting these parameters is a simple matter of "point and click" and "fill in the blanks" on the Advanced Data Analysis Monitor (WM-100A) configuration screens.

The WM-100A collects, displays, and stores all weld data in graphic and alphanumeric formats. In addition, the WM-100A has an ODBC database server that allows you to access stored weld data through third party programs via an Ethernet connection or directly from the WM-100A itself. For the rest of this manual, the Advanced Data Analysis Monitor (WM-100A) will simply be called *the Weld Monitor*.

# Section II: Major Components

### Monitor, Keyboard & Mouse



The computer monitor is a standard high-resolution widescreen monitor sized for optimal display of the WM-100A screens. If using a different monitor than the one shipped with the WM-100A, the monitor resolution must be at least 1280 x 1024.

# WM-100A Data Processing Module

This is a specially configured high-speed computer using *Microsoft Windows10*<sup>®</sup> as the operating system. The high-speed processors are specifically configured to process the large amount of data received and present it graphically in high-resolution format.

There are USB ports on the rear of the **WM-100A Data Processing Module** for file transfer and software upgrades as well as Ethernet and RS-232 ports for external communications.



*Note:* Depending on the date the WM-100A Data Processing Module, it may appear different than shown above.

## WM-100A Sensor Interface Module

This device is the I/O interface to the weld process. **Current, Voltage, Force/Pressure, Displacement, and Alternate Sensor (Gas Flow)** inputs connect to the front of this device and a range of digital I/O and Relay outputs connect to the back.

The WM-100A Sensor Interface Module processes all the I/O signals so they can be routed to the WM-100A Data Processing Module in order to make them available for the full spectrum of the Weld Monitor's observation and logging functions.



### WM-100A Sensors

The Weld Monitor accepts single channel inputs from **CURRENT**, **VOLTAGE**, and **ALTERNATE SENSOR (GAS FLOW)** inputs and dual channel inputs from **DISPLACEMENT** and **FORCE/PRESSURE** inputs.

#### Current

Inputs for the weld current can be made from either a Rogowski **CURRENT SENSING COIL** or a voltage measurement across a resistance load (shunt). A Rogowski **CURRENT SENSING COIL** can be used to measure currents up to 200,000 amps.

A shunt of approximately 0.001 or 0.004 ohms can be used to measure currents of less than approximately 2,000 amps.

For lower current levels, such as below 200 amps, the user is advised to consider a 0.004 ohm shunt instead of a 0.001 ohm shunt. The 0.004 ohm shunt will provide for greater accuracy of the current measurement and higher resolution of the current plot lines on the **Weld Monitor** screens.

#### Voltage

The Weld Monitor accepts direct voltage measurement from 0 to 15 Volts.





### **Displacement Sensor**

Heidenhain glass scale sensors are the standard AMADA WELD TECH **Displacement** sensors for the Weld Monitor.

#### Force / Pressure

The Weld Monitor's **FORCE / PRESSURE** inputs accept signals from 0 - 10 Volts. The photo to the right shows a load cell mounted internally to a weld head with an amplifier to provide the 0 - 10 Volt signal required by the Weld Monitor's inputs.

You can connect a variety of sensors, including strain gauge and piezo-electric devices. You can select force or pressure units using the Weld Monitor's configuration setup screens.



### Alternate Sensor (Gas Flow)

The Weld Monitor's **ALTERNATE SENSOR** input accepts signals from 0 - 10 Volts. One possible use of this input is to connect an output from a gas flow meter that measures gas flow over the weld zone.

A sample gas flow sensor is shown on the right.



# Section III: Weld Monitor Software

### Overview

This is a brief overview of the software screens to show the power and flexibility of the Weld Monitor software. Complete details on the software and functions are in *Chapters 3, 4, and 5*.

Large, intuitive screens are designed to allow you to see related information at a glance. All Weld Monitor functions are accessed through a flattened menu structure centered on the **Main Menu** screen shown below.



## Weld Monitor Screens

The Weld Monitor displays information in alphanumeric and graphical format as shown by the following Weld Monitoring screen. The weld parameter waveforms, Current, Voltage, Power, Resistance, Weld Force / Pressure, Weld displacement, and Alternate Sensor, are color coded for easy viewing when switching from screen to screen.



If you want to see a precise view of details on a graph screen, you can enlarge the graphical display by clicking the **EXPAND** buttons on various screens to get a large view such as the following **GRAPH** screen.

# **CHAPTER 1: DESCRIPTION**

#### **Zoom Feature**



The expanded screen shows you entire waveforms for a weld. If you want to see details, the **ZOOM** controls on the right allow you to enlarge any portion of the screen. In addition, you can "grab and move" the screen so you can get see any portion of the screen in high-resolution detail.



## Weld Error Levels

The Weld Monitor provides the ability to set error points on the weld parameters and trigger message notices when those error levels are passed. The Weld Monitor has two levels of error, Limit and Warning.

The Limit levels can be used as out of tolerance values for a process. The Warning levels can be set within the Limit values to provide an early warning that a process may be drifting to its out of tolerance levels.

On the right is a close-up of the setup screen for setting the Limit and Warning levels for Current. As you can see, you have the option of entering fixed values for upper and lower Peak and RMS Limit and Warning levels.

	Pulse 1	Pulse 2
Peak Limit Max (kA)	0	0
eak Warning Max (kA)	0	0
Peak Warning Min (kA)	0	0
Peak Limit Min (kA)	0	0
RMS Limit Max (kA)	0.4	0.5
RMS Warning Max (kA)	0.3	0.4
RMS Warning Min (kA)	0.2	0.3
RMS Limit Min (kA)	0.1	0.2

# Envelope

An **Envelope**, another capability to identify process errors, can be established to set the maximum and minimum limits above and below a sample waveform. Within the Weld Monitor, you choose or create the "ideal" waveform for the welds you want to make.



# Weld Data Log

The Weld Monitor stores and displays alphanumeric data for the weld parameters and process results. Configuration screens, such as the following **Logger Setup** screen, allow you to tailor the setup of the Weld Monitor to provide you with clear visibility of the weld information most important to your application.



# **Section IV: Measurement Method**

When the Weld Monitor is set to **Monitoring Mode**, it continually polls the I/O looking for a user-set Trigger point. When the Weld Monitor recognizes a trigger point, it stores the information, processes the information and sets outputs.

The Weld Monitor will analyze and record data that occurs during the user-set Pre-Trigger time and the user-set Post Trigger time. At the end of the Post-Trigger time, the Weld Monitor requires a period of time "Weld Data Processing" to process the weld information before it is ready to look for the Trigger point of the next weld.

The following two diagrams show sample AC and DC Welds and present definitions of key measurements.

### AC Weld



In the above AC Weld:

- **t**<sub>2</sub> is the Trigger Point
- **t**<sub>3</sub> is the Rise Point for the second cycle. A Rise Point is the first current value of any cycle after the first cycle at a point where the current reaches a current level equal to the current level at the Trigger Point.
- $t_4$  and  $t_5$  are both Fall Points. A Fall Point is a point where the peak current for the waveform multiplied by the user set Current Fall Level equals the absolute value of the actual current
- The Weld Time for an AC Weld is always the time between the Trigger Point and the last Fall Point of a waveform. In the above diagram this is between  $t_2$  and  $t_5$

# **CHAPTER 1: DESCRIPTION**

- The RMS value will be calculated between the Trigger or Rise Point of the user set **Start Cycle** and the Fall Point of the user set End Cycle. In the above diagram, if the user sets a Start Cycle of 2 and an End Cycle of 3, the RMS value will be calculated between **t**<sub>3</sub> and **t**<sub>4</sub>. The following rules apply to the calculation of the RMS value:
  - If number of cycles detected by the Weld Monitor is greater than or equal to user set End Cycle, then the RMS value is calculated from the Trigger or Rise of the Start Cycle to Fall of the End cycle
  - If number of cycles is less than the user set End Cycle and greater than or equal to the user set Start Cycle, then the RMS value is calculate from the Trigger or Rise of Start Cycle to last Fall Point
  - 3) If number of cycles is less than Start Cycle, the RMS value will be assigned to zero



# DC Weld

In the above DC Weld:

- **t**<sub>2</sub> is the Trigger Point
- RMS is calculated between  $t_2$  and  $t_3$  for first pulse and  $t_4$  and  $t_5$  for second pulse
- Weldtime is calculated between  $t_2$  and  $t_3$ ,  $t_4$  and  $t_5$ , or  $t_2$  and  $t_5$  based on the settings you choose
- The Fall points  $t_3$  and  $t_5$  are set by the you in the Setup screen

# **Section V: Weld Monitor Processes**

The Weld Monitor performs several process functions in addition to the monitoring of the weld parameters. This Section presents an overview of those functions. Refer to the remaining *Chapters* and *Appendices* for additional details on these process functions.

#### Weld to Displacement

The Weld Monitor can set digital outputs based on the positions of the displacement sensors to accomplish a weld-to-displacement function. The schedule settings and I/O connections you choose are used to perform one of four possible weld-to-displacement methods. When the user-set displacement distance is reached, the Weld Monitor will set digital outputs, called **Power Supply Cutoff Outputs**, which can be used to switch a Power Supply off.

The four configuration choices for a Weld to Displacement process are:

- A. PLC control in Part Measurement Mode with initial thickness measurement input as the setpoint for the point that WM-100A begins displacement measurement. (This is Weld-to-displacement from the point at which the electrodes contact the part)
- B. PLC control for weld-to-displacement with the PLC only setting the initial thickness measurement. (This is Weld-to-displacement from the point at which the electrodes contact the part)
- C. Using a contact closure such as a limit switch or firing switch to close the Initial Thickness Measurement input. The Thickness Delay Time setting is used for this method. The Thickness Delay Time begins when the Initial Thickness Measurement Input is set and can be used to time the moment the displacement count is set. (This is Weld-to-displacement from the point at which the electrodes contact the part)
- D. The displacement measurement for Weld-to-displacement begins when the weldhead is in the fully retracted position. The Weld Value is set to be the point of travel for the electrodes where the Power Supply will be cutoff. At the start of the weld cycle, when the weldhead is in the fully retracted position, the Initial Thickness measurement input is set. The Power Supply Cutoff outputs will then be switched when the weldhead has traveled the distance specified in the Weld Value.

The Weld Monitor has two input displacement channels, 1 & 2 and can accomplish the weld-todisplacement function on both of the displacement channels. You select weld-to-displacement for Displacement Channel 1, Displacement Channel 2, or both (AND) Displacement Channels 1 & 2 based on your connections to the Weld Monitor's output connector, J105.

#### **Force Firing**

The Weld Monitor can set a digital output based on the value of the Force 1 measurement channel. This function can be used to fire a power supply or send an output to a device when the force reaches a user-set value.

When the Weld Monitor is in **Monitor Mode**, the Force Fire Digital output will be set active if the force measured on the Force 1 channel is *greater* that the user-set force value. If the force measured is *less* than the user-set force fire value, the Force Fire Digital output will be set inactive.

The Force Fire Digital Output will switch within 20 microseconds after the actual force moves above or below the user-set value.

When the Weld Monitor is *not* in Monitor Mode, the Force Fire Digital Output will remain in the inactive state.

# **Section VI: Weld Monitor Functions**

#### Waveforms

The Weld Monitor can save graphs (waveforms) of values over time of the measured current, voltage, two force channels, two displacement channels and alternate sensor inputs, as well as the calculated resistance and power. The Weld Monitor saves each waveform as a separate file in binary (Big Endian) format. The Weld Monitor has functions that can be used to convert individual waveforms to ASCII format files.

#### **Serial Numbers and Lot Numbers**

The Weld Monitor can save a serial number and lot number for each weld record. Each Schedule can be setup to allow entry of a serial number, a lot number, or both serial number and lot number. For Schedules that allow entry of both a serial number and lot number, the Tab key can be used to jump back and forth between the serial number and lot number entry boxes. The Tab key will also highlight any characters in a serial number or lot number box so that the characters can be overwritten.

Any ASCII character can be entered as part of a serial or lot number.

Each Schedule can be setup to automatically increment integer serial numbers. If this option is selected, the Weld Monitor will increment the serial number by one after every weld. The Weld Monitor will increment the serial number until 4294967295 is reached. Once 4294967295 is reached the Weld Monitor will reset the next serial number to 1 and then continue incrementing after each weld (1, 2, 3...).

#### Hard Disk Space Management

The Weld Monitor has functions to manage the hard disk space to ensure continuous uninterrupted operation. The user should carefully select the user-settings for these parameters. The Weld Monitor saves a database record for every weld. In addition to the database record, the Weld Monitor saves waveform data separately from the database record.

Every weld record may be up to 2000 bytes. Some of the weld record fields are variable, so the actual size for each record will vary from weld to weld.

Every waveform will have a size in bytes of the length of the pre and post trigger times multiplied by 1000. If the pre-trigger time is 10 milliseconds and the post trigger time is 60 milliseconds, then each waveform will be 70,000 bytes. If the user has selected to save all nine waveforms, then all nine waveforms will occupy a total of 630,000 bytes.

The user can conserve disk space and reduce the time to manual delete records by not using an excessively long weld measurement period and by only saving the waveforms that may be examined in the future.

The Weld Monitor's Data Processing Module includes two hard drives identified as C: and D:. The Monitor's SQL database is on the D: drive and is the only information on the D; drive. The C: drive contains all remaining software and information, including the *Windows* 10<sup>®</sup> operating system, weld waveform data, and the Weld Monitor software.



The Weld Monitor is designed so that the only information on the D:\ drive is the SQL database. The user should *not* save any other information on the D:\ drive and should *not* use the D:\ drive for any function. Failure to follow this CAUTION will potentially cause database performance issues.

#### Data Backup

To enable restoring of all weld data and envelopes in case of a hard disk failure, it is recommended that the user backup the following items:

- 1. All files in the C:\test\_date\_file directory.
- 2. All files in the **C:\envfile** directory.
- 3. All files in both the **db** files and **db** backup directories on the **D:**\ drive.

#### **Result Checking – Limits and Warnings – Special Notes**

For **Current**, **Voltage**, **Resistance**, and **Power**, a user can select to monitor **RMS**, **Peak**, or **Envelope**. If the user enters 0 for a limit or warning, then WM-100A will not compare the actual value to that particular limit or warning. For example, if user selected to monitor the **RMS** parameter and set RMS Warning minimum to 0, then WM-100A will not check the RMS warning minimum.

For Force, Weldtime, and Formula, you can select whether or not Min/Max should be monitored. If you select to monitor Min/Max, and you entered a min or max parameter of 0, then the Weld Monitor will *not* check that particular parameter. For example, for Weldtime, if the user-selected Min/Max monitoring and the Min limit is 0, then WM-100A will *not* check the minimum limit for Weldtime.

For displacement, use the check boxes to select if a parameter will be monitored.

**NOTE:** If you are *not* monitoring Min or Max values for a parameter, but you still want to display that parameter on a **Run Chart** of **Histogram**, then you *must* enter **Max** and **Min** values for proper display of the **Run** screen.

#### Weld Monitor Processing Rate

The **Weld Monitor** is capable of capturing one weld a second when all nine waveforms are saved and the measurement time is 100 milliseconds or less. The following table shows the weld rate capabilities for other measurement times when all nine waveforms are saved.

Weld Time (pre-trigger + post-trigger)	Weld Rate (Welds per minute)	
100 milliseconds	60	
200 milliseconds	30	
500 milliseconds	12	
1 second	7.5	
2 seconds	3	

If less than nine waveforms are saved for each weld, then the weld rate can be maintained at rates greater than shown in the above table. When the **Weld Monitor's** memory and processing capacity has been reached due to excessively high weld rates, the **Weld Monitor** will keep the **Ready to Measure** digital output set to inactive and the yellow highlighted "Processing" message displayed on the **Run** or **Monitoring** screens until the **Weld Monitor** completes processing of all information from past welds.

# CHAPTER 2 Installation and Setup

# Section I: Before You Start



To avoid burns, shock, or electrocution, make sure the welding system has been turned OFF and all stored welding energy has been discharged *before* you install the Weld Monitor and sensors.

# Unpacking

Make sure you have all the Weld Monitor components listed on Page ii of this manual.

Verify that all Weld Monitor components show no signs of damage. If they do, please contact the carrier. Also, contact AMADA WELD TECH Customer Service immediately at the postal or e-mail address or telephone or FAX number shown in the Foreword of this manual.

# **Space Requirements**

We recommend that the **Weld Monitor** be installed in a well-ventilated area that is free from excessive dust, acids, corrosive gasses, salt, and moisture. Other installation considerations are:

- Allow sufficient clearance around all sides for power and signal cable runs.
- Allow ample workspace around the Weld Monitor so that it will not be bumped or struck while welding.
- The work surface must be level, stable, free from vibration, and capable of supporting the combined weight of the total welding system.
- The Weld Monitor must be far enough from the weld head to avoid contact with weld splash.
- Assure that there are no sources of high-frequency energy close by.

## **Input Power**

Separate input power is required for the **Data Processing Module**, **Sensor Interface Module**, and Computer Monitor (display). All components connect to single-phase power.

#### Data Processing Module

The **Data Processing Module** includes an input power cord with a three prong plug (phase, neutral, ground).

Input Power requirement: 100 – 240 VAC, 50/60 Hz (9A @ 100 VAC and 4.5A @ 240 VAC), 1Ø.

#### **Sensor Interface Module**

The **Sensor Interface Module** includes an input power cord with a three prong plug (phase, neutral, ground).

Input Power Requirement: 100 – 240 VAC, 50/60 Hz (3.2A @ 100 VAC and 1.6A @ 240 VAC), 1Ø.

#### Monitor, Keyboard & Mouse

Input Power Requirement: 100 – 240 VAC @ 1.0A, 50/60 Hz, Single-Phase.

The Monitor includes an input power cord with a three prong plug (phase, neutral, ground).

Monitor Dimensions (approximate): 21" W x 17" H x 9" D (530 mm x 430 mm x 230 mm).

**NOTE:** Size of the monitor may vary.


WM-100A - ADVANCED DATA ANALYSIS MONITOR

The preceding diagram shows the connections between the **Data Processing Module**, **Sensor Interface Module**, Computer Monitor, Keyboard and Mouse of the **Weld Monitor**. The diagram also shows the connections between the Weld Monitor and Welding Power Supply, Weldhead, Shunt Resistor, and an Alternate Sensor (gas flow meter).



All connections between the Weld Monitor and connecting equipment should be secure. The Data Connection cables between the Data Processing Module and Sensor Interface Module have high pin density connectors. The Data Processing Module and Sensor Interface Module should be placed so that the connectors on Data Connection cables are coming straight out the back of the Data Processing Module and are not exerting side loads on their mating connectors.



The body of the displacement sensor and its tip must be insulated from the welding current. Failure to provide this insulation will result in electrical noise and erroneous parameter readings.

## **Section III. Basic Functions**

## **Power Up**

Once all of the connections have been made as described in *Section II* of this chapter, the unit can be powered-up.

- 1. First, remove any USB Flash Drives that may be plugged into the **Data Processing Module**.
- 2. Press the power ON button on the front of the computer monitor.
- 3. Push the rocker power switch on the back of the **Data Processing Module** to the ON state.
- 4. Press the circular power on button on the front of the Data Processing Module. The Weld Monitor will start and when bootup is completed, the Windows 10<sup>®</sup> Desktop will be displayed on the computer monitor. You will see the WM-100A shortcut on the monitor desktop.
- 5. Double click the icon to start the Weld Monitor program. The Weld Monitor software will start and display the **Main Menu** ready for sign on. Follow instructions in *Chapter 3* to login and the **Main Menu** will be ready to use.



### Main Menu Screen after Login



## Shutdown

Click on **Shutdown** button on the **Main Menu** to exit and close the Weld Monitor application. To shutdown *Windows*  $10^{\text{®}}$  and power down the **Data Processing Module**, click on the **Start** button in the lower left corner of the screen to access the *Windows*  $10^{\text{®}}$  **Shutdown** button, click the **Shutdown** button and *Windows*  $10^{\text{®}}$  will close and the **Data Processing Module** will turn off.

WM-100A - ADVANCED DATA ANALYSIS MONITOR

## Section IV. Windows Setup

### Disable Automatic Updates for Windows 10<sup>®</sup>

To ensure that the Weld Monitor functions are not interrupted during automatic *Windows 10<sup>®</sup>* updates, automatic updates should be disabled in the **Windows 10<sup>®</sup> Services**. To disable, follow the following instructions:

1. Access the *Windows Update Services* App by entering "*service.msc*" in the *Windows* 10<sup>®</sup> *Search* field and then select the **Services** App to open.

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2. In the *Windows Update Services* window, scroll down to the **Windows Update** service. Position your mouse cursor over the **Windows Update** service and then right-click your mouse button and select **Properties**.

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	Start the service Description: Enables the detection, download, and installation of updates for Windows and other programs. If this service is disabled, users of this computer will not be able to use Windows Update or its automatic updating feature, and programs will not be able to use the Windows Update Agent (WUA) API.	Windows Mixed Reality Op     Windows Mobile Hotspot S     Windows Modules Installer     Windows Perception Servic     Windows Perception Simul     Windows Percentation Fou     Windows Process Activatio     Windows Push Notification     Windows Push Notification	<ul> <li>Enables Mix</li> <li>Provides th</li> <li>Enables inst</li> <li>Enables spa</li> <li>Enables spa</li> <li>Optimizes p</li> <li>The Windo</li> <li>This service</li> <li>Provides inf</li> <li>Windows R</li> <li>Provides co</li> </ul>	Running Running Running	Manual Manual (Trig Manual (Trig Manual Manual Manual Automatic Automatic Manual (Trig Manual Automatic (	Local Syste Local Service Local Service Local Syste Local Syste Local Syste Local Syste Local Syste Network S Local Syste	
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3. In the **Windows Update Properties** window, choose the "*Disabled*" option in the **Startup type** field, followed by **OK**.

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WM-100A - ADVANCED DATA ANALYSIS MONITOR

## Energy Saving Power Options in Windows 10<sup>®</sup>

*Windows* 10<sup>®</sup> provides power saving settings for the computer and computer monitor. Both the *Data Processing Module* and *Weld Monitor* should be set so that they are *never* turned off by *Windows* 10<sup>®</sup>. To disable the energy saving functions, follow the following instructions.

1. Access the *Windows Settings* App by entering "*settings*" in the *Windows 10<sup>®</sup> Search* field and then select the **Settings** App to open.

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	,	O ⊟t

2. In the Windows Settings window, select the System menu option.

Settings				-	×
	Windows	Settir	ngs		
	Find a setting		٩		
	System Display, sound, notifications, power		<b>Devices</b> Bluetooth, printers, mouse		
	<b>Phone</b> Link your Android, iPhone		Network & Internet Wi-Fi, airplane mode, VPN		
Ę.	Personalization Background, lock screen, colors		<b>Apps</b> Uninstall, defaults, optional features		
8	Accounts Your accounts, email, sync, work, other people	色 A字	Time & Language Speech, region, date		

3. In the Settings window, set both the Screen and Sleep power options to *Never*.

← Settings	- 🗆 X
යි Home	Power & sleep
Find a setting	Screen
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🖵 Display	
<b>4</b> 刎 Sound	Sleep
Notifications & actions	When plugged in, PC goes to sleep after
J Focus assist	Never
🕐 Power & sleep	
□ Storage	Save energy and battery life Make your battery last longer by choosing shorter times for screen
다. Tablet	and sleep settings.
曰: Multitasking	Related settings
Projecting to this PC	Additional power settings

WM-100A - ADVANCED DATA ANALYSIS MONITOR

## Section V. Installing the *Minitab* Software (optional)

If you desire to perform statistical analysis on your welds, then AMADA WELD TECH recommends using an external software program called Minitab. This software is required in order to use the SPC and Minitab features of the WM-100A **Weld Monitor** features. Purchase, download and install the latest version of the *Minitab Statistical Software* from the Minitab website (<u>www.minitab.com</u>) on to the WM-100A Data Processing Module (computer).

You may also download, install and run the Minitab software free for 30 days. Follow the instructions below to install Minitab on to the operating computer. In the example below Minitab 19 is the current version of Minitab (at the time of this publication). This same basic procedure can be done with whatever the latest version that is available.



3. Read the License Agreement & Privacy Policy.

If you agree to the software use terms, select the  $\square$  I accept the terms in the License Agreement and acknowledge the Privacy Policy field followed by <u>Next</u> >.

Select the **⊙** Start the free 30-day free trial option, followed by <u>Next</u> >.

Note: If the software is purchased, select **Activate with a license** instead.

5. Accept the default installation folder by selecting <u>Next</u> >.

Note: This installation path will be used in a later step. Write down the directory path if necessary.

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End-	-User License Agreement	
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	MPORTANT - READ CAREFULLY: THIS IS A LEG AGREEMENT BETWEEN YOU AS EITHER AN NDIVIDUAL OR SINGLE LICENSED ENTITY ("YOU 'YOUR") AND MINITAB, LLC ("US", "OUR", "WE" C 'MINITAB") GOVERNING THE USE OF THE SOFTW	GAL ", DR VARE
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© 201	19 Minitab, LLC. All Rights Reserved. < Back Next >	Cancel
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## **CHAPTER 2: INSTALLATION AND SETUP**

6. Once the Software is ready to install, select Install.

The software will install and confi Minitab.

7. Once the software is installed, select  $\underline{F}$ 

tware will install and configure	📶 Minitab 19 Setup	×
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	Please wait while setup inst Status: Configuring	alls Minitab 19. This may take several minutes. Minitab 19
	© 2019 Minitab, LLC. All Rights I	Reserved. < Back Next > Cancel
software is installed, select <b><u>F</u>inish</b>	🕕 Minitab 19 Setup	X
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	als.	Click Finish to exit setup.
	Minitab <sup>®</sup> 19	
	© 2019 Minitab, LLC. All Rights	Reserved. < Back <u>Finish</u> Cancel
WM-100A - ADVANCED DA	TA ANALYS	IS MONITOR

🕕 Minitab 19 Setup

Ready to install Minitab 19

© 2019 Minitab, LLC. All Rights Reserved.

Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit setup.

< <u>B</u>ack

Install

Cancel

 $\times$ 

8. When prompted to restart system, select  $\underline{Y}es$ .



9. On the WM-100A Main Menu screen, select the **SYSTEM SETUP** button and enter the installation path of the Minitab Software (including the *.exe* file extension) in the *Minitab Application Location* field.

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WM-100A - ADVANCED DATA ANALYSIS MONITOR

## Section VI. Third Party Software



## Section VII. Help

The Weld Monitor provides help messages integrated into the Weld Monitor program. Many of the active elements in the program contain help messages. Hold the mouse over an active element, such as a click button, for a couple seconds to display the help message for that active element in a pop up message window.

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Run Weld Monitoring View Schedule View	ew Logger View Events & Erro	ors		
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AMADA WELD TECH	Juital Thickness 1			RMS Current Pulse 1
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# Chapter 3 Monitoring

## Section I. User Login/Logout & Shutdown

The Weld Monitor is shipped from the factory with a Windows  $10^{\text{®}}$  username of "operator" with a password of "password". This username has access to the **Weld Monitor** computer and its Windows  $10^{\text{®}}$  functions. This Windows  $10^{\text{®}}$  username has security permissions outside the **Weld Monitor** application, following Windows  $10^{\text{®}}$  functionality. There are separate usernames and passwords assigned within the **Weld Monitor** application to control security when working inside the **Weld Monitor** application. Users are encouraged to establish additional Windows  $10^{\text{®}}$  usernames to maintain appropriate security for their environments.

### Login to the Weld Monitor

1. Double-click on the **WM-100A** icon to start the **Weld Monitor** application and to display the **USER LOGIN** screen.

#### **NOTES:**

- The USER LOGIN button is a "Push ON/Push OFF" button. When you push the button to log in, the button display will revert to USER LOGOUT.
- Do *not* have a USB flash drive in one of the processing modules' USB ports, otherwise a Windows 10<sup>®</sup> message will appear requesting user to remove USB flash drive.
- 2. Select the **USER LOGIN** button to login to the system.



	MONITOR	
USER LOGOUT	User Name	DATABASE MANAGEMENT
SYSTEM SETUP	SCHEDULE SETUP WAVEFORM & LOGGER SETUP	DIAGNOSTICS
SPC	SECURITY	CALIBRATION
		SHUT DOWN
	WM-100A ADVANCED DATA ANALYSIS MONITOR DATA PROCESSING MODULE	

 A window will open which allows you to select a user name and password. Select your user name from the drop down list in the User Name box.

**IMPORTANT NOTE:** A new Weld Monitor shipped from the factory is provided with one user name and password, which are both "admin". This user name has level 4, Administrative Level, security. Users are encouraged to create their own user names and delete the "admin" user to maintain system security.

4. Click the mouse pointer in the **Password** text entry box. Then, enter your password using the mouse pointer and the pop up keyboard.





 Click on **OK** on the keyboard when you're finished entering a password. The screen will appear as shown to the right.

**NOTE:** If your **Password** is not correct, an "**invalid password**" message will be displayed. Click **OK**, then click on the password text box again to reenter your password.

When you see that your **User Name** and **Password** have been entered, click on **OK** button to get the **Main Menu** shown below.

	User Name
	Operator1 🗸
	Password
	****
C	OK RETURN

The buttons on the **Main Menu** screen with be either **dark blue** or **light blue** depending on the particular user's security level. A user has access *only* to the functions behind the **dark blue** buttons.



### Shutdown

- 1. From the Weld Monitor Main Menu, select the Shutdown button to close the Weld Monitor application.
- From the Windows 10<sup>®</sup> desktop, select the Start button in the lower left corner of the screen to access the Shutdown button to close Windows 10<sup>®</sup> and power down Data Processing Module (Weld Monitor).

3. Select the **Shutdown** button. The *Windows* 10<sup>®</sup> application will close and the **Data Processing Module** will turn OFF.



## Section II. Monitor Section: Run Screen

To access the Run Screen, click the Monitor button on the main menu.



#### Window Tabs

At the top of the **Monitor** program screen, there are five tabs used to access additional weld monitor screens: **Run, Weld Monitoring, View Limits, View Logger,** and **View Events & Errors**. When you select the **Monitor** button the **Run** screen will display.

Prior to full display of the **Run** screen, the **Monitor** program will initialize the monitoring functions by; loading a schedule, loading data, setting up internal monitoring functions and performing the daily and weekly database maintenance. Database maintenance will occur if Weld Monitor was turned off or a screen other than the Monitor screen was displayed at the time of the scheduled database maintenance. The Weld Monitor will display the message box on the right while it is initializing. Once the initialization is complete, the message box will no longer be displayed.



Clicking the Run Tab when any of the other four tab screens are displayed will display the Run Screen.



The **Run** screen is a very informative display of real time welding information including actual process figures, process results, historical trends, and error information. The **Run** screen is particularly useful for production monitoring.

## Run Screen



When you access the **Run** Screen, the Monitor program will load historical data into the **Run Charts** and **Histogram** for the loaded Schedule from the past 24 hours or since the **RESET CHARTS** button was last pressed if it was pressed within the past 24 hours.

If the **Run** Screen is presently displayed and you select a different Schedule, the **Run** Screen will *not* load historical data. In the case where you select a different Schedule, exiting the **Run** Screen to the **Main Menu** and then returning to the **Run** Screen will load the historical data into the **Run Charts** and **Histogram**.

#### **Real Time Graphs**



### **Run Charts**

There are two run charts which each plot a user-selected parameter. The run charts are updated after every weld. The actual measured value line will not begin to be plotted until the first two welds are completed.

The upper and lower Limits from the Schedule are shown as **red** dashed lines and the upper and lower Warnings are shown as dashed **yellow** lines. The Y axis is scale automatically by the values chosen for the upper and lower Limits. The Y axis will be scaled such that roughly 15% of the Y axis will be above the upper Limit and 15% of the Y axis will be below the lower Limit.

When the **Run Chart** plot has reached the right side of the chart, the plotted line will automatically move approximately 25% to the left on the **Run Chart** after the next weld. The plotted line will then continue plotting with each weld.

## **CHAPTER 3: MONITORING**



#### Histogram



There is a one histogram which plots a user-selected parameter. The histogram contains **grey** vertical columns which represent the distribution of the values of the user-selected parameter. The **grey** vertical columns are updated after every weld. The Y axis units are % and represent the percent of the total number of data points presently displayed in the histogram.

There are **red** vertical dashed lines placed at 20% and 80% on the X axis. The **red** vertical lines represent the upper and lower Limits set in the Schedule. If the Schedule does not have upper and lower Limits, these **red** vertical lines will be set based on the setting in the **Higher Range** and **Lower Range** boxes on the **Run Screen** setup screen in **Schedule Setup**.

An average value of the parameter assigned to the histogram is recalculated after every weld and is displayed at the top of the histogram in **blue** font. A solid **blue** vertical line is plotted in the histogram representing the average value. The **blue** vertical average line is repositioned after every weld.

A sigma value is recalculated after every weld and displayed at the top of the histogram in **green** font. There are two **green** vertical dashed lines which represent the upper and lower sigma ranges centered on the average value. The green vertical sigma lines are repositioned after every weld.

Values for Cp and Cpk are calculated and displayed at the top of the histogram after every weld. The equations used for calculating Cp and Cpk are shown on the next page.

#### Calculations for Cp and Cpk:



Where: s is actual sigma and Mean is average of the data points contained in the histogram.

The histogram will accumulate data points up until the number of data points equals the user-set value for the number of data points in the **Run Screen Setup** for the Schedule. After the number of data points equals the user-set value, the histogram will maintain the histogram with the user-set number of data points using a first in and first out method. The average, sigma, Cp, and Cpk values are also calculated based on this same first in and first out method.

### **Process Parameters and Waveform**

#### Large Parameter Display

Four user-selected parameters, as setup by the user in the Schedule, display on the right side of the **Run** screen in large font. The parameter values displayed are updated after every weld.

If there are no limits or warnings set for a particular parameter, the actual value will be displayed in **black** font.

If there are Limits or Warnings set for the particular parameter, the actual value will be displayed in green font if the value is within Limits and Warnings, in yellow font if the value is within Limits but not Warnings, and in red font if the value is outside of Limits.

### Waveform

One user-selected waveform, as setup by the user in the Schedule, is displayed in the lower right of the **Run** screen. The waveform is re-plotted after every weld.



### Schedule, Counters, Events, Errors

Schedule Name (top, left). This box displays the Schedule that is presently loaded for monitoring. This field includes the Schedule Name followed by the Schedule Number. To select a new schedule, click on the Schedule box to display a list of saved schedules. Clicking on one of the saved schedules shown in the list will load the clicked schedule for monitoring.

**Binary Schedule Number.** This is the binary number associated with the loaded schedule. The Binary Schedule Number is for display only and is updated when a different Schedule is loaded.

**PRESS TO START/PRESS TO STOP** Button. The Monitor program does not start monitoring until you press this button. When the **PRESS TO START** button is pressed, it will immediately change to **PRESS TO STOP** and the **Monitor** program will then be actively monitoring for a weld trigger. When you wish to stop monitoring, press the **PRESS TO STOP** button. The button will then switch back to **PRESS TO START** and the **Monitor** program will no longer be monitoring.

**Upper Limit** This shows you the upper limit of weld time that you set in the loaded Schedule.

**Weld Time** This shows you the actual time of the last weld performed.

**Lower Limit** This shows you the lower limit of weld time that you set in the loaded Schedule.

The **Time** (ms) indicator will be shown in green if the most recent weld time was within its limits and will be shown in red if the most recent weld time was outside its limits.

Binary Schedule Number 15 **Schedule Name** Run Sample DC.35 **Upper Limit (ms)** 9.000 PRESS TO STOP Weld Time (ms) 7.744 Lower Limit (ms) 6.000 Zero Displacement Time(ms) Part Serial Number 333555 Part Lot Number AB90 Counter 1 0 RESET Counter 2 55 RESET Weld Pass Count Weld Fail Count Clear 43 9 Pass/Fail 10 20 30 40 50 60 70 80 90 100 ENTER EVENT **Event Table** Time Stamp Event . 9/15/2010 5:42:20 PM Test Started 9/15/2010 5:42:18 PM Clear Counter 1 9/15/2010 5:42:17 PM Test Stopped 9/15/2010 5:40:49 PM Counter 1 Reach Limit 9/15/2010 5:37:34 PM Test Started Ŧ Error Table Time Stamp Error Message ٠ 9/15/2010 5:40:49 PM Formula 1: Fail 9/15/2010 5:39:33 PM Formula 1: Fail 9/15/2010 5:39:21 PM Formula 1: Fail, 9/15/2010 5:39:12 PM Formula 1: Fail 9/15/2010 5:39:06 PM Formula 1: Fail T

**Zero Displacement** Button. This is located under the **Press To Start/Press to Stop** Button. Pressing this button will tare the displacement sensors and set their current position to zero. This button is only functional when the **Monitor** program is *not* in **Monitoring** mode.

**Part Serial Number** This is located under the **Zero Displacement** button. Enter a **Serial Number** in this box if you want the serial number to be recorded in the record for the next weld to be captured by the Monitor program. Refer to *Chapter 1* for additional information on the part serial number functionality.

**Part Lot Number** This is located under the **Part Serial Number** box. Enter a **Lot Number** in this box if you want the lot number to be recorded in the record for the next weld to be captured by the Monitor program. Refer to *Chapter 1* for additional information on the lot number functionality.

**Counter 1.** Displays the number of welds made since the counter was last reset.

Counter 2. Displays the number of welds made since the counter was last reset.

**RESET** Buttons. Pressing these buttons when the Weld Monitor is not in **Monitor** mode will set **Counter** 1 or **Counter 2** back to zero.

Weld Pass Count Displays how many welds were within the user-set limits since the Clear Pass/Fail counter was last reset.

Weld Fail Count Displays how many welds were outside of the user-set limits since the Clear Pass/Fail counter was last reset.

Weld Count Graph (bar) The green part of the bar shows the proportion of welds passed, the red part shows the proportion of welds failed.

Clear Pass/Fail Button. Pressing this button when the Weld Monitor is not in Monitor Mode will reset the Weld Pass Count to zero, reset the Weld Fail Count to zero, and clear the Weld Count Graph (bar).

The screen to the right shows **Counter 1** after its **RESET** button was pressed.

Counter 1 10		RESET
Change electro	des	
Counter 2 45		RESET
Weld Pass Count	Weld Fail Count	Clear
33	9	Pass/Fail
0 10 20 30	40 50 60 7	0 80 90 100

Counter 1 0		RESET
Counter 2 45		RESET
Weld Pass Count	Weld Fail Count	Clear Pass/Fail
0 10 20 30	40 50 60 7	0 80 90 100

### **Entering Events**

The **ENTER EVENT** button enables you to log text in the database. The text is time stamped with the time when you log an event. You can select events from a predefined list of events or you can enter text with the keyboard. You can log events such as an electrode change, equipment calibration, or other process note.

ENTER EVE	NT		
Run Weld Monitoring View Sched Ile View	w Logger View Events & Errors		
MADA	WM-100A ADVANCED DATA ANALYSIS KONITOR	RESET CHARTS	MAIN MENU
AMADA WELD TECH	RHS Current Pulse 1	1	RMS Current Pulse 1
Schedule Name Binary Schedule Numbe	0.8-		0.605
PRESS TO STOP Upper Limit (ms) 9.000	0.5-		Peak Voltage Pulse 1
Zero Displacement verme (ms) 7.864	0.5-		4.414
Part Serial Number	0 1 2 3 4 5 6 7 8 9 Weld C	10 11 12 13 14 15 16 17 18 19 ount	Volt
Part Lot Number	Peak Voltage Pulse 1 6.9- 6.5-		Force 1
Counter 1 1 R SET			12.722
	5.0-		lbs
Counter 2 13	45-		Initial Thickness 1
Wold Pare Count Wold Enil Count	3.5-		0.0785
9 1 Pear Pis/Fail	2.5 0 1 2 3 4 5 6 7 8 9 Weld	10 11 12 13 14 15 16 17 18 19 Jount	inch
	Thickness Change 1 3gr 0.0029 Xavy	0.0059 Cp 0.7 Cpk 0.67	Current
0 10 20 30 40 50 64	100 - 90 -		0.7-
Twee Stane Event 9/15/2010 5:15-90 PM Test Started 9/15/2010 5:15-90 PM Clear Counter 1 9/15/2010 5:15-90 PM Test Stopped	80 - 70 - 60 - 50 -		0.5-0.5-0.5-0.5-0.5-0.5-0.5-0.5-0.5-0.5-
Error Table Time Stamp Error Message	40		0.1-
9/15/2010 5:15:57 PM Formula 1: Fal, 9/15/2010 5:15:33 PM Formula 1: Fal, 9/15/2010 4:19:25 PM Formula 1: Fal,	20-		0-
9/15/2010 4: 19: 17 PM Formula 1: Fail, 9/15/2010 4: 19:09 PM Formula 1: Fail,	0.0040	0.0080	0.0 2.5m 5.0m 7.5m 10.0m 12.5m 15.0m 17.5m 20.0m 22.5m Time (ms)

1. To enter an event, click on the ENTER EVENT button. The Event List text box will appear.

Event List	
SAVE	RETURN

2. Type text in the text box with information that you want to log, then press **SAVE**.



**NOTE:** When you **SAVE** your event it will display at the top of the **Event Table** list as shown on the right.

vent Table		ENTER EVENT
Time Stamp	Event	A
9/15/2010 5:19:17 PM	Production halted due to par	t shortage
9/15/2010 5:15:49 PM	Test Started	
9/15/2010 5:15:48 PM	Clear Counter 1	
9/15/2010 5:15:45 PM	Test Stopped	
	1	1
rror Table	Error Message	
rror Table Time Stamp 9/15/2010 5:15:57 PM	Error Message Formula 1: Fail,	A
rror Table Time Stamp 9/15/2010 5:15:57 PM 9/15/2010 5:15:33 PM	Error Message Formula 1: Fail, Formula 1: Fail,	A
rror Table Time Stamp 9/15/2010 5:15:57 PM 9/15/2010 5:15:33 PM 9/15/2010 4:19:25 PM	Error Message Formula 1: Fail, Formula 1: Fail, Formula 1: Fail,	A
rror Table Time Stamp 9/15/2010 5:15:57 PM 9/15/2010 5:15:33 PM 9/15/2010 4:19:25 PM 9/15/2010 4:19:17 PM	Error Message Formula 1: Fail, Formula 1: Fail, Formula 1: Fail, Formula 1: Fail,	A

- 3. To choose from a list of predefined events, click on the **EVENT LIST** button to display a list such as the one shown to the right. You define the **Standard Events** shown in this list in the **System Setup** Screen.
- 4. Select the event you want, such as **Replaced Electrodes**, then press **RETURN**.



After you have selected an event it appears in the **Events** text box.

5. Click **SAVE** if you wish to save the event information.



6. When you click **SAVE** the event will now appear at the top of the **Event Table** list.

Time Stamp	Event	
9/15/2010 5:23:40 PM	Replaced Electrodes	
9/15/2010 5:22:24 PM	Test Started	
9/15/2010 5:20:47 PM	Test Stopped	1
9/15/2010 5:19:17 PM	Production halted due to part shortage	
9/15/2010 5:15:49 PM	Test Started	
rror Table		
rror Table Time Stamp	Error Message	
rror Table Time Stamp 9/15/2010 5:22:29 PM	Error Message Displacement 1: Fail, Formula 1: Fail,	
rror Table Time Stamp 9/15/2010 5:22:29 PM 9/15/2010 5:15:57 PM	Error Message Displacement 1: Fail, Formula 1: Fail, Formula 1: Fail,	
rror Table Time Stamp 9/15/2010 5:22:29 PM 9/15/2010 5:15:57 PM 9/15/2010 5:15:33 PM	Error Message Displacement 1: Fail, Formula 1: Fail, Formula 1: Fail, Formula 1: Fail,	
Time Stamp 9/15/2010 5:22:29 PM 9/15/2010 5:15:57 PM 9/15/2010 5:15:33 PM 9/15/2010 4:19:25 PM	Error Message Displacement 1: Fail, Formula 1: Fail, Formula 1: Fail, Formula 1: Fail, Formula 1: Fail,	

## Section III. Monitor Section: Weld Monitoring Screen

## Weld Monitoring Screen

The **Weld Monitoring** Screen displays waveforms of the nine process variables, all at the same time, as well as other critical information including weld results and error information. This screen is particularly useful for process development and process troubleshooting.

To access the **Weld Monitoring** Screen, click the **Weld Monitoring** Tab after having pressing the **Monitor** button on the main menu.



The left side of the **Weld Monitoring** screen, comprising approximately a quarter of the screen area, is the same as the left side of the **Run** Screen. Refer to *Section II* of this Chapter for information on the functions on the left side of this screen.

The right side of the **Weld Monitoring** screen displays nine waveforms and the results of the two user defined formulas. The nine waveforms and two formulas are updated after every weld with the data from the most recent weld.

The waveforms for Current, Voltage, Force 1, Force 2, Displacement 1, Displacement 2 and Alternate Sensor (Gas Flow) are all measured values. The waveforms for Power and Resistance are calculated. The two Formulas are also calculated.

#### Current, Voltage, Resistance, Power

The graphs for **Current**, **Voltage**, **Resistance**, and **Power** all show similar information as shown in the Power graph show to the right. The waveform and the numeric figures for the actual **Peak** and **RMS** values are shown. If the weld is a single pulse weld, only the **Peak 1** and **RMS 1** display boxes will show values. If the weld is a dual pulse weld, **Peak 1** and **RMS 1** apply to the first pulse and **Peak 2** and **RMS 2** to the second pulse.

**REFERENCE NOTE:** The X axis scale is automatically scaled in fixed increments by the **Monitor** program. Thus the actual waveform



may not extend to the far right edge of the graph. For example, the user-set the pre and post trigger time for the waveform shown to the above to a total of 22 ms, but the Monitor program scaled the X axis to the fixed size of 22.5 ms.

#### Force 1, Force 2, Alternate Sensor

The graphs for Force 1, Force 2, and Alternate Sensor are displayed as waveforms without any numeric data.



#### **Displacement 1, Displacement 2**

The graphs for **Displacement 1** and **Displacement 2** show the displacement waveform and the numeric values of the Initial Position, Final Position and Thickness Change.



#### Formula 1, Formula 2

The results of **Formula 1** and **Formula 2** are shown in text boxes just above the **Alternate Sensor** waveform shown in the lower right of the screen.

In the example shown to the right, the user has assigned a label of "Weld Calc" to Formula 1 in the Schedule Setup.



## Limits, Warnings, and Envelopes

#### **Limits and Warnings Indicators**

If a numeric parameter has assigned limits or warnings, its result will be indicated by the colored background behind the numeric display. **Green** indicates the parameter is within warnings and limits. **Yellow** indicates the parameter is within limits but out of warnings. **Red** indicates the parameter is out of Limits. Numeric parameters that are *not* being monitored with limits or warnings have a grey background color.

In the graph shown to the right, the **RMS 1** parameter was within limits and warnings.

The indicator containing the label for the graph, such as the **green Current** box shown in the graph to the above right, indicates if any aspect of the parameter was out of warnings or limits following the same color coding as described above for numeric parameters

#### Peak 1 0.688 Peak 2 0.000 RMS 1 0.576 RMS 2 0.000 0.7 0.6-0.5-0.4-0.3-0.2-0.1-0 -0.1 5.0m 15.0m 20.0m 10.0m 0.0 25.0m Time (ms) Current(kA) Expand

#### **Limits and Warnings Lines**

Limit lines are shown as **red** dashed horizontal lines and warning lines are shown as **yellow** dashed horizontal lines for **Peak** parameters.



The limits and warnings lines on the displacement graphs do *not* extend across the entire graph but are only displayed close to both the left and right Y axis.

The **Initial Thickness** limit and warning lines are indicated on the left Y axis and the **Final Thickness** limit and warning lines are indicated on the right Y axis.

**NOTE:** The limit and warning lines for thickness change are *not* shown on the graph.



#### Envelopes

The envelopes are shown as **red** dashed lines as displayed in the **Power** graph to the right.



## **Expanded Graph**

Each of the nine waveform graphs on the **Weld Monitoring** Screen has an **Expand** button in their lower right corner. When an **Expand** button is pressed a new screen is displays showing an enlarged graph of the corresponding weld parameter.

## **CHAPTER 3: MONITORING**

0.700 0.680 0.660 0.640 0.620 0.600 0.580 0.580 0.580 0.580 0.580 0.580 0.580 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.580 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.480 0.580 0.480 0.480 0.580 0.480 0.480 0.480 0.480 0.480 0.480 0.580 0.480 0.580 0.480 0.380 0. 0.240 0.220 0.200 0.180 0.160 0.140 0.120 0.080 0.080 0.060 0.040 0.020 0.020 0.000 -0.020 1.000 3.000m 4.000m 5.000m 5.000m 8.000m 9.000m 10.000m 12.000m 13.000m 17.000m 18.000m 19.000m 20.000m 7.000m 11.000m Time (ms) 14.000 15,000 101 191 -0.000799934 Curson X Reset Grap ADO • ADO • SUBTRACT • DIVIDE • AVERAGE Force/Pre Current 0.000 -0.000 Power Force/Press rre Press MADA RETURN AMADA WELD TECH

The following screen shows the result when you press the Expand button for the Current waveform.

The waveforms for the other weld parameters can also be added to the graph by clicking the **Hide/Show** buttons that are in the lower left corner of the screen.

If the **Show** buttons are clicked on the above screen for **Voltage** and **Displacement 1**, the screen looks like the following screen. The additional **Voltage** and **Displacement 1** waveforms and their corresponding Y axis scale have been added to the graph.





Waveforms are color coded for easy identification. The color code assignments are shown in the table located in the lower left of the screen.



#### Cursors

The Expanded graph screen has two cursors, drawn as vertical lines as shown in the following screen. These cursors can be moved into the graph to indicate the X and Y value of the point at which the cursor intersects the waveform. To move a cursor into the graph, click on one of the cursors, which are both on the left Y axis of the graph, and then drag the cursor into the graph.

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The X and Y values of the cursor are shown in the Cursor table located in the lower center section of the screen.

If two waveforms and two cursors are displayed on the screen, the first cursor will apply to the first waveform that was displayed on the screen and the second cursor will apply

Cursors:	X	Y
Cursor 0		
Current	0.000	-0.000
- Cursor 1		
Current	0.000	-0.000

to the second waveform displayed as shown in the example above. If more than two waveforms are displayed, the second cursor will apply to the last waveform that was selected with the **Show** button.


#### **Arithmetic Functions with Cursors**

The Add, Subtract, Divide, and Average functions can be applied to the Y values of the two cursors. Once the cursors are in the desired position, click one of the circles next to the Add, Subtract, Divide, and Average labels to perform the math function. The resulting calculation is displayed just above the Add label.





#### Zoom Controls (Expanded Screen Only)

The icons in the lower right of the **Expanded Screen** (shown on the right) are used to zoom in and move around the graph. The icon on the *left* is presently not active in the Monitor program.

The icon on the *right* allows you to click on the graph and move the graph around while the mouse button is held down. The icon in the *center* makes additional icons available that allow you to expand sections of the graph.

There are two rows of additional icons (shown on the right). Those in the first row, from left to right, allow you to zoom in a selected graph section, zoom in on a section while maintaining the entire height of the graph, and zoom in on a section while maintaining the entire width of the graph. This row of icons are used by clicking on the icon to select a function, then clicking on the graph and holding the mouse button while moving the mouse to select an area of the graph. When you release the mouse button, the graph will re-size.

Those in the second row, from left to right, allow you to return the graph to full size, zoom in, or zoom out. To use the icons in this row, click on the icon to select a function, then click on the graph.

The **Reset Graph** button can be clicked to reset the graph to full size after repositioning or re-sizing the graph.





# Section IV. Monitor Section: View Schedule



The View Schedule tab selects the screen that allows you to view the Schedule setup information without exiting the Monitoring section of the Monitor program. The View Schedule tab can be viewed while the Monitor program is actively recording welds.

You can *not* make any changes to any of the Schedules on this screen. You may want to take notes for future editing of the Schedule. If you want to edit Schedules, exit the **Monitoring** section of the **Monitor** program and go to the functions behind the **Schedule Setup** button.

### **View Schedule Screen**

The View Schedule Screen has additional tabs that allow you to see the following Schedule Setup Screens.

Test Limits Page 1 Test Limits Page 2 Trigger Weld Setup Run Relay

The Envelope Setup information is *not* accessible from the View Schedule Tab.

# Test Limits Page 1

Durrent         Voltage         Pulse 1         Pulse 1 <t< th=""><th>TEST</th><th>LIMITS PAGE 1</th><th>Run Weld Monitorium</th><th>View Schedule         View Loger         View Event           unterger         Image: reger         West Sevent         Real           unterger         Image: reger         Voltage         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Rea         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Rea</th><th>A Error      Ready      Read</th><th>Point         Point 2           Point 3         2           Point 4         2           Point 5         2           Point 6         2           Point 7         2</th><th>NAAIN MERY Notes 1 Notes 1</th><th>10 Prime 2 (7 (7 (7) (7) (7) (7) (7) (7)</th></t<>	TEST	LIMITS PAGE 1	Run Weld Monitorium	View Schedule         View Loger         View Event           unterger         Image: reger         West Sevent         Real           unterger         Image: reger         Voltage         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Rea         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Real           nume         Proger         Real         Rea	A Error      Ready      Read	Point         Point 2           Point 3         2           Point 4         2           Point 5         2           Point 6         2           Point 7         2	NAAIN MERY Notes 1 Notes 1	10 Prime 2 (7 (7 (7) (7) (7) (7) (7) (7)
Puise 1         Puise 2         Puise 1         Puise 2         Puise 1         Puise 2         Puise 2 <t< th=""><th>Current</th><th>Voltage</th><th></th><th>Resistance</th><th></th><th>Power</th><th></th><th></th></t<>	Current	Voltage		Resistance		Power		
Peak Limit Max (k)         O         O         Peak Limit Max (V)         6         O         Peak Limit Max (ma)         Pailse 2         Peak Limit Max (V)         O         O           Peak Warning Max (k)         0	Pulse 1 Dule	e 2 Puise 1	Pulse 2				Pulse 1	Pulse 2
Peak Warning Max (k)         0	Peak Limit Max (kA) 0 0	Peak Limit Max (V) 6	0	Peak Limit Max (mo)	ise 1 Pulse 2	Peak Limit Max (kW)	0	0
Peak Warning Min (kA)         0	Peak Warning Max (kA) 0 0	Peak Warning Max (V) 5.2	0	Peak Warning Max (mc)	0	Peak Warning Max (kW)	0	0
Peak Limit Min (kA)         0         0         Peak Limit Min (V)         3         0         Peak Limit Min (mo)         12         0         Peak Limit Min (kW)         0         0           RMS Limit Max (kA)         0.75         0         RMS Limit Max (V)         0         0         0         0         RMS Limit Max (WV)         0         0         0         RMS Limit Max (WV)         0         0         0         0         RMS Limit Max (WV)         0         0         0         0         RMS Limit Max (WV)         0         0         0         0         0         0         0         RMS Limit Max (WV)         0         0         0         0         RMS Limit Max (WV)         0         0         0         0         RMS Limit Max (WV)         0         0         0         0         RMS Limit Max (WV)         0         0         0         0         RMS Limit Max (WV)	Peak Warning Min (kA) 0 0	Peak Warning Min (V) 3.8	0	Peak Warning Min (mΩ) 14	0	Peak Warning Min (kW)	0	0
RMS Limit Max (kA)       0.75       0       RMS Limit Max (V)       0	Peak Limit Min (kA) 0	Peak Limit Min (V) 3	0	Peak Limit Min (mQ) 12	0	Peak Limit Min (kW)	0	0
RMS Warning Max (A)         0.7         0	RMS Limit Max (kA) 0.75	RMS Limit Max (V) 0	0	RMS Limit Max (mc)	0	RMS Limit Max (kW)	0	
RMS Warning Min (kA)       0.55       0       RMS Warning Min (V)       0 </td <th>RMS Warning Max (kd) 0.7</th> <td>RMS Warning Max (V) 0</td> <td>0</td> <td>RMS Warning Max (mΩ) 0</td> <td>0</td> <td>RMS Warning Max (kW)</td> <td>0</td> <td>0</td>	RMS Warning Max (kd) 0.7	RMS Warning Max (V) 0	0	RMS Warning Max (mΩ) 0	0	RMS Warning Max (kW)	0	0
RMS Limit Min (MA)     0.5     0     RMS Limit Min (M)     0     0     RMS Limit Min (ma)     0     0       Limit Type     RMS     Limit Type     Peak     Limit Type     Peak     Limit Type     None			_	a state of the sta		DMC Warning Min (MM)	0	0
Limit Type RMS Limit Type Peak Limit Type None	RMS Warning Min (kA) 0.55 0	RMS Warning Min (V) 0	0	RMS Warning Min (mg) 0	0	Kin 5 warning min (kwy)		0
	RMS Warning Min (kA) 0.55 0 RMS Limit Min (kA) 0.5 0	RMS Warning Min (V) 0 RMS Limit Min (V) 0	0	RMS Warning Min (mQ) 0 RMS Limit Min (mQ) 0	0	RMS Limit Min (kW)	0	0 0 0 0 0

# Test Limits Page 2

Vertication			Provide Automatica	without a View Polyadula View Law	and Manufacture & France	
Vert Time         Particular         Particular         Particular           Vert Time         Ver			Run   Weld Mo	WM	-100A Ready	MAIN MENU
Weid Time         Control         Contro         Control         Control         <	TES	T LIMITS PAGE 2 -	>	Test Limits Page 2 igger   Weld Setup	ED DATA ANALYSE HONTOR Run Screen Relay	
Weld Time       Diplacement         ForcePressore       Diplacement         ForcePressore       Diplacement         ForcePressore       Diplacement         Final Thickness Limit Max (inch)       DOD         ForcePressore       Diplacement         Final Thickness Unming Max (inch)       DOD         Final Thickness Change Unming Max (inch)       DOD         Final Thickness Change Unming Max (inch)       Diplacement         Thickness Change Unming Max (inch)       Diplacement         Th			vice Theory Web Theory Web Faculting Faculting Faculting Faculting	Objectnessel         Chaptersoneel           of These - Hang log         Linke The Hang           of These - Hang log         Linke The Hang           beam type         Many, Many           beam type         Many, Many           source of Hang Hang         Table The Hang           beam type         Many, Many           beam type         Many, Many           beam type         Many	Final St	en jank Cas: International (Landon Casa) Series Ban, 100 - Termain (Linderson Falser) Series Ban, 100 - Termain (Linderson Falser) Series Ban, 100 - Termain (Linderson Falser) Para Casas Palas 1 - Termain (Linderson Falser) Series 2 - Termain (Linderson Falser)
Weld Time       Displacement         Weld Time       Minit Time         Force/Pressure       Initial Thickness Warning Max (inch)       0.005         Initial Thickness Warning Max (inch)       0.007       0         Final Thickness Unning Max (inch)       0.005       0         Final Thickness Unning Max (inch)       0.005       0         Final Thickness Change Unnit Max (inch)       0.005       0         Final Thickness Change Warning Max (inch)       0.005       0         Thickness Change Warning Max (inch)       0.005       0         Thickness Change Warning Max (inch)       0.			GASTION	Mark 1999 (1008) MAX (2) MAX (2) Links (1999 (1000) Links (1999 (1000)	ar Naturality and participants (1990) Constrained on Constrained C	norm (BMR 12 Francis 2 Dipring Sciencis Australia ming Han 22 Sector 2 Dipring Sciences Australia and Man 2
Weid Time - Max (ma)       9       Formula 1 Limit Max (ma)       9         Weid Time - Min (ma)       6       Formula 1 Limit Max (ma)       9         Weid Time - Min (ma)       6       0       6         Weid Time - Min (ma)       6       0       6         Initial Thickness Limit Max (inch)       0.082       0       6         Initial Thickness Warning Max (inch)       0.082       0       6         Force/Pressure       Final Thickness Limit Max (inch)       0.082       0       6         Force/Pressure 1 Max (lbs)       14       Final Thickness Limit Max (inch)       0.082       0       6         Force/Pressure 1 Min (lbb)       9       Final Thickness Limit Max (inch)       0.085       0       6         Force/Pressure 2 Min (lbb)       0       Final Thickness Warning Max (inch)       0.065       0       6         Force/Pressure 2 Min (lbb)       0       Final Thickness Warning Max (inch)       0.065       0       6         GAS FLOW       MAX 40       Thickness Change Warning Max (inch)       0.005       0       6       6         Minit Type None       Minit Tipe None       Thickness Change Warning Max (inch)       0.005       0       6         MAX 40       Thickness Change	Weld Time	Disolacement	_			
Weid Time - Min (ma)       G       Formula 1 Limit Max (inch)       Code       Code       Formula 1 Limit Max       1       Formula 1 Limit Max         Weid Time - Min (ma)       6       0 <th></th> <th></th> <th>Displacement</th> <th>1 Displacement 2</th> <th>Weld Calc</th> <th></th>			Displacement	1 Displacement 2	Weld Calc	
Weld Pulse       First Pulse       Initial Thickness Warning Max (inch)       0.002       0<	Weld Time - Max (ms) 9 Weld Time - Min (ms) 6	Initial Thickness Limit Max (inch)	Activate Limit	Activate Limit	Formula 1 Limit Max 1	Formula 1 Limit Check
Limit Type Max_Min       Initial Thickness Waning Min (nch)       0.002       0       0       Formula 1 Warning Min       0.65         Force/Pressure       Initial Thickness Limit Min (inch)       0.075       0       0       Formula 1 Limit Min       0.5         Force/Pressure       Final Thickness Limit Max (inch)       0.077       0       <	Weld Pulse First Pulse	Initial Thickness Warning Max (inch)	0.003		Formula 1 Warning Max 0.85 Fe	ormula 1 Display Fixed Floating Point
Force/Pressure       Final Thickness Limit Min (inch)       0.07       0	Limit Type Max_Min	Initial Thickness Warning Min (inch)			Formula 1 Warning Min 0.65	
Force/Pressure       Final Thickness Limit Max (inch)       0.068       0       0         Force/Pressure 1 Max (lbs)       14       Final Thickness Limit Max (inch)       0.08       0       0         Force/Pressure 1 Max (lbs)       9       Final Thickness Limit Max (inch)       0.08       0       0         Force/Pressure 2 Max (lbs)       0       Final Thickness Limit Max (inch)       0.065       0       0         Force/Pressure 2 Max (lbs)       0       Final Thickness Limit Max (inch)       0.065       0       0         Force/Pressure 2 Min (lbs)       0       Final Thickness Limit Max (inch)       0.065       0       0         Formula 2 Type       None       Thickness Change Warning Max (inch)       0.0065       0       0       Formula 2 Limit Max       0         GAS FLOW       MAX       0       Thickness Change Warning Max (inch)       0.0065       0       0       Formula 2 Limit Max       0       Formula 2 Display       Scientific Notation         Min       30       Envelope Limit       0       0       0       Formula 2 Function         Weid Value (inch)       0       0       0       0       0       Formula 2 Function		Initial Thickness Limit Min (inch)			Formula 1 Function (Peak Current Pulse	1 + Thickness Change 1 * 2 5)
Force/Pressure 1 Max (lbs)       14         Force/Pressure 1 Max (lbs)       14         Force/Pressure 1 Max (lbs)       9         Limit 1 Type       Max_Min         Force/Pressure 2 Max (lbs)       0         Force/Pressure 2 Max (lbs)       0         Force/Pressure 2 Max (lbs)       0         Force/Pressure 2 Min (lbs)       0         Limit 2 Type       None         Thickness Change Uarning Max (inch)       0.0065         CAS FLOW       Thickness Change Warning Min (inch)       0.0055         Min       30       Limit Type       None         Limit Type       None       Thickness Change Uarning Min (inch)       0.0055         Min       30       Limit Type       None       Formula 2 Uarning Min         Wind Value (inch)       0.004       0       0       Formula 2 Limit Min         Wind Value (inch)       0       0       0       Formula 2 Limit Min       Formula 2 Limit Min	Force/Pressure	Final Thickness Limit Max (inch)				
Force/Pressure 1 Min (lbs)       9       0	Force/Pressure 1 Max (lbs) 14	Final Thickness Warning Max (inch)				
Limit 1 Type       Max_Min       Final Thickness Varining aim (incli)       0       0       0       0       Formula 2 Name       Formula 2 Name       Formula 2 Name       Formula 2 Name       Formula 2 Limit Max       0       Formula 2 Display       Scientific Notation         GAS FLOW       Thickness Change Warning Min (inch)       0.005       0       0       Formula 2 Varning Max       Formula 2 Display       Scientific Notation         MAX       40       Thickness Change Warning Min (inch)       0.005       0       0       Formula 2 Limit Min       0       Formula 2 Function	Force/Pressure 1 Min (lbs) 9	Final Thickness Warning Min (inch)				
Force/Pressure 2 Max (lbs)       0       Final Thickness Limit Min (inch)       0.065       0       Force/Pressure 2 Min (lbs)       0       Formula 2 Limit Max       0       Formula 2 Display       Scientific Notation         GAS FLOW       Thickness Change Warning Min (inch)       0.0065       0       0       Formula 2 Warning Min       0       Formula 2 Display       Scientific Notation         MAX       40       Thickness Change Limit Min (inch)       0.004       0       0       Formula 2 Limit Min       0       Formula 2 Limit Min       0       Formula 2 Limit Min       0       Formula 2 Function       F	Limit 1 Type Max_Min	Final Trickness Warning Min (inch)			Formula 2 Name Formula 2	
Force/ressure 2 min (us)       0       Thickness Change Limit Max (inch)       0.008       0       0       Formula 2 Limit Max       0       Formula 2 Limit Max <td< td=""><td>Force/Pressure 2 Max (lbs) 0</td><td>Final Thickness Limit Min (inch)</td><td>0.065</td><td></td><td>Portidia 2 Mante Portula 2</td><td></td></td<>	Force/Pressure 2 Max (lbs) 0	Final Thickness Limit Min (inch)	0.065		Portidia 2 Mante Portula 2	
GAS FLOW       Thickness Change Warning Max (inch)       0.0065       Image: Change Warning Max (inch)       Formula 2 Warning Max       Image: Change	Limit 2 Type None	Thickness Change Limit Max (inch)	0.008	0	Formula 2 Limit Max 0	Formula 2 Limit Check
GAS FLOW     Thickness Change Warning Min (inch)     0.005     0     Formula 2 Warning Min     0       MAX     40     Thickness Change Limit Min (inch)     0.004     0     Formula 2 Limit Min     0       Limit Type     None     Weld Value (inch)     0     0     0     0	]	Thickness Change Warning Max (inch)	0.0065	0	Formula 2 Warning Max 0 Fe	ormula 2 Display Scientific Notation
MAX     40     Thickness Change Limit Min (inch)     0.004     0     Formula 2 Limit Min     0       MN     30     Envelope Limit     Envelope Limit     0     0     Formula 2 Function       Weld Value (inch)     0     0     0     0	GAS FLOW	Thickness Change Warning Min (inch)	0.005	0	Formula 2 Warning Min 0	
Limit Type None Envelope Limit Weld Value (inch) 0 0	MAX 40	Thickness Change Limit Min (inch)	0.004	0	Formula 2 Limit Min 0	
Weld Value (inch)	Limit Type None	Envelope Limit			Formula 2 Function	

# Trigger

	TRIGGER SCF		Monitoring View Schu	edule View Logger View Events & Errors WMM100A Ready restructure and a source an	MAIN MENU
			Pro, Topg Triggerin Faces II Faces II Faces II	relation () Post Degree (no) () Post Degree (no) () () () () () () () () () () () () ()	57. 27. [9] 90 80 80
Pre-Trigger(ms)	2 Post-Trig	ger(ms) 20		Current Coil Sensitivity           90         91         92         93         94         95         96         97         98         99         100	99.75 0
Pre-Trigger(ms) Triggering Mechan Digital	2 Post-Trig ism Enable Debounce Time (ms)	ger(ms) 20		Current Coil Sensitivity           90         91         92         93         94         95         96         97         98         99         100	99.75
Pre-Trigger(ms) Triggering Mechan Digital Current	2 Post-Trig iism Enable Debounce Time (ms) Enable Debounce Time (ms)	ger(ms) 20 0 Trigger Level (%)	10.137	Current Coil Sensitivity           90         91         92         93         94         95         96         97         98         99         100           0         200         400         600         800         1000         1200         1400         1600         1800         2000	99.75 202.74 (A)
Pre-Trigger(ms) Triggering Mechan Digital Current Voltage	2 Post-Trig iism Enable Debounce Time (ms) Enable Debounce Time (ms) Enable Debounce Time (ms)	ger(ms) 20 0 Trigger Level (%) 0 Trigger Level (%)	10.137	Current Coil Sensitivity           90         91         92         93         94         95         96         97         98         99         100           0         200         400         600         800         1000         1200         1400         1600         1800         2000           0         1         2         3         4         5         6         7         8         9         100	99.75 202.74 (A)
Pre-Trigger(ms) Triggering Mechan Digital Current Voltage Force 1/Pressure	2 Post-Trig iism Enable Debounce Time (ms) Enable Debounce Time (ms) Enable Debounce Time (ms) Enable Debounce Time (ms)	ger(ms) 20 0 Trigger Level (%) 0 Trigger Level (%) 0 Trigger Level (%)	0	Current Coil Sensitivity           90         91         92         93         94         95         96         97         98         99         100           0         200         400         600         800         1000         1200         1400         1600         1800         2000           0         1         2         3         4         5         6         7         8         9         10           0         2.5         5         7.5         10         12.5         15         17.5         20         22.5         25         27.5         30         32.5         35         37.5         40	99.75 202.74 (A) 0 (V) 0 (bs)
Pre-Trigger(ms) Triggering Mechan Digital Current Voltage Force 1/Pressure Force 2/Pressure	2 Post-Trig iism Enable Debounce Time (ms) Enable Debounce Time (ms) Enable Debounce Time (ms) Enable Debounce Time (ms) Enable Debounce Time (ms)	ger(ms) 20 0 Trigger Level (%) 0 Trigger Level (%) 0 Trigger Level (%) 0 Trigger Level (%)	10.137 0 0 0	Current Coil Sensitivity	99.75 202.74 (A) 0 (bs) 0 (bs)

## Weld Setup

		Run Weld Monitoring View Schedule View I	Logger View Events & Errors WM-100A Ready	MAIN MENIL
WELD S	SETUP SCREEN	Weld Se	tup of Screen Relay	
		Spring Configuration of	Mark     Takes The state of the	1 Inspire 4
System Configuration_Scheduler				
	Eull Pange	play Limits Selected - Go to Limits Configu	ration for Updates	
1 0017			Counter 1 Message Change electrodes	
Current Turn	Coll Current (A)	<u> </u>		
DC	Voltage (V)		Counter 1 Set	point 10
Start Cycle	GAS FLOW	0	Counter 2 Message Schedule Maintenance	
End Cycle 99	Voltage Threshold for Res	istance Calculation (V)	Counter 2 Set	point 200
Coil Ratio	Current Threshold for Resi	stance Calculation (kA)		
1	0.1		Serial Number Incre	ment No
Pulse Type SINGLE PULSE	Current Fall Level (%)		Serial Nu	mber No
Limit/Warning Lines	Force 1 Fire Level		Lot Nu	mber No
FIRST PULSE	0 (lbs) Initial Thickness Delay			
	jo (ins)			
Current Filter- 2nd	Voltage Filter- 2nd	Force Filter	GAS FLOW Filter	
Filter Type Butterworth	Filter Type Butterworth	Filter Type NO FILTER	Filter Type NO FILTER	
Cutoff Freq 1000	Cutoff Freq 1000	Cutoff Freq 0	Cutoff Freq 0	

### Run Screen

RUN SCR	EEN	Ints & Errors Ready Main Menu Main Menu
	Pret Rain Chart Taits Carrier Pair 2015 2017	Participan         Nameta Data           Rate         State         State           100         The Course Course 1         State           In an
First Run Chart	Histogram	Numeric Data
First Run Chart Number of Welds on X axis	Histogram Number of Welds in Histogram	Numeric Data First Numeric Data
First Run Chart Number of Welds on X axis	Histogram Number of Welds in Histogram 200	Numeric Data First Numeric Data RMS Current Pulse 1
First Run Chart Number of Welds on X axis	Histogram Number of Welds in Histogram 200 Histogram data	Numeric Data First Numeric Data RMS Current Pulse 1 Second Numeric Data
First Run Chart Number of Welds on X axis 20 Run Chart Data RMS Current Pulse 1	Histogram          Number of Welds in Histogram         200         Histogram data         Thickness Change 1	Numeric Data First Numeric Data RMS Current Pulse 1 Second Numeric Data Peak Voltage Pulse 1
First Run Chart Number of Welds on X axis 20 Run Chart Data RMS Current Pulse 1	Histogram Number of Welds in Histogram 200 Histogram data Thickness Change 1 Sigma	Numeric Data First Numeric Data RMS Current Pulse 1 Second Numeric Data Peak Voltage Pulse 1 Third Numeric Data
First Run Chart Number of Welds on X axis 20 Run Chart Data RMS Current Pulse 1 Second Run Chart	Histogram          Number of Welds in Histogram         200         Histogram data         Thickness Change 1         Sigma         Three Sigma	Numeric Data First Numeric Data RMS Current Pulse 1 Second Numeric Data Peak Voltage Pulse 1 Third Numeric Data Force 1
First Run Chart Number of Welds on X axis 20 Run Chart Data RMS Current Pulse 1 Second Run Chart	Histogram          Number of Welds in Histogram         200         Histogram data         Thickness Change 1         Sigma         Three Sigma         Wishes Press (2001)	First Numeric Data         First Numeric Data         RMS Current Pulse 1         Second Numeric Data         Peak Voltage Pulse 1         Third Numeric Data         Force 1         Fourth Numeric Data
First Run Chart Number of Welds on X axis 20 Run Chart Data RMS Current Pulse 1 Second Run Chart Number of Welds on X axis 20	Histogram          Number of Welds in Histogram         200         Histogram data         Thickness Change 1         Sigma         Three Sigma         Higher Range (80%)         0	Numeric DataFirst Numeric DataRMS Current Pulse 1Second Numeric DataPeak Voltage Pulse 1Third Numeric DataForce 1Fourth Numeric DataInitial Thickness 1
First Run Chart Number of Welds on X axis 20 Run Chart Data RMS Current Pulse 1 Second Run Chart Number of Welds on X axis 20	Histogram          Number of Welds in Histogram         200         Histogram data         Thickness Change 1         Sigma         Three Sigma         Higher Range (80%)         0         Lower Range (20%)	First Numeric Data         First Numeric Data         RMS Current Pulse 1         Second Numeric Data         Peak Voltage Pulse 1         Third Numeric Data         Force 1         Fourth Numeric Data         Initial Thickness 1
First Run Chart Number of Welds on X axis 20 Run Chart Data RMS Current Pulse 1 Second Run Chart Number of Welds on X axis 20 Run Chart Data	Histogram          Number of Welds in Histogram         200         Histogram data         Thickness Change 1         Sigma         Three Sigma         Higher Range (80%)         0         Lower Range (20%)         0	Numeric Data         First Numeric Data         RMS Current Pulse 1         Second Numeric Data         Peak Voltage Pulse 1         Third Numeric Data         Force 1         Fourth Numeric Data         Initial Thickness 1         Run Screen Waveform

#### **Relay Screen**





Section V. Monitor Section: View Logger

The View Logger tab selects the screen that allows you to view the Logger information without exiting the Monitoring section of the Monitor program. The View Logger tab can be viewed while the Monitor program is actively recording welds.

This screen will display the logger information configured in the Logger Setup. This screen will also display events in the left most column. Only the most recent 200 welds will be displayed. If you want to see more or older logger information, exit the Monitoring section of the Monitor program and go to the functions behind the Waveform & Logger Setup button.

			2								
Event	alternate max.	aternate minimum	alternate result	counter_1	counter_2	current peak 1	current peak 2	current result	current rms 1	current rms 2	displacement 1
	4.535474	-1.646880	NA	11	11	0.688005	0.000000	PASS	0.575588	0.000000	0.006890
Counter 1 Reach Limit	4 342276	-1.057284	NA	10	10	0 722153	0.000000	DASS	0.601890	0.000000	0.004862
	3.955879	-1.453681	NA	9	9	0.614281	0.000000	WARN	0.525602	0.000000	0.005531
	3.569482	-0.874085	NA	8	8	0.625950	0.000000	WARN	0.533684	0.000000	0.007047
	3.955879	-1.260483	NA	7	7	0.730447	0.000000	PASS	0.600712	0.000000	0.006575
	4.149077	-1.067284	NA	6	6	0.710580	0.000000	PASS	0.586019	0.000000	0.006929
	4.149077	-1.260483	NA	5	5	0.712867	0.000000	PASS	0.589158	0.000000	0.006102
	4.149077	-0.874085	NA	4	4	0.741485	0.000000	PASS	0.606533	0.000000	0.003976
Test Started											-
Clear Pass/Hail Counter											
Test Stoppen	4 342276	-0 690887	NA	3	3	0.695791	0.000000	PASS	0.529139	0.000000	0.005295
	4.149077	-0.874085	NA	2	2	0.685765	0.000000	PASS	0.570144	0.000000	0.005315
Test Started				1							
Schedule 34 Selected											
	4.149077	-0.874085	NA	1	1	0.720819	0.000000	PASS	0.592540	0.000000	0.005118
	3.955879	-1.067284	NA	489	489	0.752445	0.000000	PASS	0.614504	0.000000	0.004213
	4.149077	-1.067284	NA	488	488	0.497610	0.000000	FAIL	0.431490	0.000000	0.008839
	3.376283	-0.680887	NA	487	487	0.746571	0.000000	PASS	0.613750	0.000000	0.003976
	3.376283	-0.294490	NA	485	485	1.129647	0.000000	FAIL	0.830346	0.000000	0.000571
	3.955879	-2.033277	NA	484	484	0.491549	0.000000	FAIL	0.425704	0.000000	0.007618
	3.762680	-0.487688	NA	483	483	0.735919	0.000000	PASS	0.603201	0.000000	0.003248
	4.342276	-1.067284	NA	482	482	0.729631	0.000000	PASS	0.595551	0.000000	0.006457
	4.535474	-0.874085	NA	481	481	0.742479	0.000000	FAIL	0.610675	0.000000	0.005787
	4.149077	-1.067284	NA	480	480	0.738683	0.000000	FAIL	0.605502	0.000000	0.006122
	4.535474	-1.067284	NA	9/9	4/9	0.714395	0.000000	WARN	0.590198	0.000000	0.005984
-	3.762680	-1.040880	NA	477	477	0.332025	0.000000	FAIL	0.607175	0.000000	0.005531
	3.955879	-1.260483	NA	476	476	0.744859	0.000000	FAIL	0,610057	0.000000	0.006831
	4.535474	-0.487688	NA	475	475	0.738587	0.000000	FAIL	0.607734	0.000000	0.004272
	4.149077	-1.840078	NA	474	474	0.887094	0.000000	FAIL	0.721705	0.000000	0.010886
	3.955879	-0.874085	NA	473	473	0.930205	0.000000	FAIL	0.744117	0.000000	0.010433
	3.955879	-1.260483	NA	472	472	0.903578	0.000000	FAIL	0.735305	0.000000	0.010807
	4.342276	-1.453681	NA	4/1	4/1	0.906104	0.000000	PAIL	0.734217	0.000000	0.008839
	3.370283	-0.101291	NA	469	469	2.100151	0.000000	FAIL	1.340907	0.000000	-0.000079
	3.183084	-0.101291	NA	468	468	2.087055	0.000000	FAIL	1.342876	0.000000	-0.000020
	3.376283	-0.101291	NA	467	467	2.071687	0.000000	FAIL	1.335849	0.000000	0.000000
	3.376283	-0.101291	NA	466	466	2.070951	0.000000	FAIL	1.337078	0.000000	0.000020
	3.183084	-0.101291	NA	465	465	2.070603	0.000000	FAIL	1.330296	0.000000	0.000000
	3.376283	-0.101291	NA	464	464	2.069649	0.000000	FAIL	1.335879	0.000000	0.000000
	3.183084	-0.101291	NA	463	463	2.072084	0.000000	FAIL	1.332342	0.000000	0.000000
1											<u>×</u>

### View Logger Screen

### WM-100A - ADVANCED DATA ANALYSIS MONITOR

# Section VI. Monitor Section: View Events & Errors

Run	Weld Monitoring	View Schedule	View Logger	View Events & Erro	ors
	MA		WM-10 ADVANCED D	DOA ata analysis monitor	Ready
	AMADA WELI	D TECH			

The View Events & Errors tab selects the screen that allows you to view the Events and Error tables without exiting the Monitoring section of the Monitor program. The View Events & Errors tab can be viewed while the Monitor program is actively recording welds.

**Events** appear in the left table and **Errors** in the right table. The tables on this screen show up to the most recent 200 events or errors. If you want to see more or older events or errors, exit the **Monitoring** section of the **Monitor** program and go to the functions behind the **Waveform & Logger Setup** button.

	View	Events and Errors Screen		M-100A Material and the second	water below	
					N INTERNATION	
Time Sture         Time St	Event Table			Error Table		
Image: Section 1000000000000000000000000000000000000		The second s	191	Life Char	Free Messee	
9/12/2014 11:17.00       Oxfinit I Assortunit       Deglay Feeth Durg Test         9/12/2014 11:27.00       Test Storted       9/12/2014 11:24.00       Forma 11:64,         9/12/2014 11:27.00       Test Storted       9/12/2014 11:26.00       Forma 11:64,         9/12/2014 11:26.00       Desc Courter 2       9/12/2014 11:26.00       Forma 11:64,         9/12/2014 11:26.00       Desc Courter 2       9/12/2014 11:26.00       Storted 11:64,         9/12/2014 11:26.00       Test Storted       9/12/2014 11:26.00       Stored 11:64,         9/12/2014 11	Time Stamp	Event	A	Time Stamp	Error Message	A
9/12/2019.11/2019       1187/20	9/15/2010 4:19:17 PM	Counter 1 Reach Limit Display Events	During Test	9/15/2010 4:19:25 PM	Formula 1: Fail,	
19/12/2019       10/12/2019 <th>9/15/2010 4:17:37 PM</th> <th>Clear Deve End Country</th> <th></th> <th>9/15/2010 4:19:17 PM</th> <th>Formula 1: Fail,</th> <th></th>	9/15/2010 4:17:37 PM	Clear Deve End Country		9/15/2010 4:19:17 PM	Formula 1: Fail,	
19/10/2014 01:17187       BetaSantal         19/10/2014 01:07188       BetaSantal         19/10/2014 01:07188       Text Standal         19/10/2014 01:07188       Carcomic 2         19/10/2014 01:0788       Tenda 11:041	9/15/2010 4:17:36 PM	Test Stepped		9/15/2010 4:19:09 PM	Formula 1: Fail,	
19/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/2014       12/3/3/2014       12/3/2014 <th>9/15/2010 4:17:17 PM</th> <th>Test Started</th> <th></th> <th>9/15/2010 4:19:02 PM</th> <th>Formula 1: Fail</th> <th></th>	9/15/2010 4:17:17 PM	Test Started		9/15/2010 4:19:02 PM	Formula 1: Fail	
1/15/2014       1/15/2014	9/15/2010 4:17:11 PM	Schedule 34 Selected		9/15/2010 4:18:16 PM	Formula 1: Fail	
9/15/2010 4:13:49 PM       Test Started         9/15/2010 4:13:40 PM       Char Counter 2         9/15/2010 4:13:40 PM       Char Counter 1         9/15/2010 PM       Char Counter 1	9/15/2010 4:16:44 PM	Test Stopped		9/15/2010 4:18:07 PM	Formula 1: Fail.	
9/15/2010 4:15:38 PM       Schedule 33:86kend         9/15/2010 4:15:38 PM       Clear Counter 1         9/15/2010 4:13:40 PM       Clear Counter 1         9/15/2010 4:13:40 PM       Test Stopped         9/15/2010 4:13:20 PM       Test Stopped         9/15/2010 4	9/15/2010 4:15:45 PM	Test Started		9/15/2010 4:17:56 PM	Displacement 1: Fail, Formula 1: Fail,	
9/15/2010 4:13:410 PM       Clear Counter 1         9/15/2010 4:13:40 PM       Test Stopped         9/15/2010 4:13:40 P	9/15/2010 4:15:38 PM	Schedule 33 Selected		9/15/2010 4:17:30 PM	Formula 1: Fail,	
9/15/2010 4:13:40 PM       Clear Counter 1         9/15/2010 4:13:40 PM       Test Stopped         9/15/2010 4:16:21 PM       Deplacement 1: Fal, Formula 1: Fal,	9/15/2010 4:13:41 PM	Clear Counter 2		9/15/2010 4:17:22 PM	Formula 1: Fail,	
	9/15/2010 4:13:40 PM	Clear Counter 1		9/15/2010 4:16:21 PM	Displacement 1: Fail, Formula 1: Fail,	
	9/15/2010 4:13:40 PM	Test Stopped				
				-		
				-		
				-		
				-		
			_	-		
CLEAR EVENT						
CLEAR EVENT CLEAR ERROR			*1			
CLEAR EVENT CLEAR ERROR			<u>.</u>			1
			VENT	CLEAR ERROR TABLE		

### WM-100A - ADVANCED DATA ANALYSIS MONITOR

The two lower buttons at the bottom of the screen will clear the **Event** table and clear the **Error** table. Press either button to clear the corresponding table. The following screen shows the screen *after* the **Clear Event Table** button was pressed.



# Chapter 4 Monitor Setup

The Monitor program has 5 main areas that you can use to setup up the Weld Monitor for the specific application and specific parts to be welded.

- 1. System Setup This area includes global parameters that apply to every Schedule.
- 2. Schedule Setup This area includes the setup items that are specific to each Schedule.
- 3. Security This area is used to setup users and passwords.
- 4. Logger Setup This area is used to setup the weld parameters displayed in table views of the weld data.
- 5. Waveform Setup This area defines which waveforms will be saved for each weld.

# Section I. System Setup

The System Setup establishes "global" settings for the Monitor program.

From the Main Menu, click on System Setup.



report neader	Sensor Type	Unit Name
	ST1278 1um	001
Current Measure Mode	Displacement Units	Baud Rate Setting
Coil	inches	3 57.6K
Force/Pressure	Alternate Sensor Label	Automatic Maintenance
Force	GAS FLOW	15:24
Force Units	Minitab Application Location	
lbs	c:\program files\minitab\minitab 16\mt	tb.exe
Automatic File Purge	Update Binary Schedule	
Automatic File Purge	Update Binary Schedule	
Automatic File Purge NO Standard Events (time in even	Update Binary Schedule	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed B	Update Binary Schedule at descriptions separated by comma) Electrodes, Performed Weld Head Maintenance	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed B	Update Binary Schedule at descriptions separated by comma) Electrodes, Performed Weld Head Maintenance	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed B	Update Binary Schedule at descriptions separated by comma) Electrodes,Performed Weld Head Maintenance	
Automatic File Purge NO Standard Events (type in ever Replaced Electrodes,Dressed B	Update Binary Schedule at descriptions separated by comma) Electrodes, Performed Weld Head Maintenance	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed B	Update Binary Schedule at descriptions separated by comma) Electrodes,Performed Weld Head Maintenance	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed B	Update Binary Schedule At descriptions separated by comma) Electrodes,Performed Weld Head Maintenance	

#### **Report Header**

The text entered here will print on reports printed by pressing the Print buttons on the Monitor program screens. Enter up to 50 ASCII characters in this box.

#### **Current Measure Mode**

You can select either **Shunt** or **Coil** based on the method of current measurement setup with the welder.

#### Force/Pressure

**Force/Pressure Type** allows you to select force or pressure units. Select either **Force or Pressure** from the list box.

Shunt	
✓ Coil	

Force/Pressure	
✓ Force	- 1
Pressure	
r orce onna	
lbs	

### Force Units

Select the units for Force or Pressure from a drop down box. Choose Kg (kilograms), Ibs (pounds), or N (Newtons) for Force applications. Chose **bar** or **psi** for pressure applications.

#### Automatic File Purge

Choose **Yes** or **No** to select if the Monitor program will automatically delete data from the hard drive. If you select **Yes**, the Monitor program will automatically delete database records to keep the hard disk space below a maximum of 75% full. If you select **No**, you must manually delete records as the hard disk becomes full. Refer to *Chapter 5* for more information.

#### Standard Events

Enter the event descriptions that will appear in the Event box on the **Run** and **Monitoring** screens. Enter up to 1000 ASCII characters for the event text. Each event should be separated by a comma without any spaces before or after the comma.

### Sensor Type

Select the particular displacement sensor installed on the weldhead from the list box.

### **Displacement Units**

Select either **Millimeters** or **Inches** for the displacement units from the list box. The units selected will appear with the displacement readings on the Monitor program screens.

### Alternate Sensor Label

The text entered in this box will appear on the Monitor program screens as the reference for the **Alternate Sensor**. Enter up to 10 characters of text. For example, if the **Alternate Sensor** input is being used to measure gas flow, enter "Gas Flow" in this entry box to provide a better label for this sensor than the standard "Alternate Sensor" label.

Gas Flow	as Flow
----------	---------



millimeters

J inches



Ν	
√ Ibs	
kg	
bar	
psi	

### Minitab Application Location

The file path for the Minitab application should be entered in this entry box. This file path is entered at the factory and should *not* need to be changed unless notified by AMADA WELD TECH.

### Unit Name

The unit name will be included in the ASCII character string output after every weld on the RS-232 port on the Weld Monitor's Processing Module. Enter up to a three digit number from 0 to 999. The Monitor program will add zero's at the beginning of the unit number you entered as needed to create a three digit unit name.

### Baud Rate

Select the baud rate to be used for RS-232 communications from the list box.

Minitab Application Location

c:\program files\minitab\minitab 16\mtb.exe





### Automatic Maintenance

Enter the time of day in the 24 hour clock format of XX,XX to set the time of day when the daily and weekly database maintenance will be automatically performed. The entered time should be in the range of 00:00 to 23:59. For example, enter 15:24 if you want the maintenance to be performed at 3:24 PM. If you enter in an incorrect format for the time, an error message will appear when you click the **SAVE** button.

The Monitor program must have the Monitor Screen displayed for the Automatic Maintenance to occur. The Monitor program can be either in or out of Monitor Mode for the Automatic Maintenance to occur.

15.24		
Der	No. of the second secon	Band Bate Setting
Force	- Severe Label	Automatic Maintenan
Face tain	Winitah Applica.	-
NO	Epdaw Binary Schedule	
Paglaced Decircles, Decord E	lectrodes Performed Weld Head Mainter	tanca

If the Monitor program does not have the **Monitor Screen** displayed when the user set maintenance time occurs, the Monitor program will perform the **Automatic Maintenance** the next time that the **Monitor Screen** is displayed. The automatic maintenance will typically take a few seconds to a minute.

(

When the **Monitor Program** is performing the database maintenance, a message will be displayed that Database Maintenance is in progress. When the maintenance is complete, the message window will disappear.

In addition, if the **Monitor Program** is in **Monitoring Mode**, the **Ready to Measure** digital input will be switched to inactive and the **Monitor Program** will not trigger any welds while the maintenance is being performed. Once the maintenance is completed, the **Ready to Measure** digital input will switch back to active. The database maintenance completes *Microsoft* SQL functions that maintain good speed for database functions.

#### **Update Binary Schedule**

Up to 127 schedules can be loaded using the Schedule Digital Inputs. The Binary Schedule Table is used to assign the Binary Schedule Numbers (BSN) from 1 to 127 to Schedules.

Update Binary Schedule

Click the **Update Binary Schedule** button to open the Binary Schedule Table. This table shows the schedules currently assigned to the **Binary Schedule Numbers**.

<b>Binary Schedule Number</b>	Schedule ID	Schedule Name	6
1	2	DC Shunt Sample	-
2			
3			_
4	1	DC Coil Sample	
5			
6			
7			
8			
9			
10			
11			
RESET BSN	UPDATE	RETURN	

To assign a Schedule to a **Binary Schedule Number**, the number must not have a current Schedule assigned to it.

- Click the line for desired Binary Schedule Number to highlight the line. The RESET BSN and UPDATE buttons will then become accessible.
- 2. Click the **Update** Button.

Binary Schedule Number	Schedule ID	Schedule Name	(5)
1	2	DC Shunt Sample	1
2			
3			
4	1	DC Coil Sample	
5			
6			
7			
8			
9			
10			
11			
RESET BSN	UPDATE	RETURN	

A table with all the Schedules will appear.

- 1. Click on the desired **Schedule ID** and **Schedule name** line to select that Schedule.
- 2. Click **SAVE**.

Schedule ID	Schedule Name
119	
120	
121	
122	
123	
124	
125	
126	
127	
128	Part 123
129	Part ABC
C	SAVE RETURN

The **Binary Schedule** Table will then appear showing that the selected Schedule has been assigned to the highlighted **Binary Schedule Number**.

To remove a Schedule assigned to a Binary Schedule, highlight the row for the **Binary Schedule Number** and click the **RESET BSN** button.

When finished updating the **Binary Schedule Number** table, click the **Return** button to close the **Binary Schedule Number** table.

Binary Schedule Number	Schedule ID	Schedule Name	(*)
1	2	DC Shunt Sample	1
2			
3			
4	1	DC Coil Sample	
5			
6	129	Part ABC	
7			
8			
9			
10			
11			
RESET BSN	UPDATE	RETURN	

# **Section II. Schedule Setup**

The **Schedule Setup** section of the Monitor program is used to establish separate schedules for every part to be welded. The Monitor program includes a **Schedule Name** and **Schedule ID** number. You enter the schedule name. The Monitor program automatically assigns a unique **Schedule ID** number to a schedule every time you save a schedule. The Monitor program increments the **Schedule ID** by 1 for each schedule you save. This feature provides for Schedule traceability.

User Name ADMIN	MANAGEMENT
(STEM SETUP)	
SK SKATT	
	SHJT DOWN
WM-100A	

### **Test Limits Page 1**

From the Main Screen click on the Schedule Setup button to get the screen below.

RMS Marring Max (not)     0 <td< th=""><th>Image: Section of the sectio</th></td<>	Image: Section of the sectio
Limit Type  PluS Limit Type  Pook Limit Type  Pook Limit Type  None	1     1

### WM-100A - ADVANCED DATA ANALYSIS MONITOR

### CHAPTER 4: MONITOR SETUP

The **Schedule Name** and **Schedule ID** number of the schedule that is loaded and available for editing is shown in the upper right area of the screen. The **Schedule Name** and **Schedule ID** appear in the same text box and are separated by a comma. If the **Schedule Name** box is clicked a drop down list of all schedules will appear. You can select a different schedule if you choose.

The **Binary Schedule Number** assigned to this schedule appears in the upper center part of this screen. If the Schedule has not been assigned to a **Binary Schedule Number** this text box will display a **0**. This text box cannot be used to select a different schedule.

Binary Schedule Number ()2 un Screen Relay Envelope	Schedule Name	DC Shunt Sample,2 ,18 ,17 ,16	
	Resistance	,15 ,14	
Pulse 1         Pulse 2           .imit Max (V)         4         0           ning Max (V)         3.7         0           rning Min (V)         3.2         0           Limit Min (V)         3.2         0	Peak Limit Max (mQ) Peak Warning Max (mQ) Peak Warning Min (mQ) Peak Limit Min (mQ)	,13 ,12 ,11 ,10 ,9 ,8	Ise 1 Pulse 2
-imit Max (V) 0 0 0 ning Max (V) 0 0 0 0 ning Min (V) 0 0 0 0 Limit Min (V) 0 0 0 0	RMS Limit Max (mO) RMS Warning Max (mO) RMS Warning Min (mO) RMS Limit Min (mO)	,7 ,6 ,5 ,4 ,3	
pe Peak	Limit Type Peak	DC Shunt Sample,2     DC Coil Sample,1	

#### Current

Enter the Limit and Warning values in the text boxes for **Pulse 1** and **Pulse 2**.

A decimal number **0** or greater can be entered for all the **Limits** and **Warnings** on **Test Limits Page 1** 

	Pulse 1	Pulse 2
Peak Limit Max (kA	0 () 0	0
eak Warning Max (kA	0 0	0
Peak Warning Min (kA	0 0	0
Peak Limit Min (kA	1)0	0
RMS Limit Max (kA	0.6	0
MS Warning Max (kA	0.55	0
RMS Warning Min (kA	0.5	0
RMS Limit Min (kA	0.45	0

The selection made for Limit Type will determine what limits, warnings, or envelope will be monitored. If you have entered limit or warnings values, you must still select Peak, RMS, or Peak and RMS for Limit Type. If you have defined an envelope for current, you must still select Envelope for Limit Type to monitor the envelope for current.

Select the Limit Type using the drop down list.

None – no limits, warnings, or envelope will be monitored

 $\ensuremath{\text{Peak}} - \ensuremath{\text{Peak}}$  limits and warnings will be monitored

 $\ensuremath{\mathsf{RMS}}-\ensuremath{\mathsf{RMS}}$  limits and warnings will be monitored

**Peak and RMS** – Peak and RMS limits and warnings will be monitored **Envelope** – envelope limit will be monitored

#### Voltage

Resistance

for Current.

990-879

Set Limits, Warnings, and Limit Type as described above for Current.

Set Limits, Warnings, and Limit Type as described above

	Pulse 1 Pulse
Peak Limit Max (V)	L 0
eak Warning Max (V)	3.7 0
eak Warning Min (V) 🗍	3.2 0
Peak Limit Min (V)	3 30
RMS Limit Max (V)	0
MS Warning Max (V)	0
MS Warning Min (V)	0
RMS Limit Min (V)	0
imit Tyne Peak	

11-14

Peak Limit Max (mc) (25 ak Warning Max (mc) (23 ak Warning Min (mc) (20	0
ak Warning Max (m(2)) ak Warning Min (m(2))	0
eak Warning Min (mc)	41
	- 0
Peak Limit Min (mc)	0
RMS Limit Max (mΩ)	
AS Warning Max (mΩ)	0
MS Warning Min (mc)	0
RMS Limit Min (mc)	0

None
Peak
√ RMS
Peak and RMS
Envelope

#### Power

Set Limits, Warnings, and Limit Type as described above for Current.

	Pulse 1	Pulse 2
Peak Limit Max (kW	n () o	0
eak Warning Max (kW	0 10	0
Peak Warning Min (kW	0 0	0
Peak Limit Min (kW	n () o	0
RMS Limit Max (kW	<b>n</b> () o	0
MS Warning Max (kW	0 0	0
RMS Warning Min (kW	0 :0	0
RMS Limit Min (kW	0 10	0

### SAVE Limits

- 1. When you have finished making all your changes, click on **SAVE**. A window will open which will prompt for a **Schedule Name**.
- 2. Enter a schedule name in the text box, such as, **Part ABC**, as shown in the diagram to the right. When you are finished, click on **OK**.

The new schedule name will appear in the **Schedule Name** box in the upper right of the screen. The new **Schedule Number** will appear after the schedule name separated by a comma.

Please Enter So	chedule Name	
Schedule_Na	ime	
Part AB C		

Schedule Name	Part ABC,53	~

### Test Limits Page 2

				Formula
Neld Time	Displacement			Formula 1 Name Wed Calc
Weld Time - Max (res)		Displacement 1 Activate Limit	Etoplacement 2 Activate Limit	Formula 1 Limit Max
Weld Time - Min (ms) 56	Initial Thickness Limit Max (inch) 51 015			Formula 1 Warning Max 10 15 Formula 1 Deplay   Fixed Divotes Point
Weld Palse First Pulse	Initial Thickness Warning Max (inch) [1 012		1.	Formula 1 Warning Min . 0 15
Limit Type Max_Min	Initial Thickness Warning Min (inch) (10075		10	Formula 1 Limit Min 0.5
	Initial Thickness Limit Min (inch)			Formula 1 Function Peak Current Pulse 1 + Thickness Change 1 * 2.5)
oncelPressure	Final Thickness Limit Max (Inch)	- 🖂	· ·	
Force/Pressure 1 Max (Rs)	Final Thickness Warning Max (inch)	- 6	· ·	
Force/Pressure 1 Mis (Bo)	Final Thickness Warning Him (inch)		1.	
Force/Pressure 2 Max (fbs)	Final Thickness Limit Min (inch)			Formula 2 Name Formula 2
Force/Pressure 2 Min (Ibs)	Thickness Change Limit Max (inch)			Formula 2 Linit Max
Limit 2 Type None	Thickness Change Warning Max (inch)		0	Formula 2 Warning Max 10 Formula 2 Display Scientific Notation
las Flow	Thickness Change Warning Min (inch)			Formula 2 Marning Min 0
MAX () 40	Thickness Change Limit Min (inch) (10004		1.	Formula 2 Limit Min J0
MIN () 30				Formula 2 Function

#### Weld Time

Enter the Max and Min Weld Time Limits. Enter a decimal number **0** or greater.

Weld Time	e - Max	( <b>ms</b> ) 🗍 9
Weld Tim	e - Min	(ms) () 6
Weld Pulse	Firs	t Pulse
Limi	t Type	Max Min

Select the desired weld pulse setting from the **Weld Pulse** drop down list.

The **Weld Time** limits can be applied to the first weld pulse the second weld pulse or both pulses. If **Both Pulses** is selected for **Weld Pulse** the Monitor program will compare the limits you set to the time between the trigger of the first pulse and fall of the second pulse.

✓ First Pulse Second Pulse Both Pulses

### CHAPTER 4: MONITOR SETUP

The selection made for Limit Type will determine if the Weld time limits you set are monitored. You should select None if the Weld time limits are *not* to be monitored or Max\_Min if the limits are to be monitored.

Select the desired Limit Type to from the drop down list.

#### Force 1 and 2

Enter the **Max** and **Min** limits for Force 1 and 2. Enter decimal numbers 0 or greater.

The selections made for Limit 1 Type and Limit 2 Type will determine if the Force 1 or 2 limits you set are monitored. You should select None if the Force limits are not to be monitored or Max\_Min if the limits are to be monitored.

Select the desired Limit Type from the drop down list.

#### Alternate Sensor

This example shows the Alternate Sensor you labeled as Gas Flow. Enter the Max and Min Limit values. Enter decimal numbers 0 or greater.

Sensor limits you set by are monitored. You should select **None** if the Alternate Sensor limits are not to be monitored or **Max\_Min** if the limits are to be monitored.

The selections made for Limit Type will determine if the Alternate

Select the desired Limit Type to from the drop down list.

	MAX ()40
	MIN () 30
Limit Type	None



None

✓ Max Min





#### **Displacement Limits**

Enter the limits and warnings for Initial Thickness, Final Thickness, and Thickness Change for both Displacement 1 and Displacement 2. Enter positive or negative decimal numbers as shown on the following page.

Click the check box next to the limit or warning for the Monitor program to monitor that limit or warning. If the **Activate Limit** box is left unchecked, that limit or warning will *not* be monitored.

	Displacement 1 Activate Limit		Displacement 2 Activate Limit
Initial Thickness Limit Max (inch)		0	
Initial Thickness Warning Max (inch)		0	
Initial Thickness Warning Min (inch)		0	
Initial Thickness Limit Min (inch)		0	
Final Thickness Limit Max (inch)		0	
Final Thickness Warning Max (inch)		0	
Final Thickness Warning Min (inch)		0	
Final Thickness Limit Min (inch)		0	
Thickness Change Limit Max (inch)		0	
Thickness Change Warning Max (inch)		0	
Thickness Change Warning Min (inch)		0	
Thickness Change Limit Min (inch)		0	
Envelope Limit			
Weld Value (inch) 40.005	_	40	_

Click an X in the Envelope Limit check box if the envelope limit is to be monitored for Displacement 1 and Displacement 2.

If a Weld to Displacement process is implemented, enter values in the Weld Value box.

#### Formula

Formulas can be created and the results used for comparison to Limit or Warning values.

Formula 1 Name Weld	Calc	
Formula 1 Limit Max	÷)1	Formula 1 Limit Check
Formula 1 Warning Max	() 0.85	Formula 1 Display
Formula 1 Warning Min	0.65	
Formula 1 Limit Min	0.5	
Formula 1 Function (F	Peak Current P	ulse 1 + Thickness Change 1 * 2.5)
Formula 2 Name Form	ula 2	
Formula 2 Name Form	ula 2	Formula 2 Limit Check
Formula 2 Name Form Formula 2 Limit Max Formula 2 Warning Max	ula 2	Formula 2 Limit Check
Formula 2 Name Form Formula 2 Limit Max Formula 2 Warning Max Formula 2 Warning Min	ula 2	Formula 2 Limit Check
Formula 2 Name Form Formula 2 Limit Max Formula 2 Warning Max Formula 2 Warning Min Formula 2 Limit Min	ula 2 	Formula 2 Limit Check
Formula 2 Name Form Formula 2 Limit Max Formula 2 Warning Max Formula 2 Warning Min Formula 2 Limit Min Formula 2 Function	ula 2	Formula 2 Limit Check
Formula 2 Name Form Formula 2 Limit Max Formula 2 Warning Max Formula 2 Warning Min Formula 2 Limit Min Formula 2 Function	ula 2 	Formula 2 Limit Check

#### Formula 1 Name

Enter up to a 10 character name for the Formula. This name will be displayed on the Monitoring Screens as a reference for Formula 1. If this box is left blank, the Monitor program will display **Formula 1** as the reference.

### Formula 1 Limit Max, Warning Max, Warning Min, Limit Min

Enter the desired values for the upper and lower Limits and Warnings. Enter positive or negative decimal numbers.

### Formula 1 Limit Check

Click this box if the Monitor program is to monitor this Formula's Limit and Warning levels.

### Formula 1 Display

Select either **Fixed Floating Point** or **Scientific Notation** for the format to be used for the display of the formula result.

✓ Fixed Floating Point Scientific Notation

#### Formula 1 Function

Formulas up to 250 characters can be entered.

The formula should consist of weld parameter names, arithmetic functions and parenthesis.

Arithmetic functions: Add (+), subtract (-), multiple (\*), divide (/).

Parenthesis (or) used to sequence calculations.

#### Weld parameter names

Peak Current Pulse 1	RMS Resistance Pulse 2
RMS Current Pulse 1	Peak Power Pulse 2
Peak Voltage Pulse 1	RMS Power Pulse 2
RMS Voltage Pulse 1	Initial Thickness 1
Peak Resistance Pulse 1	Final Thickness 1
RMS Resistance Pulse 1	Displacement 1
Peak Power Pulse 1	Initial Thickness 2
RMS Power Pulse 1	Final Thickness 2
Peak Current Pulse 2	Displacement 2
RMS Current Pulse 2	Force 1
Peak Voltage Pulse 2	Force 2
RMS Voltage Pulse 2	Alternate Sensor Maximum
Peak Resistance Pulse 2	Alternate Sensor Minimum

If the formula calculation results in a calculation that is not mathematically possible, the Monitor program will assign the Formula calculation a value of 0.

To setup the parameters for Formula 2, refer to the above instructions for Formula 1.

### Trigger

The Trigger settings set the beginning of the first weld pulse. In addition, the Monitor program uses the trigger settings to determine if a weld pulse has occurred.

The Monitor program can monitor one parameter to determine the trigger. The choices for this parameter are the Digital Trigger Input, Current, Voltage, Force1/Pressure, or Force2/Pressure. The Digital Trigger Input, Current or Voltage are selected with a Check Box. Force1/Pressure and/or Force2/Pressure are selected from a drop down list.

A **Debounce Time** can be set for the trigger function to address noise or signal variability so that false triggers are prevented. The process will need to be above the trigger value for the length of the **Debounce Time** in order for the Monitor program to set the trigger point.

t Limits Page Trigger	reno sensor   san Screen   Relay   Envelope	
Pre-Triggerjonij J+ Triggering Mechania	Post Enggenteni j	Carrent Coll Sensibility
Digitad	Enable Debource Time (m)	
Current	Enable Delevence Time (m) (0) Trigger Level (%) (1)	1 - 20 - 40 - 10 - 10 - 10 - 10 - 10 - 10 - 1
Voltage	Enable Debource Time (m) (10 Trigger Level (N) (11	
Force SPressare	Debource Time (m)	·
Force 2Pressure	Debounce Time (ms) Jo Trigger Level (%) Ja	(jii

gering Mechani	un	90 91 92 93 94 95 96 97 98 99 a
Digital	Enable Debounce Time (ms) g0	
Current	Enable Debounce Time (ms) () Trigger Level (%) ()	0 200 400 400 1000 1200 1400 1000 1000 2000 (]20 (00
Voltage	Enable Debousce Time (ms) Jo Trigger Level (%) J1	Jan 10
Force 1/Pressure	Debounce Time (ms) Jo Trigger Level (%) J1	້ ບໍ່ ເຮັ ຮັ ກໍຣ ພໍາມີຣ ເຮັ ເກີຣ ໝໍ 22.5 ແລ້ 27.5 ໝໍ 32.5 ຮັນກີຣ ໜີ ີ∫0.4 (0∞0)
Force 2/Pressure	Debounce Time (ms) J0 Trigger Level (%) J1	ο 2/5 5 7/5 10 12/5 15 17/5 20 22/5 25 27/5 30 32/5 15 37/5 40 (0.4)

SLIDER SETTING

NUMERICAL VALUE

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#### **Pre-Trigger**

Enter the **Pre-Trigger (ms)** value to set the Pre-Trigger time in milliseconds. The Pre trigger time can be set from 0 to 2000 milliseconds with the restriction that the total of the Pre and Post Trigger times must sum to 2000 milliseconds or less.

#### Post-Trigger

Enter the **Post-Trigger (ms)** value to set the Post-Triggering time in milliseconds. The Post Trigger time can be set from 1 to 2000 milliseconds with the restriction that the total of the Pre and Post Trigger times must sum to 2000 milliseconds or less.

#### **Current Coil Sensitivity**

Set the **Current Coil Sensitivity** using the slide bar in the upper right corner of the **Trigger Setup** screen. The Current Coil Sensitivity will determine the trigger point for coil applications when Current is selected as the parameter to monitor for the trigger point. The instructions under the following Current Trigger section must also be followed for current triggering applications.

A higher value for coil sensitivity will increase the chance of false **Monitor** triggers when an actual weld has not occurred. A possible method for establishing a **Current Coil Sensitivity** for an application is to start with a Sensitivity of 98%. Increase the **Current Coil Sensitivity** if the **Monitor** is not triggering on all of the actual welds. Reduce the **Current Coil Sensitivity** if the **Monitor** is recording false triggers.

#### **Triggering Mechanism**

The Monitor program can monitor one parameter to determine the trigger. The choices for this parameter are the **Digital Trigger Input**, **Current**, **Voltage**, **Force1/Pressure**, or **Force2/Pressure**. The Digital Trigger Input, **Current** or **Voltage** is selected with a Check Box. **Force1/Pressure** and/or **Force2/Pressure** are selected from a drop down list.

#### **Digital Trigger**

Click an **X** in the **Enable** box if you want to use the Current to set the trigger point.

The Monitor program will set the trigger point at the moment that it reads the Digital Trigger input is active. The Monitor program polls the **Digital Trigger Input** once every 100 milliseconds. You should consider this 100 millisecond time window- when selecting the pre- and post- trigger times.

#### **Current Trigger**

Click an **X** in the **Enable** box if you want to use **Current** to set the trigger point for either a coil or shunt application.

For shunt applications, set a **Debounce Time** between 0 and 10 milliseconds as a decimal number. The actual trigger parameter must be above the user-set trigger level for the length of the **Debounce Time** before the Monitor will initiate a trigger. The start of the post-trigger time will begin at the start of the **Debounce Time**. If you set a **Debounce Time** greater than the post trigger time, the Monitor program will use the post trigger time in place of the user-set **Debounce Time** when it evaluates debounce periods and determines trigger points.

### CHAPTER 4: MONITOR SETUP

Set a value for current level using the slider bar on the **Current Trigger** line on the screen. Moving the slider bar will change the % of range (2000 amps) and the amps boxes. This value will be used for current triggering for shunt applications. The maximum current trigger level for shunt applications can be 2000 amps.

For shunt applications with a dual pulse, the value set for the current level is also used to identify the point at which time and RMS calculation begin for the second pulse.

For coil applications with a single pulse, the value set for the current level is not used for any function. For coil applications with a dual pulse, the value set for the current level is used to identify the point at which time and RMS calculation begin for the second pulse.

For coil applications, **Debounce Time** does not apply. If the schedule has been setup for a coil on the **Weld Setup** Screen, the **Debounce Time** will be greyed-out on the **Current Trigger** line as shown on the screen below.



**NOTE:** For applications with a current trigger level of 50 amps or less it is strongly recommended to select either the **Butterworth** or **IIR** filter on the **Weld Setup** Screen. If a filter is not selected, there is a possibility of false or missed trigger points due to any low electrical noise that may be present.

#### Voltage Trigger

Click an **X** in the **Enable** box if you want to use Voltage to set the trigger point.

Set a **Debounce Time** between 0 and 10 milliseconds as a decimal number. The actual trigger parameter must be above the user-set trigger level for the length of the **Debounce Time** before the Monitor program will initiate a trigger. The start of the post-trigger time will begin at the start of the **Debounce Time**. If you set a **Debounce Time** greater than the post trigger time, the Monitor program will use the post trigger time in place of the user-set **Debounce Time** when it evaluates debounce periods and determines trigger points.

Set a value for voltage level using the slider bar on the **Voltage Trigger** line on the screen. Moving the slider bar will change the % of range (10 volts) and the volts boxes. The maximum voltage trigger level can be 10 volts.

#### Force 1/Pressure and Force2/Pressure Trigger

Set **Debounce Times** between 0 and 10 milliseconds as a decimal number. The actual trigger parameter must be above the user-set trigger level for the length of the **Debounce Time** before the Monitor program will initiate a trigger. The start of the post-trigger time will begin at the start of the **Debounce Time**. If you set a **Debounce Time** greater than the post trigger time, the Monitor program will use the post trigger time in place of the user-set **Debounce Time** when it evaluates debounce periods and determines trigger points.

Set values for force 1 and 2 levels using the slider bar on the **Force/Pressure Trigger** lines on the screen. Moving the slider bar will change the % of range (set on the **Weld Setup Screen**) and the numeric boxes. The maximum force trigger level is the value entered on the **Weld Setup Screen**.

#### Force Pressure Trigger Enable

Force triggering can be based on only the Force 1/Pressure channel, only the Force 2/Pressure channel or both Force/Pressure Channels. If **Force 1 OR Force 2** is selected for **Force Pressure Trigger Enable** setting then the trigger point will be set when either Force 1/Pressure or Force2/Pressure is greater than the trigger setpoint for the length of



the debounce time. If Force 1 AND Force 2 is selected for Force Pressure Trigger Enable setting then the trigger point will be set when both Force 1/Pressure and Force2/Pressure are greater than the trigger setpoint for the length of the debounce time.

### Weld Setup

The Weld Setup Screen sets a number of parameters for the Schedule.

Limits Page 1 Test Limits Pa	ige 2 Trigger Weld Setup	Cun acress Relay Envelope		
Shunt Resistance(mc)	Full Range		Counter 1 Message	
1 0017	Coil Current (A)	24	Orange electrodes	
DC	Voltage (V) Force/Pressure (Ibs)	10	Counter 1 Setpoint	10
Start Cycle	Alternate	10	Schedule Mantenance	
End Cycle	Voltage Threshold for	Resistance Calculation (V)	Counter 2 Setpoint	200
Coil Ratio	Current Threshold for F	lesistance Calculation (kA)	Serial Number Increment	No
Pulse Type SINGLE PULSE	Current Fall Level (%)		Serial Number	No
LinitWarning Lines FIRST PULSE	Force 1 Fire Level		Lot Number	No
	Initial Thickness Delay			
Count Day and	Notice They but	for the	Aburna Dina	
Filter Type Ruthouseth	Filter Type Remound	Filter Type MOLENTED	Filter Type MO EXTED	
- Dullerworth	- I Dones worth	MOTILIER	NOTILIER	

### Shunt Resistance

For a current shunt application, enter a shunt resistance as a decimal number 0 or greater.

### **Coil Ratio**

For a coil application enter the coil multiplier. For example, enter 1 for a 1 X coil. Enter **10** for a 10X coil. Enter the **Coil Ratio** as a decimal value 1 or greater.

### **Current Type**

The choices for Weld Current Type are AC or DC. Choose either AC or DC setting based on type of welding power supply used for the application.

### Start Cycle and End Cycle

For an AC Weld application, a Start Cycle and End Cycle must be entered. These values are used for calculating RMS values. Refer to Chapter 1 for more details of RMS calculations.

Start Cycle can be from 1 to 119. End Cycle can be from 1 to 120. If the user enters in a Start Cycle number greater than the End Cycle, the RMS value reported will be 0.

If DC is selected for Current Type, entry of settings into the Start Cycle and End Cycle boxes is prevented by the Monitor program.

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### Pulse Type

Select Single or Dual for Pulse Type.

1.0017	
Current Type	
DC	
Start Cycle	
1	
End Cycle	
99	
Coil Ratio	



Current Type	
AC	
Start Cycle	
÷ 1	
End Cycle	
99	



4-21

## Limit/Warning Lines

The Limit/Warning Line parameter will determine if the limit lines for the first or second pulse will be displayed on the Weld Monitoring Graphs.

### Full Range – Coil Current

Select the range for the coil used for the application from the drop down box.

## Full Range – Voltage, Force/Pressure/ Alternate

The **Full Range** parameters can be set to provide better proportions in the graph displays.

Voltage can be set from 0 to 15 Volts as a decimal number.

Force/Pressure can be set from 0 to 1000000 as a decimal number.

The Alternate Sensor can be set from 0 to 1000000 as a decimal number.

## Voltage Threshold for Resistance Calculation

Enter a value from 0 to 15 volts as a decimal number. The resistance for the resistance waveform will not be calculated when the voltage is below the value entered into this box.

# **Current Threshold for Resistance Calculation**

Enter a value from 0 to 200 k amps as a decimal number. The resistance for the resistance waveform will not be calculated when the current is below the value entered into this box.

Setting the **Current** and **Voltage** thresholds enables you to eliminate the spikes in the **Resistance** value that would be

calculated from very low Voltage or Current levels. Data points for the Resistance waveform will *not* be plotted unless both the Voltage and Current settings are met.

Coil Current (A)	2K
Voltage (V)	10
Force/Pressure (Ibs)	40
Alternate	

0.1	
Current Thresho	old for Resistance Calculation (kA
Current Fall Lev	rel (%)
Force 1 Fire Lev	vel
Initial Thickness	Delay

√ 2K	
6K	
20K	
60K	
200K	

✓ FIRST PULSE SECOND PULSE

Limit/Warning Lines

#### **Current Fall Level**

Enter a value from 10 to 90 as a whole number. This value determines the end of a weld pulse for RMS and time calculations for DC and AC Welds. This value represents the level of the signal from zero. If the pulse has a peak current of 1000 amps and a **Current Fall Level** of 90% is entered, 900 amps will be the end of the weld pulse for RMS and time calculations.

#### Force 1 Fire Level

Enter a value from 0 to 1000000 as a decimal number. This value sets the point at which the Force Fire Digital Output J105-6 will switch active. When the Force 1 channel is below the Force 1 Fire Level, the Force Fire Digital Output will be inactive. When the Force 1 channel is above the Force 1 Fire Level, the Force Fire Digital Output will be active.

Refer to Chapter 1 for additional information on the Force Fire Function.

#### **Initial Thickness Delay**

Enter a value from 0 to 9999 milliseconds as a decimal number. This parameter is used to set the amount of time that the Monitor program will wait after reading the Initial Thickness Measurement Input go from inactive to active before taking the Initial Thickness Measurement.

Refer to *Appendix C* for additional information on use of the **Initial Thickness Delay**.

#### Counters

The Monitor program provides two user-settable weld counters which can be used to display messages or switch digital outputs. Each counter will display the user-defined message when the user-specified weld count is reached.

Counter 1 Message

Counter 2 Messag

#### **Counter 1 and 2 Messages**

Enter the messages for Counters 1 & 2 as ASCII characters with up to 200 characters.

#### **Counter 1 Setpoint**

Enter values for Counter 1 and 2 Setpoints from 0 to 2147483647 as a whole number.

#### **Serial Numbers and Lot Numbers**

Parameters can be set to control the use of serial and lot numbers.

Counter 2 Setpoint	

Counter 1 Setpoint / 10

Jenar Humber merement	INO
Serial Number	No
Lot Number	No

#### Serial Number Increment

The choices for Serial Number Increment are No or Automatic. If Automatic is selected then the Monitor program will increment the serial number after every weld.

#### **Serial Number**

The Choices for Serial Number are Yes or No. If No is selected, the Serial Number field on the Run and Weld Monitoring Screens will not be accessible.

### Lot Number

The Choices for Lot number are Yes or No. If No is selected, the Lot Number field on the Run and Weld Monitoring Screens will not be accessible.

#### **Filters**

The Monitor program has filters which can be selected to filter noise on the analog input channels.

Current Filter- 2nd	Voltage Filter- 2nd	Force Filter	Alternate Filter
Filter Type Butterworth	Filter Type Butterworth	Filter Type NO FILTER	Filter Type NO FILTER
Cutoff Freq () 1000	Cutoff Freq 3 1000	Cutoff Freq	Cutoff Freq 20

The Filter choices for each of the analog channels are **Butterworth**, **IIR**, or NO FILTER.

Enter Cutoff Frequency from 100 to 20000.

NO FILTER ✓ Butterworth IIR Median

√ No	
Automatic	

√ No	
Yes	

J NO

Yes



### **Run Screen**

imits Page 1	Test Limits Page 2	Trigger Weld Setup Run Scre	en reisy L'nvelope
First Run (	Chart	Histogram	Numeric Data
Number o	f Welds on X axis	Number of Welds in Histogram	First Numeric Data
20		200	RMS Current Pulse 1
		Histogram data	Second Numeric Data
Run Cha	rt Data	Thickness Change 1	Peak Voltage Pulse 1
J Jruno C	urrent Puise i	Sigma	Third Numeric Data
Second R	un Chart	Three Sigma	Force 1
		Higher Pange (80%)	Fourth Numeric Data
Number of	f Welds on X axis	(CFM)	Initial Thickness 1
5/20		Lower Dange (20%)	
Run Cha	rt Data	0 (CEMD	Run Screen Waveform
Peak V	/oltage Pulse 1	(crm)	Current

The **Run Screen** Setup Screen is used to select the parameters that will be displayed on the **Run Screen** and also select some screen formats.

The following parameters can be selected for display on the two Run Charts, Histogram, four Numeric Displays and Waveform on the **Run Screen**.

Peak Current Pulse 1
RMS Current Pulse 1
Peak Voltage Pulse 1
RMS Voltage Pulse 1
Peak Resistance Pulse 1
RMS Resistance Pulse 1
Peak Power Pulse 1
RMS Power Pulse 1
Peak Current Pulse 2
RMS Current Pulse 2
Peak Voltage Pulse 2
RMS Voltage Pulse 2
Peak Resistance Pulse 2
RMS Resistance Pulse 2

Peak Power Pulse 2 RMS Power Pulse 2 Initial Thickness 1 Final Thickness 1 Thickness Change 1 Initial Thickness 2 Final Thickness 2 Thickness Change 2 Force 1 Force 2 Alternate Formula 1 Formula 2
#### **First Run Chart**

For the first **Run Chart** enter the number of welds which can be displayed on the X axis. Enter a value from 10 to 4000.

Select the parameter to be plotted in the first **Run Chart** from a drop down list.

Number	of Welds on X axis
20	
Run Ch	art Data
Run Ch	art Data



#### Second Run Chart

For the second **Run Chart** enter the number of welds which can be displayed on the X axis. Enter a value from 10 to 4000.

Numbe	r of Welds on X axis
20	
P	
Run Cł	hart Data

Select the parameter to be plotted in the second **Run Chart** from a drop down list.

Peak Current Pulse 1	-
RMS Current Pulse 1	
Peak Voltage Pulse 1	
RMS Voltage Pulse 1	
Peak Resistance Pulse 1	
RMS Resistance Pulse 1	
Peak Power Pulse 1	
RMS Power Pulse 1	
Peak Current Pulse 2	
RMS Current Pulse 2	
Peak Voltage Pulse 2	
RMS Voltage Pulse 2	
Peak Resistance Pulse 2	
RMS Resistance Pulse 2	
Peak Power Pulse 2	
RMS Power Pulse 2	
Initial Thickness 1	
Final Thickness 1	
Thickness Change 1	
Initial Thickness 2	
Final Thickness 2	
Thickness Change 2	-

#### Histogram

For the **Histogram**, enter number of welds that will be retained in the histogram. Enter a number from 10 to 4000. Once the number is reached, the Monitor program will maintain the histogram using a first in first out basis.

200 200	ogram
listogram data	
Thickness Change	1
Sigma	
Three Sigma	
gher Range (80%) 0 (CFM)	
wer Range (20%)	
0 (CEM)	

Select the parameter to be plotted in the **Histogram** from a drop down list.

**RMS Resistance Pulse 1** Peak Power Pulse 1 **RMS Power Pulse 1** Peak Current Pulse 2 **RMS Current Pulse 2** Peak Voltage Pulse 2 RMS Voltage Pulse 2 Peak Resistance Pulse 2 **RMS Resistance Pulse 2** Peak Power Pulse 2 **RMS Power Pulse 2 Initial Thickness 1** Final Thickness 1 Thickness Change 1 **Initial Thickness 2 Final Thickness 2** Thickness Change 2 Force 1 Force 2 Alternate Formula 1 Formula 2



umber of Welds in Histogra
Histogram data
Final Thickness 1
Sigma
Three Sigma
igher Range (80%) 0.06 (inch)
ower Range (20%)
20.00

Select the number of sigma to be displayed on the histogram for the standard deviation calculation.

If the parameter selected for the **Histogram** does not have limits set on either the Limits Page 1 or 2 screens the higher range and lower range will be in black font indicating that these parameters should be entered. The Higher and Low Ranges are used to scale the X Axis of the Histogram.

Enter Higher and Lower range as a decimal number from 0 to 100

## CHAPTER 4: MONITOR SETUP

#### **Numeric Data and Waveform**

Up to four Numeric parameters can be selected to be displayed in large font in the upper right corner of the **Run Screen**.

Select the parameter for each of the Numeric display.



st Numeric Data	
RMS Current Pulse 1	-
Peak Current Pulse 1	
RMS Current Pulse 1	
Peak Voltage Pulse 1	
<b>RMS Voltage Pulse 1</b>	
Peak Resistance Pulse 1	
<b>RMS Resistance Pulse 1</b>	
Peak Power Pulse 1	
RMS Power Pulse 1	
Peak Current Pulse 2	
RMS Current Pulse 2	
Peak Voltage Pulse 2	
RMS Voltage Pulse 2	
Peak Resistance Pulse 2	
<b>RMS Resistance Pulse 2</b>	
Peak Power Pulse 2	
RMS Power Pulse 2	
Initial Thickness 1	
Final Thickness 1	
Thickness Change 1	-
Initial Thickness 2	
Final Thickness 2	
Thickness Change 2	

### Waveform

The waveform needs to be selected for the lower right of the **Run Screen**.

Run	Screen	Waveform
	0010011	

Current

## Relay

The **Relay Setup Screen** below allows you to set when you want each of the four Weld Monitor relays to activate. This screen also allows you to set the **Condition** and **Relay State** for each of the relays. The process for setting these parameters is the same for each relay.

1   Test Limits Page 2   1	Ingger Weld Setup Run Scree Relay   Presses	Schedule Name Ru	un Sample DC,46
Relay 1		Relay 2	
Relay State	Select Parameter	Relay State	Select Parameter
F NO C NC	Any Force 1 Force 2 Current X Initial Thickness 1 Initial Thickness 2	A NO C NC	Any Force 1 Force 2 Current Initial Thickness 1 Initial Thickness 2
Condition	Vohage Final Thickness 1 Final Thickness 2	Condition	Voltage Final Thickness 1 Final Thickness 2
Above Limit Max Above Warning Max	Power Displacement 1 Displacement 2 Resistance Formula 1 Altornate	Above Limit Max Above Warning Max	Power Displacement 1 Displacement 2 Resistance Formula 1 Alternate
<sup>(4</sup> Below Limit Min	Weld Tane Formula 2 Hard Drive Full	C Below Limit Mis	Weld Time Formula 2 Hard Drive Full
Relay 3		Relay 4	
Relay State	Select Parameter	Relay State	Select Parameter
<sup>©</sup> NO ⊂ NC	Any Force 1 Force 2 Current Initial Thickness 1 Initial Thickness 2	A NO C NC	Any Force 1 Force 2 Current Initial Thickness 1 Initial Thickness 2
Condition	Voltage Final Thickness 1 Final Thickness 2	Condition	Voltage Final Thickness 1 Final Thickness 2
C Above Limit Max C Above Warning Max	Power Displacement 1 Displacement 2 Hesistance Formula 1 Altornate	C Above Limit Max Above Warning Max	Power Displacement 1 Displacement 2 Resistance Formula 1 Alternate
Derow marning min		Derow training this	

## **Relay State**

Select NO (Normally Open) or NC (Normally Closed).

Relay State	
ONC	

## Condition

Set the **Condition** of when the relay should activate. Select **Out of Limits, Above Upper Limit,** or **Below Lower Limit.** 

Abo	ve Limit Max
Abo	ve Warning Max
C Bel	ow Warning Min
• Bel	ow Limit Min

## **Channels Selected**

You may select any individual Parameter or any combination of these parameters. If you select **Any**, the relay will activate any time any one of these parameters goes out of limits.

elect Paramete	r	
Any	Force 1	Force 2
Current	Initial Thickness 1	Initial Thickness 2
Voltage	Final Thickness 1	Final Thickness 2
Power	Displacement 1	Displacement 2
Resistance	Formula 1	Alternate
Weld Time	Formula 2	Hard Drive Full

## Envelope

1. Click on the **Envelope** tab on the **Schedule Setup** to setup an envelope for a schedule. When the **Envelope** tab is accessed, the current waveform will be displayed by default for the selected schedule. The screen below does not display an envelope waveform, indicating that the current envelope has not yet been setup.

	Minindex																						
	1		zie		ie .	ż		-		sin		1500		uise .		ie .	zise		2000		2790	)•	
Ervelope ID 0	M	ax Inde	x																				
Timestamp References Waveform File Reinter		_	-	_	_	_	_	-	_	-	_		_		_	_	-	_		_			
c'en/ieiCarent	ó		230	3	80	75	0	3000		1250		1300		1750	3	200	2250		2900		2750		
	Re	efWav	eform U	pper C	fiset (	(16)																Upper Of	wet
Record ID Included	4	i	ż	iš.	20	15	÷	-	÷.	÷	- 50	35	-	is.	ż	ż	ń	is.	-	÷.	-	J	A
	Re	efWav	eform L	pwer C	Hiset (	14																Lower Of	set.
		-																			- 1	0	A
	0	5	30	15	20	25	- 20	35	-40	-45	50	55	- 60	65	70	75	80	85	-90	85	300		
001- 002- 006- 006- 006-																							
100-							_																1

**Envelope** limits sets the maximum and minimum limits above and below a waveform from a previous weld (or welds) for a specific parameter. You may choose a single waveform around which to create an envelope or you may average several waveforms together in order to get an "ideal" reference for the welds you want to make. The upper and lower bounds of the envelope remain a constant distance from the reference waveform.

### **CHAPTER 4: MONITOR SETUP**



2. Click the **Envelope Type** box to display a drop down box listing the envelopes available for this schedule. If the voltage waveform is selected the screen will appear as shown below.

NA
✓ Current
Voltage
Force 1
Displacement 1
Power
Resistance
Gas Flow
Force 2
Displacement 2

to a longe		_							_		_			-	-	4.	-	1	
Envelope ID 0		t Max Inde	200	50	0	740	1000	13	•	1000	P	50	3080	1090		1000	2790		
Timestamp Reference Waveform File Pointer	-	_		_	_				_		_	-			-		-	1	
c'endievotage			210	30		750	200	10	0	1500	10	50	20100	2290		1900	2790		
		Ref Wave	eform Up	per O	fiset (3	6)												Upper Offset	
Record ID Included		i i	ŵ	ģ	ż	28 20		* *		1 93	ŵ	45	70 1		ni 1	i 15	No	J. 100	
		Ref Wave	eform Lo	wer Of	ffset (3	6)												Lower Offset	
· · · · · · · · · · · · · · · · · · ·		1 1	ŵ	ģ	ż	26 26		÷ ÷			- 60	15	* *	÷.	eš 1	ė 18	rio	J. 100	
	Di 1	i.	R.	2-		1 Tree	_ 1	-	<u>1</u> -		a			Ļ	ш-	n-		0 23	
											Ge	mera	ate Re avefo	ference	1				

3. Click on **Generate Reference Waveform** and then a **Query** screen will appear. Do a query which, at a minimum, includes the desired welds that will be averaged into the envelope for this schedule. This will give a screen with a query as shown in the following screen.

	Starting Date E	Ind Date				-						
	September, 2010	September, 2010										
	Sin Min Tue Well Thu Fe Sa	Sun Mon Sue West Thu Fr. Sat										
	5 6 7 8 9 10 11	5 6 7 8 9 10 11		_	_/ .							
	19 21 22 23 24 25	9 7 2 2 2 3 4 5		0		2 0	h	In Form	Colort			
	1 4 5 6 7 1 5	1 4 5 6 7 1 5 Turker \$/27/2010		Que	ry	- 3	now wa	verorm	Select			
Weld Count	Time Stamp	Schedule Name	Weld Serial	Weld Lot	Test ID ECC01	Sche ID	Polarity	Current Peak	Voltage Peak	Power Peak	Resistance P	eak /
100	9/20/2010 4:35:40 PM	Run Sample DC	-		52601	30	Pos	0.794933	4.349024	2.10012	110.47000	126
100	9/20/2010 4:35:30 PM	Run Sample DC		-	52600	30	Pos	0.696164	4.403700	2.000000	14.94304	120
104	9/20/2010 4:35:29 PM	Run Sample DC			52599	30	Pus	0.000104	4.090701	2.30422	10.7430/	205
103	9/20/2010 4:35:19 PM	Run Sample DC		-	52598	30	Pos	0.768251	4.411305	2.13312	45 0374	200
102	9/20/2010 4:35:12 PM	Run Sample DC		_	52597	30	Pos	0.739997	4.049123	2.01012	10.03/13	102
101	9/20/2010 4:35:06 PM	Run Sample DC			52596	30	Pos	0.724040	4.242100	2.40020	14./4000	102
100	9/20/2010 4:34:49 PM	Run Sample DC	-		52595	35	Pos	0.742857	4.202001	2.51392	14.40183	101
33	9/20/2010 4:34:26 PM	Run Sample DC		_	52594	30	Pos	0.731781	4.238098	2.46/30	15.63820	201
98	9/20/2010 4:34:16 PM	Run Sample DC	_	_	52593	35	Pos	0.726222	4.146968	2.49431	14.58635	165
9/	9/20/2010 4:34:05 PM	Run Sample DC		_	52592	35	Pos	0.715319	4.259490	2.52400	15.48779	301
96	9/20/2010 4:33:45 PM	Run Sample DC	_		52591	35	Pos	0.680515	4.394323	2.38529	14.88210	111
95	9/20/2010 4:33:37 PM	Run Sample DC		-	52590	35	Pos	0.68/1//	4.289286	2.44934	13.61684	170
94	9/20/2010 4:33:27 PM	Run Sample DC		-	52589	35	Pos	0.645138	4.145526	2.46147	10.25134	1/2
93	9/20/2010 4:33:16 PM	Run Sample DC		_	52588	35	Pos	0.730965	4.246863	2.49094	14.63179	135
92	9/20/2010 4:32:47 PM	Run Sample DC			52587	35	Pos	0.747542	4.084793	2.57171	13.63737	96
91	9/20/2010 4:31:58 PM	Run Sample DC			52586	35	Pos	0.699624	4.244141	2.47566	13.02146	24
90	9/20/2010 4:31:50 PM	Run Sample DC		-	52585	35	Pos	0.649162	4.345870	2.34505	15.86371	70
89	9/20/2010 4:31:41 PM	Run Sample DC			52584	35	Pos	0.629893	4.559584	2.21315	17.30585	386
88	9/20/2010 4:31:31 PM	Run Sample DC	1	2	52583	35	Pos	0.747534	4.118857	2.56120	12.39950	127
87	9/20/2010 4:31:24 PM	Run Sample DC		1	52582	35	Pos	0.605372	4.491244	2.29290	14.53480	162
86	9/20/2010 4:31:17 PM	Run Sample DC			52581	35	Pos	0.742160	4.181622	2.52252	15.36198	190
85	9/20/2010 4:31:09 PM	Run Sample DC			52580	35	Pos	0.671751	4.421860	2.38427	14.17446	513

4. You may choose an individual waveform or up to 30 waveforms to average together as the baseline for the envelope. Select multiple waveforms by holding down the **Ctrl** key and selecting, or you may select a block by holding down the **Shift** key and click on the first and last selections and all waveforms in between will be selected. The following screen shows selected welds.

	Starting Date	End Date										
	E September 2010	E September 2010							1			
	Sun Mon Tue Wed Thu Fit Sat	Sun Mon Tue Wed Thu Fri Sat										
	5 6 7 8 9 10 11	5 6 7 8 9 10 11 12 10 14 15 16 17 18				_						
	19 27 21 22 20 24 25 26 27 28 29 30 1 2	19 21 22 29 24 25 26 27 28 29 30 1 2		Oue	~ <	> 5	how Way	Eorm II	Supreme +			
	Teler, \$/27/2018	1 Noter 3/22/2010		Que	y		1014 144	veronn	Jeicer			
	(The Area)	Industry Name		100.000.00	12	10-1-10	18-to the	10	Martin Bart	D	Decision of the	
106	9/20/2010 4:35:46 PM	Run Sample DC	Weld Serial	Weld Lot	52601	36	Pos	0 794933	4 349824	2 78672	15 47006	7
105	9/20/2010 4:35:38 PM	Run Sample DC			52600	35	Pos	0 744004	4 403766	2 66586	14 94364	26
104	9/20/2010 4:35:29 PM	Run Sample DC			52599	35	Pos	0.686164	4.596701	2 584220	15,74382	40
103	9/20/2010 4:35:19 PM	Run Sample DC			52598	35	Pos	0.768251	4.411369	2 73372	14.73723	03
102	9/20/2010 4:35:12 PM	Run Sample DC			52597	35	Pos	0.739997	4.649723	2.67672	15.03713	85
101	9/20/2010 4:35:06 PM	Run Sample DC			52596	35	Pos	0.724848	4.242180	2.46526	14.74085	52
100	9/20/2010 4:34:49 PM	Run Sample DC			52595	35	Pos	0.742857	4.262551	2.51392	14,46183	87
99	9/20/2010 4:34:26 PM	Run Sample DC			52594	35	Pos	0.731781	4.238698	2.46730	15.63820	55
98	9/20/2010 4:34:16 PM	Run Sample DC			52593	35	Pos	0.726222	4.146968	2.49431	14.58635	23
97	9/20/2010 4:34:05 PM	Run Sample DC			52592	35	Pos	0.715319	4.259490	2.524004	15.48779	58
96	9/20/2010 4:33:45 PM	Run Sample DC			52591	35	Pos	0.680515	4.394323	2.38529	14.88210	$\overline{n}$
95	9/20/2010 4:33:37 PM	Run Sample DC			52590	35	Pos	0.687177	4.289286	2.44934	13.61684	7C
94	9/20/2010 4:33:27 PM	Run Sample DC			52589	35	Pos	0.645138	4.145526	2.46147;	10.25134	75
93	9/20/2010 4:33:16 PM	Run Sample DC			52588	35	Pos	0.730965	4.246863	2.49094	14.63179	39
92	9/20/2010 4:32:47 PM	Run Sample DC			52587	35	Pos	0.747542	4.084793	2.571712	13.63737	96
91	9/20/2010 4:31:58 PM	Run Sample DC		2	52586	35	Pos	0.699624	4.244141	2.47566	13.02146	24
90	9/20/2010 4:31:50 PM	Run Sample DC	1		52585	35	Pos	0.649162	4.345870	2.34505	15.86371	7C
89	9/20/2010 4:31:41 PM	Run Sample DC	- 14		52584	35	Pos	0.629893	4.559584	2.21315	17.30585	86
88	9/20/2010 4:31:31 PM	Run Sample DC	- 12		52583	35	Pos	0.747534	4.118857	2.561207	12.399502	27
87	9/20/2010 4:31:24 PM	Run Sample DC			52582	35	Pos	0.605372	4.491244	2.29290	14.53480	62
86	9/20/2010 4:31:17 PM	Run Sample DC			52581	35	Pos	0.742160	4.181622	2.52252	15.36198	90
85	9/20/2010 4:31:09 PM	Run Sample DC	87	5	52580	35	Pos	0.671751	4.421860	2.384270	14.17446	13

5. Click the **Show Waveform** button to display the waveforms selected. Each waveform will be shown as a dashed line in a unique color. The color is coded to one of the **Remove/Add** buttons that appear along the bottom of the screen. The **Remove/Add** buttons in grey font do not have an assigned waveform. This screen provides an opportunity to deselect waveforms if it is not desired to include them in the final average baseline for the envelope.



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6. If there is a waveform that should not be included in the average of waveforms for the baseline, then the **Remove/Add** button can be clicked for that particular waveform. In the following screen, the waveform 52600 has been removed as indicated by the **Remove/Add** button which is shown as **Add**.



7. Click the **Return** button when finished removing or adding waveforms. The **Query** screen for the waveforms will then appear and only the waveforms that remain selected will be highlighted.

1	Starting Date 6	End Date									1
	E September, 2010	El September 2010								A 2	
	Sun Non Tue Hed Thu Re Se	Sun Han Tue Wed Thu To Sat									
	1171111	3 4 7 8 5 10 11						-			
	19 20 21 22 23 24 25	19 2 2 2 3 3 3		0	1	> 0	a muse Mara		Calact		C 1
	1 4 5 6 7 1 5	3 4 5 6 7 1 5		Que	y		now way	verorm	Select		
								-			
Weld Count	Time Stamp	Schedule Name	Weld Serial	Weld Lot	Test ID	Sche ID	Polarity	Current Peak	Voltage Peak	Power Peak	Resistance Peak *
105	9/20/2010 4:35:46 PM	Run Sample DC	_		52601	35	Pos	0.794933	4.349824	2.786720	15.4700670
105	9/20/2010 4:35:38 PM	Run Sample DC			52600	35	Pos	0.744004	4.403766	2.665860	14.9436426
104	9/20/2010 4:35:29 PM	Run Sample DC			52599	35	Pos	0.686164	4.596701	2.584220	15.7438249
103	9/20/2010 4:35:19 PM	Run Sample DC			52598	35	Pos	0.768251	4.411369	2.73372.	14.7372303
102	9/20/2010 4:35:12 PM	Run Sample DC			52597	35	Pos	0.739997	4.649723	2.67672	15.0371389
101	9/20/2010 4:35:06 PM	Run Sample DC			52596	35	Pos	0.724848	4.242180	2.465264	14.7408552
100	9/20/2010 4:34:49 PM	Run Sample DC			52595	35	Pos	0.742857	4.262551	2.513928	14.4618387
99	9/20/2010 4:34:26 PM	Run Sample DC			52594	35	Pos	0.731781	4.238698	2.467308	15.6382055
98	9/20/2010 4:34:16 PM	Run Sample DC			52593	35	Pos	0.726222	4.146968	2.494314	14.5863523
97	9/20/2010 4:34:05 PM	Run Sample DC			52592	35	Pos	0.715319	4.259490	2.52400-	15.4877958
96	9/20/2010 4:33:45 PM	Run Sample DC			52591	35	Pos	0.680515	4.394323	2.385293	14.8821077
95	9/20/2010 4:33:37 PM	Run Sample DC			52590	35	Pos	0.687177	4.289286	2.44934:	13.6168470
94	9/20/2010 4:33:27 PM	Run Sample DC			52589	35	Pos	0.645138	4.145526	2.46147:	10.2513475
93	9/20/2010 4:33:16 PM	Run Sample DC			52588	35	Pos	0.730965	4.246863	2.49094:	14.6317935
92	9/20/2010 4:32:47 PM	Run Sample DC			52587	35	Pos	0.747542	4.084793	2.57171:	13.6373796
91	9/20/2010 4:31:58 PM	Run Sample DC			52586	35	Pos	0.699624	4.244141	2.475661	13.0214624
90	9/20/2010 4:31:50 PM	Run Sample DC			52585	35	Pos	0.649162	4.345870	2.34505-	15.8637170
89	9/20/2010 4:31:41 PM	Run Sample DC			52584	35	Pos	0.629893	4.559584	2.21315	17.305858E
88	9/20/2010 4:31:31 PM	Run Sample DC			52583	35	Pos	0.747534	4.118857	2.56120	12.3995027
87	9/20/2010 4:31:24 PM	Run Sample DC		1	52582	35	Pos	0.605372	4.491244	2.292908	14.5348062

8. Then click the **Select** button. The **Select** button will then appear in grey font indicating it has been pressed.



9. Then click on **Return**. The waveforms selected will be averaged into one waveform which will be shown on the **Envelope** screen as a white line.



10. The slider bars for the **Min Index** and **Max Index** can be moved to select the beginning and end of the envelope. The **Ref Waveform Lower Offset** sets the lower limit of the envelope, and the **Ref Waveform Upper Offset** sets the upper limit.

Envelope Type Voltage	M	in Inder	ĸ																			
Envelope ID 0	ë Ma	ux Inde	250		sóo	730		xioo	3	1250	3	1500	1	:150	20	ioo	2250		250		2350	101
Reference Waveform File Pointer	-	_	100	-	nin.	-	2	vin	_	-	-			in .		in .	-		-			1288
c'envfievoltage	Ra	of Wave	eform t	Upper	Offset	(%)		200		_							1150					Upper Offset
Record ID included	4	ŝ.	ŵ	ů	ż	ż.	39	á.	-	45	*	35	-	<b>1</b> 5	'n	ń	<b>1</b> 00	<b>1</b> 5	ż	**	100	JI 4223 Vots
12801,52590,52590,52597,52596,52595,52594,52594,52593,52590,52590, 12590,52598,52588,52587	Re	ef Warve	rform L	ower	Offset	(%)			222.000	10000	- 302			22:20:23								Lower Offset
	1	ŝ	10	ii.	20	25	<del>30</del>	á.	-	-	10	ń	eb.	<b>65</b>	'n	75	80	ń	10	95	100	Junit Vite
												-										
1.00-		-																				
2.50					_																	
1.56						11																
1.90-						11																

11. When the envelope has been defined, click the **Save** button and a window will open prompting for the schedule name.

The information in the upper left of the screen is updated as follows:

**Envelope ID** is a reference number.

**Timestamp** is time that envelope was created.

**Reference Waveform File Pointer** is file location of the waveform.

**Record ID Included** lists the waveforms averaged into the baseline for the envelope.

The Envelope ID and Reference Waveform File **Pointer** are for historical reference.

Envelope Type	Voltage
Envelope ID	
Envelope ID	4
Timestamp	9/27/2010 6:43:16 PM
Reference	Waveform File Pointer
c:\envfile\vo	ltage\4
Record ID Ir	ncluded

## Section III. Security

The Monitor program maintains a list of users and their passwords. There are four levels of security. Only users with the highest level of security can add or delete users.

Level	Description	Access
0	Operator	Access to view screen <i>only</i> .
1	Technician	Access to Diagnostics, Calibration, and Monitor <b>Program</b> screens.
2	Engineer	Access to all screens <i>except</i> the <b>Security</b> screen.
3	Administrator	Access to <b>all</b> screens.

From the **MAIN MENU**, click on the **SECURITY** button. When the **SECURITY MENU** screen appears it automatically displays the user currently logged-on to the Monitor program and what the security level is for that user.





Click on the **USER NAMES** button to go to the user name and password table.

#### To Add A User

- 1. Type a new username in **USER NAME** box
- 2. Type a new password in **PASSWORD** box
- 3. To set the security level, click on the **LEVEL** text box to open a list of security levels.

USER NAME	PASSWORD	LEVEL	USER NAME
Miyachi	UNITEK	4	
MUC	MUC	4	
liser	USER	1	PASSWORD
			LEVEL
			Operator
			-
			ADD
			DELETE
			DOME

4. Click Operator, Technician, Engineer, or Administrator to select the security level.

Myachi UNTEK: 4 MUC MUC 4 USAR USER 1 Coperator Coperator Coperator Technician Engineer Administrator CELETE	E PAS	SWORD	LEVEL (X	USER MAME
MUC MUC 4 User USEP I Coperator Technician Engineer Administrator	UNI	EK	4	Operator1
User USEP 1 User USEP 1 User USEP 1 User Engineer Administrator DELETE	MUC		4	
Utvel V Operator Technician Engineer Administrator	USE	ł.	1	PASSWORD
LEVEL V Operator Technician Engineer Administrator DELETE				Linen
Coperator Technician Engineer Administrator				LEVEL
Technician Engineer Administrator				J Operator
Engineer Administrator				Technician
Administrator				Engineer
Celete				A designation
DELETE				Administrator
DELETE				
DELETE				
DELETE				
				DELETE
DONE				DOME
				DOME

**NOTE:** The **User Name** and **Password** table only displays the security levels of users as numbers which correspond to the descriptions below.

Level	Description	Access
1	Operator	Access to view screen <i>only</i> .
2	Technician	Access to Diagnostics, Calibration, and Monitor <b>Program</b> screens.
3	Engineer	Access to all screens <i>except</i> the <b>Security</b> screen.
4	Administrator	Access to <i>all</i> screens.

5. Click the ADD button. The new user name will appear in the USER NAME list

USER NAME	PASSWORD	LEVEL	A USER RAME	
Miyachi	UNITEK	4	Operator1	
Operator1	ABCO	1	PASSWORD	
			ABCD	
			LEVEL	
			Operator	-
			400	
			DELETE	
				1
			DONE	
(				

#### To Delete a User

- 1. To delete a user, click on the user you want to delete to highlight the user and then press **DELETE**.
- 2. When you are finished adding or deleting users, press the **DONE** button to return to the main **SECURITY** menu.
- 3. Click on **RETURN** to go back to the **MAIN MENU**.

## Section IV. Logger Setup

For **Logger Setup**, you select which weld parameters will be displayed in listings of weld data on the Monitor Program's **View Logger** Screens.

From the Main Menu, click the Waveform & Logger Setup button and then the screen for the Logger Setup Tab will display.



There are two columns of weld parameters displayed on the **Logger Setup** screen. The column on the left shows all the weld parameters which can be selected for display on the screens listing weld data. The column on the right shows the weld parameters which have been selected for display.

## **CHAPTER 4: MONITOR SETUP**



- To add a parameter to the right column, click on a parameter in the left column and press the > key to add it to the right column
- 2. To remove a parameter from the right column, click on a parameter in the right column and press the < key to remove it.
- 3. To add all the parameters in the left column to the right column, click on the >> key. To remove all parameters from the right column press the << key.

The sequence that parameters will be displayed from left to right on the **View Logger** screens is the order in which the parameters appear in the right column. The sequence can be changed using the  $\Lambda$  or **V** keys. Highlight a parameter in the right column and then click the  $\Lambda$  or **V** keys to move it up or down in the list.

	part serial
	timestamp
>>	current peak 1
	current result
>	displacement 1
	displacement 1 result
<	voltage peak 1
	voltage rms 1
	Change Order

## Section V. Waveform Setup

For Waveform Setup, select which waveforms you want to save for each weld. This selection will be applied to all welds. You can save all or only a subset of the waveforms, which include Current, Voltage, Force (1), Displacement (1), Power, Resistance, Alternate Sensor, Force 2 and Displacement 2 waveforms.

From the Main Menu, click the Waveform & Logger Setup button and then the Waveform Setup Tab to get to the Waveform Setup screen.

	Image: Constant of the second of
Logger Setup	Waveform Log Type       Full Log         Current       Voltage         Voltage       Force         Displacement       Power         Resistance       Gas Flow         Force 2       Displacement 2

#### Select Waveform Log type.

The **Waveform Log Type** applies additional selection criteria on the wave forms selected from the waveform list.

- No Log = Monitor Program will not save any waveforms.
- Full Log = For every weld, the Monitor Program will save all the waveforms which have been selected in waveform list.
- Out of Limits Log = For only every weld with an out of limits parameter, the Monitor Program will save only the waveforms selected in the waveform list.



#### Waveform List.

Below the **Waveform Log Type** is a list of waveforms. Click an X in the box to the left of the weld parameter to select that parameter as a waveform to be saved based on the **Waveform Log Type** configured.

The Monitor Program is shipped with the Current, Voltage, Force, Displacement, Power, Resistance, and Alternate Sensor waveforms selected. If the user wants to save the waveforms for the second channels of force and displacement, Force 2 and Displacement 2 should also be checked.

# Chapter 5 Using the WM-100A Database

## Section I. Database Overview

You can access the Monitor Program's database through several of the Monitor Program's screens and you can access it by using third-party software. This chapter will describe how to retrieve and analyze weld data from the database as well as how to manage the database as it grows.

*Chapter 5* will cover Monitor Program functions behind the Waveform & Logger Setup, Database Management, and SPC buttons on the Main Menu.



## Section II. View Logger

To view the weld data information in alphanumeric format in the Monitor program database, access the functions behind the **Waveform & Logger Setup** button. The weld data can be viewed for a range of welds.

- 1. Click the Waveform & Logger Setup button.

2. The screen for logger and waveform setup and viewing will be displayed. To view the alphanumeric weld data, click on the **View Logger** tab to access the **View Logger Screen** as shown on the following screen.

Date Tar Wes	2010 II II	d Date Repterber, 2010							Events Intertance	Tion 19	1009	
7 8 14 15 21 22 21 23 1 5 Feder	3 10 11 1 14 17 18 10 21 34 25 19 30 1 2 2 30 1 2 2 3729/2010	6 7 8 1 13 14 15 14 1 21 22 23 2 27 28 29 30 6 7 89997	0 11 7 10 4 25 1 2 0 7 0	14.0	Query	< >						
*	schedule af	schedule name	counter_1	current ress 1	current peak 2	current result	displacement 1	displacement 1 result	force 3 peak	voltage prak 1	voltage result	
	-									-	-	

## **Querying the Database**

Using the **View Logger** screen, you can retrieve data by selecting a start date and end date on the two calendars in the upper left corner of this screen.

- 1. Click on the desired **Starting Date** in the calendar on the left.
- 2. Click on the desired **End Date** in the calendar on the right.
- 3. When both dates are selected, press the **Query** button. The weld data for the parameters setup in the **Logger Setup** will display in columns.

searcing course	E	nd Date							Events			
	and the local distance of the local distance	Enterter 2010							Treate	no froe	No.	_
September.	. 2010	<ul> <li>September, 2010</li> </ul>							9.20.00	12 4.35-40 PM	Test Stopped	_
Sun Mon Tue Wed	Thy Fri Sat 5	kun Mon Tue Wed Thu I	An Sat						4.06.08	10 4 35-46 PM 2	Deplocement 1: Fail.	
20 30 31 8	2 3 4	25 30 31 8 2	3 4						9.00.00	12 4.25.38 PM 2	Deplecement 1: Fal.	
5 6 7 8	9 10 11	5 6 7 8 9	10 11			1 1			9,00,00	10 4 35 37 PM 2	Weld Time out of Range	
12 13 14 15	16 17 18	12 13 14 15 16	17 18		Ourse l	< >			9.05.05	12 4 25 04 Per 2	Deplecement 1: Fal.	
19 20 21 22	23 24 25	19 20 21 22 23 2	24 25		Query I	and a second			9/20/20	12 4 34 40 PM 2	Department 1 Fal.	
26 27 28 29	30 1 2	26 27 28 29 30	1 2		-				9,20,00	10 4 34 26 PM 2	Deplecement 1: Fal.	
	7 2 2			Rec	rds Shown: 1 to 25 of 3	6			9,25,25	12 4 34 16 PM 2	Deplocement 1: Fail,	
Today	9/26/2010	Tuskey 3/2/0/3	1010									_
									and the second			
mestamp	schedule id	schedule name	counter_1	current rms 1	current peak 2	carrent result	deplacement 1	displacement 1 result	force 1 peak	volkage peak 3	voltage result	
25/2510 4:35-46 PM	35	Run Sanple DC	106	0.629829	4.000800	PAGS	0.003091	PAL	10.996238	4.346824	PASS	
(25)(35:10 4:35:38 PM	35	Run Sample DC	205	0.584063	6.000000	PAdd	0.003681	FAL	10.857968	4.403767	PAGE	
35/35 30 4 35/25 PM	35	Ruh Sample DC	304	0.557654	6-300800	PAGS	0.005354	P455	10.941302	4.596.002	PAGE	
25(35:00 4:35:19 PM	35	Run Sample DC	10.5	0.4 00306	6-000809	PAGE	0.004671	VENEN	10.749612	4.411370	PAGS	
25/30 ID 4 35 12 PM	35	Run Sample OC	10.2	0.592913	0.000000	PAGE	0.001309	PASS	10.799740	4.649723	PAGG	
20/2010 4 35-06 PM	35	Run Sample DC	101	0.568755	6-300800	PAGE	0.003445	PAL	10.849068	4.242181	PASS	
20/20/30 4 34 40 PM	35	Run Sanple DC	200	0.580715	6-300808	PAGE	0.003484	FAL	10.833025	4.362951	PAGS	
30/3010 4 34 36 PM	28	Bun Sample OC	95	0.572706	0.000000	PAGE	0.003854	P43.	10.733170	4.238608	PAGS	
20(2010 4 34 56 PM	15	Run Sample DC	98	0.570305	0.000000	PAGE	0.003384	FAL	12.964403	4.146968	PAGG	
25/2010 4 34:05 PM	35	Run Sample OC	97	0.5690799	6.00000	PA65	0.003681	FAD.	12.405463	4.299491	PASS	
25/2010 4:33:45 PM	35	Run Sample OC	95	0.544638	0.000000	WARN	0.003858	PAL	12.430426	4.394323	PASS	
20/2010 4:33:37 PM	35	Run Sample OC	95	0.553814	6.000000	PASS	0.004104	VLARN	12.713639	4.285287	PASS	
20/2010 4:33:27 PM	35	Run Sanple OC	94	0.529688	0.000000	INARY	0.001717	PAL	12.413/84	4.145528	PAGG	
30/30.00 4/30/39.94	25	Run Sample DC	93	0.549489	0.00000	PA95	0.002953	PAL	12.755246	4.246864	PAGE	
25/30:30 4:32:47 PM	35	Run Sample OC	92	0.581552	6.00000	PA05	0.003224	PAL.	12.42.8672	4.584793	PASS	
20/2010 4:31.56 PM	38	Run Sample OC	93	0.586344	6-300800	PAGE	0.007087	VLMPIN	12.438304	4.264143	PN00	
2020-00-4-31-30-PM	35	Run Sangki OC	90	0.550/84	0.00000	PA00	0.007306	VLMON	12.173989	4.345870	PN00	_
20/2010 4:31/41 PM	38	Run Sanple OC	89	0.129996	0.000000	INMIN	0.008304	PAL.	13.7961110	4.539384	PAGE	
20120-00 0 31:00 PM	10	Run Garage (K.	47	0.6.0015	4.00000	PAGE	0.001768	Page	12.012.0000	4.110057	P100	
AUX 20 4 31/24 PM		Run Sangle OC	10	0.51/6/0	0.000000	INVESTIGATION OF COMPANY	0.0006.34	TANKS	12.000.007	4.49.2146	150	
2010/00/00 + 31/10/100		Run Sangle CC		0.000193	4.000000	1400	0.000000	TARK .	12.003124	4 47 94 7	1400	
10.00 × 31.00 PM	10	Run Sangle CK	80	0.002/01	4.000000	1400	0.005128	P 400	14.000000	4 1000	8445	
10,000 A 10,00 A	15	Run Sample CV	10	0.000000	6.000000	FAB	0.0056-46	643	14.036.032	4 10 10 44	8405	
00/00 to 4 30 24 PM	H	Run Sample IV	10	0.000127	4.000000	FAD	0.01101	143	4.843854	4.5336.64	PAGE	
10/10/10 4 Mag 100	16	Run Sample (M	81	0.750110	6.00000	FAB	0.0096.36	643	12.003433	4.614735	PAGE	
00/00 to 0 20 14 PM	15	But Lands OC	80	0.7306.15	4.000000	FAIL	0.005449	FAL	10.04000.0	4.492106	1400	
10,00 m + 76.00 Pm	16	Run Sample (M		0.700005	0.000000	FAB	0.010945	P.43	18.987400	4.4 10 100	PAGE	
25/05 (0 4 29 36 PM	35	Run Sample OC	79	0.702104	4.000000	IN ARTY.	0.008307	FAL	10.12742-00	4.801348	PA00	
	36	Bun Ganale OC	72	0.4.30990	4-000800	PAGE	0.00 8063	FAL	0.0100308	4.431347	PAGE	
(Margarette and and a second second	1	DC Col Sample		0.471117	8-000000	FAB	0.000591	Fab	0.065360	4.388-485	FAD	
20/00 to 4 28-36 PM		a sea sea bar and		1	1			1				_

While the data is loading into the **View Logger** screen there will be a message to the left of the **Query** Button, "**Query Data...Please Wait**". The background for this message with change from **red** to **grey** indicating that the Monitor program is retrieving information. This message will disappear after the data has finished loading. The loading of the data may take a number of seconds as it loads and updates the

Query data Please wait	
Query data Please wait	

color coded weld parameters on the screen. Any weld parameter that is out of limits appears in red font. Any weld parameter that is in limits but out of warnings appears in **yellow** font.

This screen will display up to 200 records. If your query contains more than 200 records, use the < > (left and right) arrow buttons that are just to the right of the **Query** button to page through your query.

Query	<	>
Records Shown: 1 to 35 (	of 35	

A table, labeled **Events**, listing the events and errors for the query, is displayed in the upper right of the screen. There are vertical and horizontal slider bars which can be used to scroll through the event and error information.

Timestamp	Type	Message	
9/20/2010 4:35:49 PM	1	Test Stopped	
9/20/2010 4:35:46 PM	2	Displacement 1: Fail,	i i
9/20/2010 4:35:38 PM	2	Displacement 1: Fail,	
9/20/2010 4:35:37 PM	2	Weld Time out of Range	
9/20/2010 4:35:06 PM	2	Displacement 1: Fail,	
9/20/2010 4:34:49 PM	2	Displacement 1: Fail,	
9/20/2010 4:34:26 PM	2	Displacement 1: Fail,	1
9/20/2010 4:34:16 PM	2	Displacement 1: Fail,	
<li>I</li>			•

## **Selecting Data to Export or Print**

Data from the query can be printed or exported to a file using the **Export** and **Print** buttons. A range of data must first be selected. To select a portion of the data displayed in the query, use the mouse to highlight a section of the data as shown in the picture below.



To select all the data in the query, press the **Select** button.



## **Exporting Data to a File**

- 1. Once the desired data is selected, press the **Export** button to save the data to a file in **.CSV** format.
- 2. When the window opens, enter a file name and save the file following typical *Windows*  $10^{\text{®}}$  procedures.

1	current rms 1	current peak 2	current result	displacement 1	displacement 1 resul	force 1 peak	voltage pea
	0.6198	a to write			×	10.916238	4.349824
	0.5842	e to write.			-	10.857988	4.403767
2	0.5576! Save	in: Documents		- 0 1 P	-	10.941202	4.596702
3	0.6102	_				10.749812	4.411370
	0.5928	Name		<ul> <li>Date modified</li> <li>Ty</li> </ul>	pe 🔹	10.799740	4.649723
	0.5687:	1		9/21/2010 10:33 Fi	e	10.849668	4.242181
	0.5807 Recent Place	5				10.833025	4.262551
	0.5727					10.733170	4.238698
	0.5702					12.164433	4.146968
	0.5690! Desktop					12.605463	4.259491
	0.5448					12.630426	4.394323
	0.5538					12.713639	4.289287
	0.5198					12.613784	4.145526
	0.5694 Libraries					12.755246	4.246864
	0.5815:					12.921672	4.084793
	0.5865					12.938314	4.244142
	0.5507t Computer					12.771889	4.345870
	0.52995					12.780210	4.559584
	0.6200					12.813496	4.118857
	0.5128 Network				1.00	12.888387	4.491245
	0.6069	41				12.805174	4.181622
	0.5627	-				12.938314	4.421861
	0.6059	File name:	Export Information		ОК	14.078334	4.239676
	0.7587.		coper, recently of			14.036727	4.793044
	0.8003;	Save as type:	All Files (".")	*	Cancel	14.843894	4.532011
	0.7793		1000		11.	17.007433	4.614330
	0.770625	0.000000	FAIL	0.009449	FAIL	16.940863	4.492196
	0.788005	0.000000	FAIL	0.010945	FAIL	16.982470	4.610508
	0.702104	0.000000	WARN	0.008307	FAIL	16.974148	4.801548
	0.670990	0.000000	PASS	0.001063	FAIL	0.056938	4.431747
16 m	0.671117	0.000000	FAIL	0.000591	FAIL	0.065260	4.388485

3. The data will be saved in rows with data separated by commas. Each row will contain data for one weld. The top row of the file will contain the column headings separated by commas.

The following is an example of a one of the **.CSV** exported files.

The End Remark New Net         Ourrent Tens 1, Current Deak 1, Current Tensult, force 2 peak, force 2 result, force	E Low - Notrpad	
	<pre>Tek Edit Remat New Neb Uurrent remat is (urrent remat) displacement 1 displacement 1 result.force 1 peak.voltage peak 1.final thickness 1.final thickness 2.force 1 result.force 2 peak.force 2 1.26054(.1.9546), NA -0.000019, FALL 11.1252(.0.46554+.0.00240), -0.00240, FASS, 0.05513, NA .1.95408, FALL 0.000000, NA -0.00241, -0.00241, -0.00241, -0.00241, -0.00241, -0.00241, -0.00241, -0.00241, -0.000241, -0.00241, -0.000241, -0.000241, -0.000241, -0.000241, -0.000241, -0.000241, -0.000241, -0.000241, -0.000241, -0.00000, NA -0.00000, NA -0.00000, NA -0.00000, NA -0.00240, FASS, 0.01113, NA .1.94108, FALL 0.000000, NA -0.00241, -0.00241, -0.00241, -0.00241, -0.00000, NA -0.40184, NA -0.000000, NA -0.00000, NA -0.00000, NA -0.40184, NA -0.000000, NA -0.000000, NA -0.40184, NA -0.0000000, NA -0.000000, NA -0.40184, NA -0.000000, NA -0.00</pre>	result, f. 000000, 0. 000000, 0. 0000000, 0. 000000, 0. 00000

## Printing Data to a Printer

If a printer is setup in the *Windows*  $10^{\text{®}}$  Control Panel, the data can be printed by clicking the **Print** button after the desired data to be printed has been selected. As soon as the **Print** button is clicked, the data will be printed. There will not be any print windows that appear on the screen. This print function will only print to the default printer assigned in the *Windows*  $10^{\text{®}}$  Control Panel.

**NOTE:** This print function within the Monitor program is provided as a convenience feature for printing a small amount of information. Up to eight columns of information will print in a very readable format in landscape mode as shown in the following sample printout. If more than eight columns are selected, the resulting printout format will vary and may not be very readable depending on the type of printer.

current peak 1	current peak 2	current rms 1	current rms 2	alternate maximum	alternate minimum	alternate result	counter_1
0.291761	0.268768	0.241146	0.237733	4.215633	0.348800	392	392
0.291546	0.269301	0.241204	0.238251	4.215633	0.348800	391	391
0.291520	0.269090	0.241254	0.237937	4.215633	0.348800	390	390
0.291544	0.269138	0.240998	0.237771	4.602317	0.155459	389	389
0.291204	0.269213	0.240845	0.238247	4.215633	0.348800	388	388
0.291990	0.269651	0.241051	0.238170	4.602317	0.542142	387	387
0.291574	0.268816	0.241083	0.238213	4.408975	0.348800	386	386
0.291226	0.269066	0.241180	0.238107	5.375683	0.348800	385	385
0.292028	0.269000	0.241196	0.237644	4.408975	0.542142	384	384

## Printing Data to a Document Writer

If *Microsoft XPS Document Writer* or another document writer is setup in the *Windows 10*<sup>®</sup> Control Panel as the default printer, a **Save the file as** window will be displayed as shown below when the **Print** button is clicked. This window may appear on top of the Monitor program or may open behind the Monitor program. If this **Print Manager** window does not appear on top of the Monitor program, go to the Taskbar on the bottom of the Microsoft *Windows 10*<sup>®</sup> desktop to access the **Save the file as** window.



If the **Save the file as** window opens behind the Monitor program, *the Monitor program will be frozen* until you go to the **Save the file as** window and click on either the **Save** or **Cancel** button in that window.

Follow typical *Windows 10^{\text{®}}* procedures to print the data to your **.XPS** or document writer file. The information will be printed in rows with data separated by commas. The top row of the file will contain the column headings separated by commas.

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	e folder e folder e folder e folder e folder	e folder e folder e folder e folder e folder	e folder e folder e folder e folder e folder

## **Statistics**

.

Press the **Statistics** button to calculate statistical information for the 200 data records presently displayed from the query. Once the **Statistics** button is pressed a window that displays the statistical calculations will open.

		Run Sample DC	301	0.568755	0.000000	PASS	0.003445	FAIL	10.84966
/20/2010 4:34:49 Ph		Run Sample DC	100	0.580715	0.000000	PASS	0.003484	FAIL	10.83302
/20/2010 4:34:25		Run Sample DC	99	0.572706	0.000000	PASS	0.002854	FAIL	10.73317
20/2010 4:34:16 Pm								1000 (C.S.)	
(20/2010 4:34:05 PM 35		o meet une 1	o ment next 3	deplacement 4	force it near	unitana nank t		100	
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20/2010 4:33:37 PM 35	FED DEV	0.0.30109	0.000000	0.003360	6.749016	9.272039			
20/2010 4:33:27 PM 35	STUDEY	0.120.3%	0.000000	0.003047	31240118	0.094092		_	
20/2010 4:33:16 PM 35	TANDARALE	0.013002	0.000000	0.000009	27.511299	0.402079			
/20/2010 4:32:47 PM 35	100H	1.103907	0.000000	0.011790	17.007403	9.001590			
(20/2010 4:31:58 PM 35	LOW	T 0.211810	0.000000	-0.000020	0.030938	0.444402		_	
/20/2010 4:31:50 PM 35		1					_		
(20/2010 4:31:41 PM 35									
(20/2010 4:31:31 PM 35									
/20/2010 4:31:24 PM 35	_								
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20/2010 4:29:26 PM 35 20/2010 4:28:57 PM 35 20/2010 4:28:26 PM 1									

## **Run Chart**

A Run chart can be displayed which graphs data from one column of the query. Use the mouse to select the desired data in a column then Press the Run Chart button. The screen below shows a Run Chart graphing highlighted Voltage Peak 1 data. Limit and Warning lines will be plotted on the Run Chart.



## Section III. View Waveforms

To view the waveform information in the database, access the waveform viewing functions behind the **Waveform & Logger Setup** button:

1. Click the Waveform & Logger Setup button.



2. The screen for logger and waveform setup and viewing will be displayed. Click on the View Waveform tab to access the View Waveform Screen.

Logger Setup	Waveform Setup	View Logger	View Waveform
	Lage State Section State 3		
		Contraction from the first term	Show Warefurn
	and the second second	Post Convert	In ASCIL Convert to ASCIL
		Show Overlay Communic	Admitted Column Format

## **Querying the Database**

You can retrieve data by selecting a start date and end date using the two calendars in the upper left corner of this screen.

- 1. Click on the desired **Starting Date** in the calendar on the left.
- 2. Click on the desired **End Date** in the calendar on the right.
- 3. When both dates are selected, press the **Query** button. The welds for the selected data range will be displayed. The columns and their order are fixed and *cannot* be configured.

12 13 14 19 20 21 26 27 28	15 16 17 18 12 13 14 15 1 12 23 24 25 19 20 21 23 2 25 30 1 2 26 27 21 29 1 dev \$/22/2010 Tedex \$/	9 10 11 16 17 18 23 34 25 30 1 2 7 1 3 722/2010	Query	< >						Show	Waveform
Weld Count	Time Stamp	Schedule Name	Part Serial No.	Part Lot No.	Record ID	Schedule ID	Polarity	Current Peak	Voltage Peak	Power Peak	Resistance Peak
134	9/23/2010 10 17 58 AM	Bun Sample DC		T BET DOLLAR.	62629	16	Pea	0.747994	4.654264	2.674626	15.675051
13.3	9/23/2010 10 17 52 AM	Run Sample DC			62628	36	Pos	0.775453	4 334199	2 779772	15 135118
32	9020010 10 17 45 AM	Run Sample DC			52627	35	P05	0.721331	4.602144	2.526867	16.311409
31	9/22/2010 10 17 35 AM	Run Sample DC			52626	35	Pos	0.777630	4.475654	2,734110	13.979474
30	9/22/2010 10:17:25 AM	Run Sample DC			52625	35	Pos	0.779619	4.250292	2.789957	13,291104
29	9/22/2010 10 17 14 AM	Run Sample DC			52524	36	Pos	0.255859	5.612114	1.456303	24 926081
28	9/22/2010 10 16 56 AM	Run Sample DC		1.	52623	36	P05	0.725738	4.640558	2.569318	16.048296
27	9/22/2010 10:16:45:4M	Run Sample DC	1.1	12	52522	35	Pos	0.700060	4.448149	2.717176	13.185445
26	9/22/2010 10:16:41 AM	Run Sample DC			52621	35	Pos	0.654134	4.707693	2.543888	13 750 312
25	9/22/2010 10 16 34 AM	Run Sample DC			52620	36	Pes	0.759487	4.349974	2 788926	14.867276
24	9/22/2010 10 16 28 AM	Run Sample DC			52519	36	Pes	0.799066	4.447974	2.764310	13.948256
23	9/22/2010 10:16:23 AM	Run Sample DC		1	52618	36	Pes	0.688784	4.528475	2.677083	13 926539
22	9/22/2010 10:16:19:4M	Run Sample DC			52617	38	Pos	0.721710	4.536723	2.661022	14.555387
21	9/22/2010 10:16:14 AM	Run Sample DC		1	52616	35	Pos	0.794411	4 335291	2.792707	15 335221
20	9/22/2010 10 16:08 AM	Run Sample DC			52615	36	Pos	0.768049	4 509408	2 726371	14.310837
19	9/22/2010 10:16:03 AM	Run Sample DC			52614	36	Pes	0.786126	4.310680	2,791581	14.090006
18	9/22/2010 10:15:58:4M	Run Sample DC			52613	35	P05	0.730809	4.715425	2.551914	15.255652
57	9/22/2010 10:15:51 AM	Run Sample DC			52512	35	Pos	0.624702	4.641043	2.552588	15.152440
16	9/22/2010 10:15:47 AM	Run Sample DC			52511	35	Pos	0.819159	4.401351	2754832	14.771367
15	9/22/2010 10:15:41 AM	Run Sample DC			52510	35	P05	0.743818	4 500632	2.662775	16.261848
14	9/22/2010 10:15:33 AM	Run Sample DC		1	52609	35	Pes	0.713378	4.563882	2.644043	14.856357
13	9/22/2010 10:15:27 AM	Run Sample DC			52508	35	Pos	0.616151	4.779163	2.458146	15,215453
12	9/22/2010 10:15:22 AM	Run Sample DC			52607	35	Pos	0.786768	4.551529	2.681532	14.921035
11	9/22/2010 10:15:16 AM	Run Sample DC			12606	36	Pos	0.673996	4.656571	2.591498	15.535619
10	9/22/2010 10:15:12 AM	Run Sample DC			52605	36	Pes	0.801385	4.387513	2.785376	15.449425
29	9/22/2010 10:15:06:4M	Run Sample DC			52604	35	Pos	0.785762	4.293073	2.788836	14.060338
08	9/22/2010 10:14:56-4M	Run Sample DC			52503	35	Pos	0.791436	4.390946	2.790673	14.276726
0.7	9/22/2010 10:14:45:4M	Run Sample DC			52602	35	Pos	0.778953	4.295445	2.783569	14.577992
06	9/25/2010 4:35 46 PM	Run Sample DC			52601	36	Pes	0.794933	4.349824	2.786721	15.470067
Add Clea	Record ID Time Stamp	Convert to ASCII Convert to ASCII Convert to ASCII					ASCII	1			
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This screen will display up to 200 records. If your Query contains more than 200 records, use the < > (left and right) arrow buttons that are just to the right of the **Query** button to page through your query.

Query	<	>
Records Shown: 1 to 200 of	of 52565	

## Viewing the Waveforms for a Weld

To view the waveforms for one weld, click on a weld to select the weld, then press the **Show Waveform** button to display the waveform.



The waveforms can be displayed and expanded using the buttons along the bottom of the screen. Cursors can also be used to obtain values for points along a waveform. See *Chapter 3* for explanations for using these buttons and cursors.

## **Displaying One Waveform for Multiple Welds**

The Monitor program can be used to display waveforms for one weld parameter for up to five welds on one graph. The waveforms are selected by clicking on the desired weld to highlight it and then clicking one of the Add buttons in the lower left corner of the View Waveform screen. You can select up to five welds. The Clear button can be clicked to remove a particular weld from the selection.

Sun Mon Tue We 29 30 30 5 6 7 12 13 14 7 19 20 21 0	Act, 2010         Date         Sec. Harr Torontor, 240           12         3         5         47           12         3         5         10         11           5         5         7         5         6           5         5         10         11         5         6         7         8           5         5         10         11         5         6         7         8         9         10         11         5         11         5         11         5         11         15         16         17         16         17         16         17<	72 E.I. 76 Sar 3 4 10 11 17 18 24 25 1 2	Query	< >						Chau	
3 4 5 Toda	• 3/22/2010 Today: 3/2	2/2010	Records Shown: 1 to 200 af	12565						Show	waverorm
feld Count	Time Stamp	Schedule Name	Part Serial No.	Part Lot No.	Record ID	Schedule ID	Polarity	Current Peak	Voltage Peak	Power Peak	Resistance Peak
34	9/22/2010 10:17:58 AM	Run Sample DC		2	52629	35	Pts	0.747994	4.554251	2.674625	15.675951
33	9/22/2010 10:17:52 AM	Run Sample DC	· · · · · · · · · · · · · · · · · · ·	-	52620	36	Pos	0.775453	4.334199	2.779772	15.135110
12	9/22/2010 10:17 45 AM	Run Sample DC	1		52627	35	Pes	0.721331	4.092144	2.526867	15.311409
1	9/22/2010 10:17:35 AM	Run Sample DC			52526	35	Pos	0.777630	4.475654	2.734110	13.979474
10	9/23/2010 10:17:26 AM	Run Sample DC			52525	35	P05	0.779619	4.250292	2.789957	13.291184
9	9/22/2010 10:17:14 AM	Run Sample DC		- A -	52624	38	Pos	0.266859	5.612114	1.456303	24.926081
9	9/22/2010 10:15:55 AM	Run Sample DC			52623	36	Pos	0.725738	4.646558	2.569318	95.048295
7	9/22/2010 10:16:45 AM	Run Sample DC		- S	62622	35	Pos	0 700060	4.448149	2.717176	13.105445
6	9/23/2010 10:15:41 AM	Run Sample DC			62621	36	P95	0.654134	4.707683	2.543888	13.750312
5	9/22/2010 10:16:34 AM	Run Sample DC		1	52620	35	Pes	0.769487	4.349974	2.788926	14.867276
4	9/22/2010 10:16:28 AM	Run Sample DC			52619	36	Pes	0.799066	4.447974	2.764310	13.949258
3	9/22/2010 10:15:23 AM	Run Sample DC		2	52510	36	Pos	0.588784	4.528475	2.677093	13.926539
2	9/22/2010 10:15:19 AM	Run Sample DC			52617	36	Pos	0.721710	4.536723	2.661022	14.555387
1	9/22/2010 10:18:14 AM	Run Sample DC			52616	36	Pes	0.794411	4.335281	2.792707	15.336221
9	9/22/2010 10:15:08 AM	Run Sample DC			52615	36	Pes	0.768049	4.509408	2.726371	14.310837
9	9/22/2010 10:15:03 AM	Pun Sample DC		2	52514	35	Pos	0.786126	4.310690	2.791581	14.090005
0	9/22/2010 10:15:58 AM	Jun Sample DC	5.2		52613	36	Pos	0.730809	4.715425	2.551914	15.255652
7	9/22/2010 10:15:51 AM	Run Sample DC			52612	36	P08	0.624782	4.641043	2.552588	15.152440
	A REAL PROPERTY OF THE REAL PR	Sample DC			52611	35	Pes	0.818159	4.461351	2.754832	14,771367
6	9/22/2010 10:15:41 44	He DC			52910	38	P65	0.743818	4.500632	2.662775	16,261848
		100 March 100 Ma			52609	36	P05	0.713378	4.563882	2.644043	14.656357
3	9/22/2010 10:15:27 AM				52600	36	Pos	0.616151	4.779963	2.458146	15,216453
2	9/22/2010 10:15:22 AM				52607	36	Pos	0.766768	4.551528	2.681532	14.921035
1	9/22/2010 10:15:15 AM	Run			52505	35	Pos	0.673996	4.656571	2.591498	15.535619
ó	9/22/2010 10:15:12 AM	Run Sample			52605	36	Pes	0.801385	4.387513	2 785376	15.449425
9	9/22/2010 10:15:06 AM	Run Sample DC			52604	36	Pes	0.785762	4 293073	2 788836	14.060338
0	\$(2)(2010 10:14:56 AM	Run Sample DC			52603	16	Pes	0.791436	4 390946	2 790673	14.276726
7	9/22/2010 10:14:45 AM	Run Sample DC		-	52602	16	Pos	0.778953	4.295445	2 783569	54.577992
6	9/25/2010 4 35 45 PM	Run Sample DC			62601	36	P05	0.794933	4.349824	2.786721	15.470067
	Record ID Time Stamp	Current			onvert to	ASCII	Co	nuert to	ASCII	7	
AND CHUR	32829 9/22(2010 10:17:52 AM		Show Over	av	onvert to	ASCH		myere to	ASCII		
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and all strends	A REAL PROPERTY OF THE REAL				omma De	anniceu	0	Olumin FC	Jilliau		
	\$28.10 9/021/0010 10-15-41.8M										
Add Clew											

The above screen shows that the **Current** weld parameter is selected for display. To select a different weld parameter:

- 1. Click on the text box to the left of the **Show Overlay** button and select the desired weld parameter, such as **Displacement 1** shown below.
- 2. Click on the Show Overlay button to show the waveforms listed in the table.



The expanded waveform graph will be displayed as shown below.



## CHAPTER 5. USING THE WM-100A DATABASE

Cursors for each line can be used to obtain the X and Y values of points along the waveform. The cursors are positioned at the far left side of the graph. These cursors are color coded to the waveform line colors and can be dragged into the graph with the mouse. The X and Y values for the point at which the cursor intersects their respective waveform are displayed in the **Cursors** table.



The waveforms can be expanded and manipulated using the buttons just to the right of the Cursors table. See *Chapter 3* for instructions on using these buttons.


## **Converting Waveforms to ASCII format**

The Monitor program saves the waveforms in a binary (Big Endian) file format with a maximum of four digits to the right of the decimal point. Some third-party applications, such as *Excel*<sup>®</sup>, more easily import ASCII files. The **View Waveform** screen provides two buttons which can be used to convert the Monitor Program's binary waveform files to ASCII format files.

- 1. Select a weld with waveforms that are to be converted to ASCII format.
- 2. Press either the Convert to ASCII Comma Delimited button or Convert to ASCII Column Format button.

September           September           Sin Rice Tax W           Sin Rice Tax W           Sin Bits         7	er, 2010 H The Fr Sac 1 2 3 4 5 16 57 18 5 16 57 18 2 25 24 25 8 30 1 2	September,           Sin Hen Tue Weil           29         21           5         6           12         13           14         15           15         20           14         16           15         20           16         21           17         14           18         20           20         21           21         21           22         23	2000 23 The R Set 2 3 4 3 10 11 10 12 21 34 25 23 31 2 23 34 23 34 24 35 24 35 25 34 25 35 25	Query	< >	1					Show	Waveform
Toda	9/22/2010	Today 1	V22/2010	Recents Desert 1 to 200 of	52548	Decedin	( Februaria 10	Delevite	Courses Back	Voltage Back	Based	Desister Desi
reis Count	time stamp	And all all and an and a state of the state	Schedule Name	Part senai No.	Part Lot No	Hecord IU	Schedule ID	Polarity	Current Peak	vortage Peak	Power Peak	Resistance Peak
14	90202010101017	58.48	Run Stangle DC			52523	30	100	0.747094	4.554(51	2 874025	15 8/3901
60	Bearing the 19-17	146.000	Paul Danight CC			14168	20	1000	0.010000	4.0001144	a contractor	10.100100
11	BO30010 10 17	10.000	Run Sample CC		-	54547	10	Pas .	0.721321	4.475554	2.725000	13.075474
10	8030040 10.17	100.488	Electrope oc			62626	14	Pag.	0.779630	4 250202	2 789047	13 201104
10	COSTO CONTINUE	Contract of Contra	Par Barris DC		112	0.0000	100	100	0.566614	5.012114	1455501	Contraction of the
14	9/00/00 10 10 10	50 AM	Run Sample DC			62623	56	Pas	0.725738	4 545558	2.5593148	16.048298
17	903001010101	45.400	Run Samala DC		-	63632	36	Pas	0.700060	4.448140	2 717130	13 185445
4	600001010101	41.48	Run Samela DC		-	42421	35	Pas	0.454134	4.727683	254388	13,750312
4	603031010101	34.400	Run Samila DC			43436	15	Pas	0.759487	4.349974	2 788936	14.887276
4	9/22/2010 10:15	29.44	Run Sample DC			12519	18	Pas	0.799055	4.447974	2754310	13 549256
3	9030310 10 16	23 48	Run Sample DC			62618	18	Pas	0.688784	4 539475	2.677093	13 826539
2	9020210 10 18	12 40	Run Sample DC		1	12017	35	Pos	0.721710	4.536723	2 681022	14.655387
1	902001010101	14.48	Run Sample DC		-	52016	35	Pas	0.794411	4.335281	2 792707	15.335221
0	9020010101018	108 AW	Run Sample DC			52615	34	P24	0 768049	4 109408	2 726371	14 310837
9	9/22/2010 10 16	103 AW	Run Sample DC		2	52614	1	P28	786126	4.310690	2.791581	14.090008
10	902/0010 10 15	58 48	Run Sample DC			52613			30959	4.715425	2.551914	15.255652
9	903/0010 10:11	51 AM	Run Sample DC		-	52612		1000	4702	4.641043	2152548	15.152440
6	8020010101015	47.486	Run Sample DC			\$2611		1	159	4.461361	2 754832	14.771367
8	8020310 10 15	45.40	Run Sample DC			52610		Pa	10	4 500632	2.662775	16,261848
4	9/22/2010 10:15	33.48	Run Sample DC			52509	A STATE OF THE OWNER OF	Pas	1	4563882	2.644043	14 656357
3	922/0010 10 15	27 AB	Run Sample DC			52608	A STREET, STRE	Pos		4.779163	2.450146	15.216453
2	903/0010 10:15	22 AM	Run Sample DC			\$2607		Pos		4.551528	2.681532	14 921036
1	903/0010 10 15	18 AM	Run Sample DC			52500		Pas	s 1.7	4.856571	2 591498	15.535619
0	90200101019	12.48	Run Sample DC			52605		Par		4.387513	2 795376	15.449425
9	922/2010 10 15	06 AW	Run Sample DC			52504	2	1		4.293073	2 798836	14.000338
0	902/0010 10 14	158 AM	Run Sample DC			52603		Pas		4.390946	2 790673	14.276728
7	92200101014	L45 ABI	Run Sample DC			52602		Pas		4.295445	2.783569	14.577992
N .	80900010438	a6 PM	Run Sample DC			12601	-5	Pas	0	4.349824	2,786721	15.470067
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AGE CHEM	1940	W1000000000000000000000000000000000000				The second s	A REPORT OF TAXABLE PARTY.	-		Colors of the local division of the local di		
Add Clew	12610	N/23/3030 30 13-41 AM						Ner e				
Add Clear	1	7			RETUR	RN					м	

The ASCII format files for the waveforms are saved in the C:\ASCII\_file\ directory with subdirectories for each weld parameter. The ASCII file name includes the underline character followed by the Record ID. The file extension is .DTA. Refer to the following screen which shows the ASCII waveform file \_52595.dta for the current waveform for weld with Record ID 52595.

Organize Include in librar	y      Share with      New folder		
	Name *	Date modified	Type
ascii_file  current  displacement_2  gas load load_2 power resistance voltage	52595	9/23/2010 3:57 PM	DTA File

The following is an example of an ASCII Comma Delimited format file.

The following is an example of an ASCII Column format file.

E stilde birged	10.00
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0. 8 m	
40.3460 2.4573	
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00. 5953 00. 5953 00. 5953	
4, 4/86 - 0, 6/19	
-0.462	
(0, 984) 	
0.7544 	
0.728	
(3, (73) (3, )90/	
-0, 4692	
4.107	
0.822	
0.967	
(3. 546) (4. 546)	
PG. 907.7 - 6, 987.9	
1.004	
	2

# Section IV. SPC and Minitab

To use the integrated *Minitab*<sup>®</sup> 16 statistical analysis software for detailed analysis of the Monitor Program database:

1. Click the **SPC** button.



**NOTE:** When you press the **SPC** button, the *Minitab*<sup>®</sup> *16* application will start and the screen below displays.

i Syla Gai Bai Dayh Aglar Suda Mindau	Se Austral	Minitab - Untitle	Calc Stat	Graph Editor	Tools	Window	Help	Assistan	nt.
	× -	jie <u>E</u> dit D <u>a</u> ta	Carc Stat	graph Egitor	Tools	Mudow	<u>H</u> elb	Assistar	jt
1132510 43437 PM		_					-		
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7		10/13/2	010 4:34:37	PM		)			
ker ( tra	_	— 10/13/2	010 4:34:37	РМ —	+	)			
	Welcome	<b>10/13/2</b> to Minitab,	010 4:34:37 press F1	for help.		C71 (	29 (2)	Q4 Q1	5
9 G G G G	Welcome	10/13/2	010 4:34:37 press F1	FOR help.		(an )	29 (2)	СМ СЛ	5
G Q Q Q G	Welcome	10/13/20	010 4:34:37 press F1	for help.		an a	29 (2)	CH CH	5
	Welcome	10/13/20	010 4:34:37 press Fl :	for help.		) a (	n (n	C4 C4	5
G Q Q Q G	Welcome	- 10/13/20	010 4:34:37 press F1	for help.		) (38 - 6	29 (2)	CH CH	5
a a a a a	Welcom	- 10/13/20	010 4:34:37 press F1	for help.	]	Ci (	22 C23	CH C2	5

2. Click on File on the top toolbar, then click Query Database (ODBC).



- 3. On the popup window, select the Machine Data Source tab.
- 4. Click the line for MUC\_AWE in the Data Source Name column to select the Monitor program database.
- 5. Click **OK**.

**NOTE: MUC\_AWE** is the name of the Monitor program database.

		1
Data Source Name	Туре	Description
abVIEW MUC_AWE	System System	Used by the Database Connectivity T
		New
A Machine Data Source "User" data sources are sources can be used by	is specific to thi specific to a us all users on this	s machine, and cannot be shared. er on this machine. "System" data machine, or by a system-wide service.

6. On the **SQL Server Login** popup window, click **OK** without making any entries.

QL Server Login			
Data Source:	MUC_AWE	OK	
Use Trusted C	✓ Use Trusted Connection		
Server SPN:		Help	
Login ID:	operator	Options >>	
Password:			

7. The **Query Database** window will open.

MUC_AWE.dbo.calib	ration
Available fields:	Selected fields:
disp_count_per_unit_me disp_unit_of_measured engineering_high engineering_low offset raw_high raw_low scaled_factor timestamp unit_name	> >> <<
↓ ↓ List available tables and fie	ids in alphabetical order
	Use rows

 Scroll through the Available tables and select MUC\_AWE.dboTest Record. The Test\_Record table is the *only* table that has weld data information. The other tables do not need to be accessed.

Query Da	tabase (ODBC)	×
	Available tables:	
	MUC_AWE.dbo.calibration	
Available disp_co disp_ur enginee offset raw_hig raw_loi scaled_ timesta	MUC_AWE.dbo.Run_Screen_Setup MUC_AWE.dbo.scheduler MUC_AWE.dbo.system_config MUC_AWE.dbo.test MUC_AWE.dbo.test MUC_AWE.dbo.test MUC_AWE.dbo.weld_count MUC_AWE.dbo.Weld_Status ening_row factor mp	_
Unit_na	available tables and fields in alphabetical order Use rows p OK Cancel	

- 9. From the listing of Available fields, select the desired fields to analyze using the left or right arrow buttons. Click OK to load data from the selected fields.
- 10. Use the *Minitab*<sup>®</sup>16 functions following *Minitab*<sup>®</sup>16 procedures to analyze your data. The *Minitab*<sup>®</sup>16 documentation can be accessed at:

http://www.minitab.com.

Query Database (ODBC)	×
Available tables:	
MUC_AWE.dbo.Test_Record	•
Available fields:	Selected fields:
comment       computer_name       counter_1       counter_2       current_limit       current_peak       current_result       current_result       current_result       descimate_rate       displacement_2	current_rms
☑ List available tables and fields in alp	habetical order
Use	rows
Help	OK Cancel

# Section V. Accessing the ODBC Database

You can access the **Monitor** program database with third-party software through the **Data Processing Module**'s Ethernet connection. The database can also be accessed directly from the **Data Processing Module** through the *Windows* 10<sup>®</sup> Operating System.



To access the **Monitor** program database, follow the protocols of the third-party software, *Microsoft SQL ServerExpress 2008* and/or *Windows 10*<sup>®</sup>. Microsoft SQL Server Express has the capability for up to five simultaneous users. The **Monitor** program uses 2 of these users when the SPC or Minitab portion of the **Monitor** program is not being used through the **Monitor** program screens. The **Monitor** program uses 3 of these users when the SPC or Minitab portion of the **Monitor** program is being accessed through the **Monitor** program screens. Therefore, it is recommended that the number of external users accessing the **Monitor** program database outside of the **Monitor** program user screens be limited to two to avoid any conflict with the restriction of no more than five simultaneous users.

The name of the Monitor program database is MUC\_AWE.



The Monitor program database, **MUC\_AWE** is comprised of many tables which contain data, setup information, and information used internally by the Monitor program. All of the weld information is contained in one table in the database, called **Test\_Record**. You should *only* access weld information from the table,**Test\_Record**. All other tables do *not* contain weld data information. It is recommended that users do *not* access any other table besides **Test\_Record** to ensure that they do not induce Monitor program errors or malfunctions.

The following listing presents the field information for the table, **Test\_Record**.

[dbo].[Test\_Record]( [computer\_name] [varchar](20) NULL, [mac\_id] [varchar](20) NOT NULL, [test\_record\_id] [int] NOT NULL, [timestamp] [datetime] NOT NULL [scheduler\_name] [varchar](50) NULL, [scheduler\_id] [int] NULL, [sys\_cfg\_id] [int] NULL, [counter\_1] [int] NULL [part\_serial] [varchar](20) NULL, [part\_lot] [varchar](20) NULL, [weld\_time] [float] NULL, [weld\_time\_result] [nchar](4) NULL, [current\_peak] [float] NULL, [current\_rms] [float] NULL, [current\_limit] [int] NULL, [current\_result] [nchar](4) NULL, [voltage\_peak] [float] NULL, [voltage\_rms] [float] NULL, [voltage\_limit] [int] NULL, [voltage\_result] [nchar](4) NULL, [pwr\_peak] [float] NULL, [pwr\_rms] [float] NULL, [pwr\_limit] [int] NULL, [pwr\_result] [nchar](4) NULL, [res peak] [float] NULL, [res\_rms] [float] NULL, [res\_limit] [int] NULL, [res\_result] [nchar](4) NULL, [load\_peak] [float] NULL, [weld\_start\_load] [float] NULL, [weld\_end\_load] [float] NULL, [load\_limit] [int] NULL, [load\_result] [nchar](4) NULL, [initial\_disp] [float] NULL, [final\_disp] [float] NULL, [displacement] [float] NULL, [displacement\_limit] [int] NULL, [displacement\_result] [nchar](4) NULL, [gas\_min] [float] NULL, [gas\_max] [float] NULL, [gas\_limit] [float] NULL, [gas\_result] [nchar](4) NULL, [sensor\_rms] [float] NULL, [weld\_status] [int] NULL, [comment] [varchar](200) NULL, [descimate\_rate] [int] NULL, [waveform\_log\_mode] [int] NULL, [waveform\_to\_log] [int] NULL, [waveform\_fp\_current] [varchar](200) NULL, [waveform\_fp\_voltage] [varchar](200) NULL,

[waveform\_fp\_pwr] [varchar](200) NULL, [waveform\_fp\_res] [varchar](200) NULL, [waveform\_fp\_load] [varchar](200) NULL [waveform\_fp\_displacement] [varchar](200) NULL, [force\_tare] [float] NULL, [polarity] [varchar](5) NULL, [waveform\_fp\_gas] [varchar](200) NULL, [force\_unit] [int] NULL, [displacement\_unit] [int] NULL, [waveform index] [int] NULL, [counter\_2] [int] NULL [weld\_cnt\_p\_f] [int] NULL [current\_peak2] [float] NULL, [current\_rms2] [float] NULL, [voltage\_peak2] [float] NULL [voltage\_rms2] [float] NULL, [pwr\_peak2] [float] NULL, [pwr\_rms2] [float] NULL, [res\_peak2] [float] NULL, [res\_rms2] [float] NULL, [spare1] [float] NULL, [spare2] [float] NULL, [spare3] [float] NULL, [spare4] [float] NULL, [spare5] [float] NULL, [spare6] [float] NULL, [spare7] [float] NULL, [spare8] [float] NULL, [spare9] [varchar](100) NULL, [spare10] [varchar](100) NULL, [spare11] [varchar](100) NULL, [spare12] [varchar](100) NULL, [initial\_disp\_2] [float] NULL, [final\_disp\_2] [float] NULL, [displacement\_2] [float] NULL, [load\_peak\_2] [float] NULL, [waveform\_fp\_load2] [varchar](200) NULL, [waveform\_fp\_displacement2] [varchar](200) NULL, [formula\_1] [float] NULL, [formula\_2] [float] NULL [force2\_result] [nchar](4) NULL, [displacement2\_result] [nchar](4) NULL, [formula1\_result] [nchar](4) NULL, [formula2\_result] [nchar](4) NULL, [limit\_value] [int] NULL,

[warning\_value] [int] NULL,

//to mark the data out of limit status - for logger data cell color // to mark the data out of warning status - for logger data cell color

# Section VI. Managing and Deleting Records

As the hard disk is filled with weld records, records must be deleted so the hard disk does not reach capacity. The hard disk also must be managed so there is enough free space available on the hard drive to ensure timely processing of weld information. *The hard disk should be maintained at 80% capacity or less to ensure good Monitor program performance*.

The **Monitor** program has functions, one manual and the other automatic, which can be used to maintain the hard disk capacity. The **Monitor** program can be setup for either automatic deleting of records or manual deleting of records on the **System Setup** screen. Make a selection for **Yes** or **No** on the **System Setup** screen in the **Automatic File Purge** box. Refer also to *Chapter 4, Configuration*.

Report Header	Sensor Type	Unit Name
	ST1278 1um	001
Current Measure Mode	Displacement Units	Baud Rate Setting
Coil	inches	3 57.6K
Force/Pressure	Alternate Sensor Label	Automatic Maintenance
Force	GAS FLOW	15.24
Force Units	Minitab Application Location	
lbs	c:\program files\minitab\minitab 16\mt	b.exe
Automatic File Purge	Update Binary Schedule	
Automatic File Purge	Update Binary Schedule	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes Dressed E	Update Binary Schedule It descriptions separated by comma)	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed E	Update Binary Schedule It descriptions separated by comma)	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed E	Update Binary Schedule It descriptions separated by comma) Electrodes Performed Weld Head Maintenance	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed E	Update Binary Schedule It descriptions separated by comma)	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed E	Update Binary Schedule At descriptions separated by comma) Electrodes,Performed Weld Head Maintenance	
Automatic File Purge NO Standard Events (type in even Replaced Electrodes,Dressed E	Update Binary Schedule It descriptions separated by comma) Electrodes /Performed Weld Head Maintenance	

When the Monitor Program Screen is displayed and the unit is set to either Yes or No for Automatic File Purge, the Monitor Program checks the disk capacity every 15 minutes.

# **Automatic Record Deleting**

If you set up the Monitor Program to automatically maintain the hard drive, the Monitor Program will automatically delete weld records when the hard disk reaches 65% full. This deleting process occurs when the Monitor Program is on the Monitor Screen and the Press to Start button has not been pressed. It will *not* be visible to you when the Monitor Program is automatically deleting records. The Monitor Program will delete enough weld records, deleting the oldest records first, to bring the occupied space from 65% to 55%. If the Press to Start button is pressed or the Monitor Program Screen is exited, the Monitor Program will stop deleting records. The Monitor Program will not begin automatically deleting records again until the hard disk has reached 65% full, the Monitor Program Screen is displayed and the Press to Start button has not been pressed.

The Monitor Program will automatically delete approximately 1000 records per minute.

If the **Monitor Program** is set up to automatically delete records, the functionality for **Manual Record Deleting** will also be active. This functionality is described in the following section.

## Manual Record Deleting

If you elect to maintain the hard disk capacity manually, the **Monitor Program** will display a warning message window when the hard disk has 30% capacity remaining and then also 25% disk capacity remaining. This message window must be acknowledged with a button click and the event will be logged in the **Event Table**. When the disk capacity has only 20% capacity remaining, the **Monitor Program** will display a message that the hard disk has 20% capacity remaining. In addition, the **Monitor Program** will also take the unit out of **Monitor Mode** and the unit can *not* be returned **Monitor Mode** until additional hard disk space is made available. An event will also be logged in the Event Table.

# **Checking the Available Disk Capacity**

To check the amount of available hard disk space, click the **Database Management** button on the **Main Menu** to access the **Database Management** Screen.



The **Database Management** screen provides functions to check the capacity of the C: hard drive, perform database maintenance and to delete records. Click the **Check Hard Drive Capacity** button and the Monitor program will measure and then display the available space remaining on the C: hard drive. The D: hard drive contains only the SQL database and has sufficient capacity and does not need to be checked by this function.



emaining Hard Driv	e Capacity 9	0%	
	ок	CANCEL	

The **Monitor Program** automatically performs daily and weekly database maintenance tasks as described in Chapter 4 in the section describing **Automatic Maintenance**.

The user can also manually start the daily and weekly maintenance by pressing the **Database Maintenance** button on the **Database Management Screen**.



When the **Database Maintenance** button is pressed, the following message box will be displayed while the **Monitor Program** performs the maintenance. The maintenance process may take up to a few minutes. When the process is completed, the message box will disappear. The maintenance process *must* be allowed to complete. If it is interrupted, data could be lost or the database could be damaged.

Database Maintenance in Process Please Wait

## **Manual Record Deleting**

If the Automatic File Purge entry in the System Setup is set to either Yes or No, the Monitor Program will display message windows when the disk capacity reaches 70, 75 and 80% full. These message windows will state the remaining capacity of the hard drive. These messages should prompt you to delete records.



When the Monitor program reaches 80% of capacity, the Monitor program will switch out of **Start Measurement** mode and remain in **Stopped Measurement** mode *until* you delete records.



To manually delete records using the **Database Management** screen, the records that are to be deleted must be first queried from the database. The calendars in the upper portion of the screen are used to select the start and end dates for the query.

The query on this screen will only display up to 5000 records. If the user selects a date range that contains more than 5000 records, the Monitor program will display only the most recent 5000 records.

rd Drive	14 <u>15</u> 16 17 18 12 13 14	San Han Tac Weel Thu, Fin. San         San Han Tac Weel Thu, Fin. San         San Han Tac Weel Thu, Fin. San           10         20         31         1         2         3.4           5         6         7         8         9.11         2         4.           10         10         10         11         5         6.7         8         10.11           10         10         10         10         10         11         5         6.7         8         10.11				Database Management						
city 28 27	21 23 29 29 29 29 29 29 29 29 29 29 29 29 29	20 28 25 20 30 1 2 5 7 5 9 4m 3/22/2010		Que	ery	RECORDS	tted Di	ELETE AII ECORDS				
ne Stamp	Schedule Name	Weld Serial	Weld Lot	Test ID	Sche ID	Polarity	Current Peak	Voltage Peak	Power Peak	Resistance Peak		
0091010-1758-44	Run Sample DC			52629	38	Pas	0.747994	4.954251	2.674625	15.675951		
2010/10/17 17:52 468	Run Sample DC	2.1	23.22	12428	36	Pas	0.775453	4.334199	2 779172	15.135118		
029101017.45.468	Ruh Sample DC		10 C.	52627	36	Pes	0.721331	4.602544	2.525867	15.311409		
001010101736468	Run Sample DC			12626	35	Pas .	0.1771630	4.470854	2734110	13.079474		
2010 10 17 26 44	Run Sample DC	11	E 21	52625	38	Pas	0.779619	4.250292	2.700957	13.291184		
10010101714.468	Run Sample DC	-	1.0	12624	36	Pas	0.206859	5.812114	1.456303	24.926081		
2010 10:16:56.468	Run Sample DC		1.0	52623	38	Pas	0.725738	4.646558	2:5603/10	15.048295		
10010 10 16 45 464	Run Sample DC			12622	35	Pas	0.700060	4.448149	2.717176	13.185445		
12910-10-16-41-4M	Run Sample DC			52621	36	Pes	0.654134	4.797593	2:543888	13.750312		
1001010101634.468	Run Sample DC		1	82620	35	Pas.	0.799487	4.349974	2 788926	14.967276		
52010181626.46	Run Sample DC	101		52619	26	P25	0.799055	4.447974	2.764310	13.949256		
1001010101623.468	Run Sample DC		1	52618	30	Pas	0.000704	4.528475	2 877083	13.826539		
22010 10 10 10 10 40	Ron Sample DC			52657	30	P98	0.721710	4.506723	2.90/10/2	14.555.367		
2010 10 10 16 14 48	Run Sample DC			626.96	20	Pas	0.794411	4.335281	2 792787	15.335221		
22910121536.464	Run Sample DC			52915	20	P98	0.750049	4.509408	2725371	14.310837		
001010101003.468	Run Sample DC			62014		Pas	0.799129	4.310690	2 791981	14 090006		
0001010101000	Run Sample DC			52913	20	100	0.130809	4./104(0	2.557914	10.200802		
LOOP THE THE ST AND	Red Cample CC			67644	10	- Free	0.000	4.464.766.0	3 34 48 33	14 TRADAT		
100101010101047.468	Run Sample DC			62677	20	Free .	0.010100	4.505612	2.467775	10.771207		
10040 40 40 VL 40	Rup Sample DC			4.5650	10	Free	A TANDA	4 54 3843	2-644943	14 454 347		
00101010102744	Run Eample DC			12608	35	Fas	0.416151	4.779763	2458145	15,236453		
10040 40 46 50 46	Run Gample DC			62607	16	Ens	0 766768	4 55 15 19	2-68-9532	14 071076		
10010 10 10 10 10 404	Run flamele DC			62606	36	Fas	0.471996	4.856571	2.591498	15.535419		
0010101010101010	Run Sample DC			52605	18	Fas	0.001385	4 387513	2 785376	15.449425		
0010101010.04.44	Run Samele DC			12404	36	Pas	0.785.762	4.293073	2 7888.36	14.040338		
2010 10 14 56 44	Run Sample DO			52603	38	Fas	0.791436	4.390945	2790473	14,276726		
10010101014.46.468	Run Sample DC			52602	36	Pas	0.778953	4.296445	2 783569	14/577992		
			1.1	1.								
	Shamp     Sol 30 - 17 - 57 - 44     Sol 30 - 17 - 57 - 57 - 44     Sol 30 - 17 - 57 - 57 - 44     Sol 30 - 17 - 57 - 57 - 44     Sol 30 - 17 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 57 - 54 - 44     Sol 30 - 10 - 56 - 56 - 56 - 56 - 56 - 56 - 56 - 5	Tester:         XX2XXVII         Tester:           8 Damp         Schedule Name           9019 10: 753 44         Run Sample CO           9019 10: 754 74         Run Sample CO           9019 10: 755 744         Run Sample CO           9019 10: 757 744	Today:         YOU/YOU         Tealer:         YOU/YOU           Examp         Schedule Mame         Weid Santal           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           9019 10:175 /r 40         Roin Sample DC         9019 10:175 /r 40         Roin Sample DC           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Name           0 Name         Schedule Name         Weid Serial         Weid Serial         Schedule Name         Schedule Name</td> <td>Nome         State         Yang         <t< td=""><td>Them         Young         Team         Young         Y</td><td>Texter, 1020,000         Solar (Status)         Value (Status)         Text (D)         Solar (D)         Pointy         Correct Peak         Voltage Peak           90519         50519         50519         505         Pin         5771934         4594295           90519         50519         505         Pin         5771934         4594295           90519         50519         505         Pin         5771934         439149           90519         50519         Fin         5771934         4403144         433149           9019         50519         Fin         5771934         4403144         432149           9019         50519         Fin         5777194         4403144         432149           9019         505         Fin         5777194         4403144         432149         55844         Fin         5777194         4403144         432019         56         Fin         5777194         4403144         432019         56         Fin         5777194         448180         542171         56         Fin         5777194         448180         542171         56         Fin         5777194         448180         547714         577714         4581875         57         Fin</td><td>Norm         Norm         Norm         Nord         Schell         Year         Part ID         Schell         Part ID         Schell         Part ID         Correct Park         Voltage Park         Park Park Park         Voltage Park         Park Park Park Park Park Park Park Park</td></t<></td>	Name         State         Yall         Tester         Yall         Tester           8 Ramp         State         State         Weid Set         State         State           915 19 15 24 M         Run Sample CC         15329         15329         15329           915 19 15 24 M         Run Sample CC         15329         15329           915 19 15 24 M         Run Sample CC         15329           915 19 15 24 M         Run Sample CC         15329           915 19 15 24 M         Run Sample CC         15329           915 19 15 24 M         Run Sample CC         15329           915 19 15 24 M         Run Sample CC         15329           915 19 15 34 M         Run Sample CC         15329           915 19 15 44 M         Run Sample CC         15329           915 19 15 44 M         Run Sample CC         15329           915 19 15 45 M         Run Sample CC         15329           915 19 15 45 M         Run Sample CC         15319           915 19 15 15 15 M         Run Sample CC         15319           915 19 15 15 15 M         Run Sample CC         15319           915 19 15 15 15 M         Run Sample CC         15319           915 19 15 15 14 M         Run Sample CC	Nome         Schedule Name         Weid Serial         Weid Last         Test ID         Schedule Name           0 Name         Schedule Name         Weid Serial         Weid Serial         Schedule Name         Schedule Name	Nome         State         Yang         Yang <t< td=""><td>Them         Young         Team         Young         Y</td><td>Texter, 1020,000         Solar (Status)         Value (Status)         Text (D)         Solar (D)         Pointy         Correct Peak         Voltage Peak           90519         50519         50519         505         Pin         5771934         4594295           90519         50519         505         Pin         5771934         4594295           90519         50519         505         Pin         5771934         439149           90519         50519         Fin         5771934         4403144         433149           9019         50519         Fin         5771934         4403144         432149           9019         50519         Fin         5777194         4403144         432149           9019         505         Fin         5777194         4403144         432149         55844         Fin         5777194         4403144         432019         56         Fin         5777194         4403144         432019         56         Fin         5777194         448180         542171         56         Fin         5777194         448180         542171         56         Fin         5777194         448180         547714         577714         4581875         57         Fin</td><td>Norm         Norm         Norm         Nord         Schell         Year         Part ID         Schell         Part ID         Schell         Part ID         Correct Park         Voltage Park         Park Park Park         Voltage Park         Park Park Park Park Park Park Park Park</td></t<>	Them         Young         Team         Young         Y	Texter, 1020,000         Solar (Status)         Value (Status)         Text (D)         Solar (D)         Pointy         Correct Peak         Voltage Peak           90519         50519         50519         505         Pin         5771934         4594295           90519         50519         505         Pin         5771934         4594295           90519         50519         505         Pin         5771934         439149           90519         50519         Fin         5771934         4403144         433149           9019         50519         Fin         5771934         4403144         432149           9019         50519         Fin         5777194         4403144         432149           9019         505         Fin         5777194         4403144         432149         55844         Fin         5777194         4403144         432019         56         Fin         5777194         4403144         432019         56         Fin         5777194         448180         542171         56         Fin         5777194         448180         542171         56         Fin         5777194         448180         547714         577714         4581875         57         Fin	Norm         Norm         Norm         Nord         Schell         Year         Part ID         Schell         Part ID         Schell         Part ID         Correct Park         Voltage Park         Park Park Park         Voltage Park         Park Park Park Park Park Park Park Park		

You can delete either selected records displayed from the query or all records in the date range selected in the query.

To delete selected records, highlight the records in the query to be deleted. Use the mouse, **Ctrl** Key or **Shift** key to highlight the records. In the following screen, only *one* record is selected.

Weld Count	Time Stamp	Schedule Name	Weld Serial	Weld Lot	Test ID	Sche ID	Polarity	Current Peak	Voltage Peak	Power Peak	Resistance Peak *
134	9/22/2010 10:17:58 AM	Run Sample DC			52529	35	P06	0.747994	4.554251	2.674625	15.675951
133	\$(22(2010 10 17:52 AM	Run Sample DC			52628	35	Pos	0.775453	4.334199	2.779772	15.135118
132	9/22/2010 10:17:45 AM	Run Sample DC			52627	35	Pos	0.721331	4.682144	2.526867	15.311409
130	9/22/2010 10 17:26 AM	Run Sample DC		0	52425	35	Pos	6.779619	4,250292	2.789957	13,291184
128	\$(2)2010 10 16 56 AM	Run Sample DC			52123	35	Pos	0.725738	4.640558	2 549318	15.048296
127	\$(22(2010 10 16 45 AM	Run Sample DC			52622	35	Pos	0.700060	4.448149	2717176	13 105445
126	9/22/2010 10 16 41 AM	Run Sample DC			52621	35	Pos	0.654134	4.707693	2.543888	13 750312
125	\$(22)2010 10 16 34 AM	Run Sample DC			52620	35	Pos	0.769487	4.349974	2.788926	14.957276
124	\$/22/2010 10 10 28 AM	Run Sample DC			52619	35	Pos	0.799066	4.447974	2.764310	13.949256
123	9/22/2010 10 16/23 AM	Run Sample DC			52518	35	Pos	0.688784	4.529475	2.677093	13 826539
122	\$(22(2010 10 10 19 AM	Run Sample DC			52617	35	Pos	0.721710	4.536723	2.661022	14.555387
121	\$(22(2010 10 16 14 AM	Run Sample DC			52616	35	Pos	0.794411	4.335281	2 782707	15.335221
120	8/22/2010 10 16 08 AM	Run Sample DC		1	52615	35	Pos	0.768049	4.503408	2.726371	14.310837
119	\$(22(2010 10 16 03 AM	Run Sample DC			52614	35	Pos	0.786126	4.310690	2.791581	14.000006
118	\$/22/2010 10 15 58 AM	Run Sample DC			52613	35	Pos	0.730809	4.715425	2.661914	15.255652
187	\$/22/2010 10 15 51 AM	Run Sample DC			52612	35	Pos	0.624792	4.641043	2 552588	15.152440
116	\$(22(2010 10 15 47 AM	Run Sample DC			52611	35	Pos	0.018159	4.461351	2.754832	14.771367
115	\$222010 10 15 41 AM	Run Sample DC			52610	35	Pos	0.743818	4.500632	2.642775	15251848
114	9/22/2010 10:15:33 AM	Run Sample DC			52509	35	Pos	0.713378	4.563882	2.644043	14.656357
113	\$222010 10 15:27 AM	Run Sample DC			52508	35	P05	0.616151	4.779163	2.458146	15,216453
112	\$(22(2010 10 15 22 AM	Run Sample DC			52507	35	Pos	0.766758	4.551528	2.681532	14.921035
151	9/22/2010 10:15:16 AM	Run Sample DC			52505	35	Pos	0.673996	4.656571	2.591498	15.535619
110	9/22/2010 10 15 12 AM	Run Sample DC			52605	35	Pos	0.801385	4.387513	2.785376	15.449425
109	\$(2)(2010 10 15 05 AM	Run Sample DC			52504	35	Pos	0.785752	4.293073	2 788836	14 050138
108	9/22/2010 10 14 56 AM	Run Sample DC			52903	35	Pos	0.791436	4.390946	2.790673	14.276726
107	5/22/2010 10 14 45 AM	Run Sample DC			52502	35	P05	0.778953	4.295445	2 783669	14.577092

Then press the **Delete Selected Records** button to delete the selected record(s).



A window will appear asking you to confirm that the records are to be deleted. Select OK to delete the records.



**NOTE:** Deleting records can take several minutes or longer depending on the number of records selected. A **blue** bar will appear on the screen to indicate that the Monitor program is processing the request.

	Database Maintenance in Process Please Wait
-	

The following picture shows the **Database Management** screen after the record was deleted.

	Star Star	ting Date September, 2010	End Date September 20 Ser Nor Tor Visit In 22 22 23 1 2	10 00 10 00 2 0		Data	base	Manag	ement			
Check H Cap	land Drive	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				Que	ry	DELETE Selec RECORDS	tted Di	ELETE AII ECORDS		
eld Count   Ti	ime Stamp	Schedule I	lame	Weld Serial	(Weld Lot	(Test ID	Sche ID	Polarity	Current Peak	Voltage Peak	Power Peak	Resistance Paul
4 90	000091010101758.466	Run Sample 5	oc .			12129	36	P06	0.747994	4354251	21074625	15-675851
9 90	02/2010 10:17:52 AM	Run Sample I	90			52528	36	P10	0.775452	4.334199	2.778772	15.135718
2 90	0200910 10 17 45 464	Run Sample I	90			52527	36	Pos	0.721034	4.552144	2-5258657	15.311409
8 46	020/00/10 10 17 35 MM	Run Sample I	9C			62626	38	Pas	0.7779.30	4.479854	2.754110	13.879474
0 90	0305/10 10 17 26 MM	Run Dample 2	xc .			62625	36	Pas	0.779610	4.250290	2 799957	13,291/184
9 90	0000010 10 17 14 HM	Run fample (	xc .			12124	36	Pos	0.2558819	6.812114	1.456.300	24 829081
9 90	03/39/16 10 16:56 464	Run Sample 5	90			12923	36	P10	8.725738	4.540558	2.549318	15.0482395
7 90	03/09/10 10 10 45 464	ikun Sample I	0			52622	36	P16	0.700040	4.642142	2717476	13.185445
6 46	0000048-00-10-48 AM	illun Sample I	90			62629	38	Pas	0.054134	4 707683	2-54/1008	43.2503102
6 40	0000040 10 16 34 MM	Run Earrain I	NC .			62620	36	Pas	0.765487	4.549974	2 788925	14.867276
4 40	030910 10 16 JB 4M	Run Sample 1	C .			52515	36	Pla	3.799044	4.447974	2 744310	13.848256
5 90	030978 10 16 23 MM	Run Sample I	xC			12518	35	P14	0.080754	4.525475	2.677090	13.8265.39
2 90	0000010 10 10 10 MM	Run Sample (	x.			52517	36	P14	0.721710	4536723	2-66/1022	14 005/887
1 40	00000-10-10-14 MM	Run Sample I	90			52516	16	Pas	0.754411	4 100201	2762702	15.336201
9 40	00000-10 10 10 08 MM	But Sample I	×			42414	16	Fas	0.768549	4 101408	2 126 179	14 110817
6 60	000010 10 10 01 44	Run Lamain I	10 C			12014	36	Fas	0.784/094	4.510480	2.79/141	14 090004
8 90	COCO10 10 10 10 4M	Run Earnage I	÷			52673	36	Pag	5.730808	4 715405	2.05/1814	15 255402
1 10	NAME AND ADDRESS OF ADDRESS OF	ites family (	*	-		61677	16	Pos	1.010700	4.641543	1.04.0048	es estuan
6 40	CONTRACTOR AND AND AND AND	But Sample I	90	-		62671	14	Pas	0.040/100	4.0011011	2 25,4810	to Friday
4 40	00000-00 00 00 AT MM	iten famele i	2 2			424.48	18	Fas	0.747010	4 1005/32	2-062775	10.2010.00
4 40	2555545 45 H 15 H	But Extends	20 C			12404	34	Free	0.713370	4 1411442	2444143	14 MACHINE
5	CONSTRAINT NO. 10, 27 AM	Red Earney's 1	×			125024	36	File	3.4 service	4 779193	2.450145	15.216415
	PERSONAL DR NO. TO AM	State Technology	2°	-		616.07	15	P14	a haaling	4 10 10 10	1.4475.55	to printe at
1 44	COLORADA AN 103 18 484	But Sample I	9 <sup>1</sup>			10404	36	Pag	0.6710995	4.5505.71	0.000400	15.535.010
	Conditioned and set of a state	day Surgers	ũ			1.14.04	10	- 100	a sale land	a ballanta	1 Tax 124	IN Ashelin
	CONTRACTOR AND AND AND AND	dive formers	×			10004	14	Pres.	a Nations	4 34 3073	3 Tana la	14 040718
	COSC 10 10 14 14 14	Res Lemma 1	2 2			82482	36	Pro-	5 751414	4 Mitchell	3 190613	14 378736
-	1000000 10 14 45 46	Red Excepts 1	× .			12502	35	Fire	3 7780015	4 2004 4401	2 79/0049	14 STTREE
						_	_		_			



To delete all records for the date range of the query, click the **Delete All Records** button.

Once this button is pressed, a message will appear and you will be asked to confirm that the records are to be deleted. Select **OK** to delete the records. All the records in the date range of the query will be deleted.

Press Ok to Delete File	es	
	ок	CANCEL

**NOTE:** Deleting of records can take several minutes or longer depending on the number of records selected. As an approximate guideline for the time it will take to delete records, 85,000 records will take approximately 45 minutes to delete. A **blue** bar will appear on the screen to indicate that the Monitor program is processing the request.



# Chapter 6 Diagnostics, Calibration, and Maintenance

# **Section I. Diagnostics**

The Monitor program provides diagnostic capability to view the present status of the digital inputs and actuate the digital outputs and relay outputs. This provides the user the capability to confirm the I/O channels are functioning correctly. These diagnostics functions are accessed by clicking the **DIAGNOSTICS** button on the main menu.



# **Digital I/O Diagnostics**

From the **Main Menu**, select **DIAGNOSTICS** to get the screen below. This screen shows the states of the digital inputs and allows the user to change the states of the digital outputs and relay outputs.

When this screen is accessed, the Monitor program changes all the **Digital Outputs** and **Relay Output** states to inactive.

When the **Diagnostics** screens are exited and the user starts the **Monitoring Mode**, the Monitor program will return the two **Counter Digital Outputs** to the active state if the counter limit has been reached.

# CHAPTER 6: DIAGNOSTICS, CALIBRATION, AND MAINTENANCE

Diagnostics Analog input Diag	gnostics Displacement Diagnostics	
DIGITAL INPUTS	DIGITAL OUTPUTS	RELAY OUTPUTS
RESET	READY TO MEASURE	RELAY 1
ZERO DISPLACEMENT	MEASUREMENT IN PROGRESS	RELAY 2
WELD TO DISPLACEMENT	LAST WELD IN LIMITS	RELAY 3
RESET WELD COUNTER 1	LAST WELD OUT OF LIMITS	RELAY 4
RESET WELD COUNTER 2	LAST WELD IN WARNING LIMITS	
START STOP MONITOR	LAST WELD OUT OF WARNING LIMITS	
START PART MEASUREMENT	INITIAL THICKNESS PASS	
INITIAL THICKNESS MEASUREMENT	INITIAL THICKNESS FAIL	
PART MEASUREMENT MODE	FINAL THICKNESS PASS	
EXTERNAL DIGITAL TRIGGER	FINAL THICKNESS FAL	
Future Expansion 2	WELD COUNT 1 REACH MAX	
Future Expansion 3	WELD COUNT 2 REACH MAX	
Future Expansion 4	POWER SUPPLY 1 CUTOFF	LOGIC SIGNAL TEST
Future Expansion 5	POWER SUPPLY 2 CUTOFF	
	Future Expansion 6	ETHERNET
	FORCE FIRING	TEST
REMOTE BCD SCHEDULE SELECT	LOCAL BCD SCHEDULE SELECT	

## **Digital Inputs and Schedule Inputs**

This section of the screen displays the states of the Digital Inputs and Schedule Inputs.

The box or circle next to the description of the signal will be **GREEN** when the output is set to active. A **GREY** box or circle indicates the output is set inactive.

The Digital Inputs identified as **Future Expansion** are wired in the **Sensor Interface Module**, but do not have any Weld Monitor functions.

DIGITAL INPUTS						
RESET						
ZERO DISPLACEMENT						
WELD TO DISPLACEMENT						
RESET WELD COUNTER 1						
RESET WELD COUNTER 2						
START STOP MONITOR						
START PART MEASUREMENT						
INITIAL THICKNESS MEASUREMENT						
PART MEASUREMENT MODE						
EXTERNAL DIGITAL TRIGGER						
Future Expansion 2						
Future Expansion 3						
Future Expansion 4						
Future Expansion 5						
REMOTE BCD SCHEDULE SELECT						
1 2 4 8 16 32 64 0 0 0 0 0						

#### **Digital Outputs and Schedule Outputs**

The **DIGITAL OUTPUTS** can be set active or inactive by clicking the box to the left of the **DIGITAL OUTPUT** description.

The **Schedule BCD Outputs** can be set active or inactive by clicking the circle below the corresponding BCD bit.

The box or circle will be **GREEN** when the output is set to active. A **GREY** box or circle indicates the output is set inactive.

DIGITAL OUTPUTS						
READY TO MEASURE						
MEASUREMENT IN PROGRESS						
LAST WELD IN LIMITS						
LAST WELD OUT OF LIMITS						
LAST WELD IN WARNING LIMITS						
LAST WELD OUT OF WARNING LIMITS						
INITIAL THICKNESS PASS						
INITIAL THICKNESS FAIL						
FINAL THICKNESS PASS						
FINAL THICKNESS FAIL						
WELD COUNT 1 REACH MAX						
WELD COUNT 2 REACH MAX						
POWER SUPPLY 1 CUTOFF						
POWER SUPPLY 2 CUTOFF						
FORCE FIRING						
LOCAL BCD SCHEDULE SELECT						
1 2 4 8 16 32 64 O O O O O O						

## **Relay Outputs**

The Relay outputs can be set active or inactive by clicking the box to the left of the **Relay Output** description.

The box will be **GREEN** when the output is set to active. A **GREY** box indicates the output is set inactive.

RELAY OUTPUTS
RELAY 1 RELAY 2 RELAY 3 RELAY 4

# Serial Port Test (Serial Loopback)

The serial port tests that the serial port on the **Data Processing Module** is functioning and the Weld Monitor software has established a connection with the serial port.

To perform this test, Pins 2 and 3 (Data Transmit and Data Receive) should be jumpered together on the RS-232 Connector on the back of the **Data** 



**Processing Module**. Then, click the **Serial Loopback** button. The Monitor program will display a message that the serial port test is in progress. After approximately a minute, the Monitor program will display a message stating if the serial port test passed or failed.

# **Ethernet Port Test**

The Ethernet port tests that the Ethernet port on the **Data Processing Module** is functioning and the *Windows*  $10^{\text{®}}$  Operating System can communicate through the Ethernet port to another computer.

To perform this test, the **Data Processing Module** should be connected to a network through the Ethernet connector on the back of the **Data Processing Module**.

- 1. Click the **Ethernet Test** button.
- 2. Enter the **IP Address** of one of the computers on the network and click **OK**.

**NOTE:** The Monitor program needs to have security rights to access that computer. It will display a message that the **Ethernet test is in progress**. After approximately a minute, the Monitor program will display a message stating if the Ethernet port test passed or failed.



# **Logic Signal Test**

The Logic Signal Test checks the communications between the Sensor Interface Module and the Data **Processing Module**. Consult the AMADA WELD TECH Service Department for further information about this test.

When the **Logic Signal Test** button is pressed, there will not be any messages displayed on the screen Digital Diagnostics screen nor will any new window be displayed. Clicking the **Logic Signal Test** button will not change the Monitor Program's configuration or calibration. Click the **Return** button to exit the **Diagnostics** screens.

## **Analog Input Diagnostics**



The Analog Input Diagnostics screen shows the real time signal values present on the Voltage, Force 1 and 2, and Alternate Sensor input channels. If the user has entered in text for the label for the Alternate Sensor in the System Setup, such as "Gas Flow", the user text label will appear on the Analog Input Diagnostics screen in place of the standard Alternate Sensor text.

There is a graphical display of these signal values with the Y Axis labeled with the units for each signal. There is also a numeric display of the signal values shown in the table in the upper right portion of the screen. The graph lines are color coded as noted in the color key table in the upper right corner of the screen. The user can click the **Hide/Unhide** buttons located in the upper right portion of the screen to remove a signal from the graphical display.

## **Displacement Diagnostics**

The **Displacement Diagnostics** screen shows the current position measurement of the two displacement channels. There is a graphical display of the positions with the Y Axis labeled with the units. There is also a numeric display shown in the table in the upper right corner of this screen.

The displacement sensors can be zeroed from this screen by clicking the Zero Displacement 1 or 2 buttons.



# Section II. Calibration

The Monitor program user interface provides functions to allow an electronics technician to calibrate most of the process measurement inputs on site. The procedures to complete those calibrations are described in this section. The measurement inputs for **Current**, **Voltage**, **Force 1**, **Force 2**, and **Alternate Sensor** can be calibrated by an electronics technician at the user site.



The displacement channel inputs are digital signals and do not have any calibration capabilities within the Monitor program. Gage blocks can be used to set an electrode position and the resulting electrode position can be read on the **Displacement Diagnostics** screen to confirm if the Heidenhain linear encoder and **Weld Monitor** are operating correctly. If the Heidenhain linear encoder is *not* operating properly, replacement or repair of the Heidenhain linear encoder is required.

To provide for calibrated input channels, the Monitor program utilizes a scale factor (slope) and offset (y intercept) that it applies to the raw value read on the input channel. The scale factors and offsets can be entered manually through the keyboard or determined in an automated manner using the Monitor Program's calibration functions.

From the Main Menu, click on Calibration button to access the calibration functions.



#### **Calibration Menu**

The following screen shows the **Calibration Menu**. The button in the upper right corner of the screen is the button for the calibration of the **Alternate Sensor**. In this view of the screen, the button is labeled **Gas Flow**, because **Gas Flow** was the text entered on the **System Setup** menu for the **Alternate Sensor Label**.



## **Current Calibration**

To calibrate the current channel, click the **Current** button on the **Calibration Menu** to access the **Current Calibration** screen.

	unionic o	andiauon	855.44	17m (A)	Pormula	slope (m)	74	tercept (b)				
Current I	leasure Type	Set Manually	Type D	Data Source	y = mx + b	10.000	0 7	50.00000	00n			
Col		Yes E	ACP	Manual					_			
Maximum	e Current Range	Am (7)		Annual C	7-		_	_	_	_	_	-
() 2K		740 14			6-							
					5-							
Mark Danafara	15-6.14	alas Battino			4-							
nigh Heading	regn vi	alue Setting	TAKE HIGH ME	ASUREMENT	3-							
- WWW												
	and g.	fur weeks										
		for a set										
Low Reading	Low Va	due Setting	Tare reported		Aughtede							
Low Reading	s-kAmp) (0	due Setting (rms-kAmp)	TAKE ZERO ME	ASUREMENT	Anglitude							
Low Reading	Low Va	due Setting (rms-kAmp)	TAKE ZERO ME	ASUREMENT	Angliste o i i i i i i i i i i i i i i i i i i i							
Low Reading	Low Va	due Setting (ms-kAmp)	TAKE ZERO ME	ASUREMENT	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4							
Low Reading	Low Va	due Setting (rms-kAmp)	TAKE ZERO ME	ASUREMENT	4048444							
Low Reading	Low Va	due Setting (rms-kAmp)	TAKE ZERO ME	ASUREMENT	1							
Low Reading 0.000 (rm	s-kAmp) ∯0	due Setting (ims-kAmp)	TAKE ZERO ME	ASUREMENT		10000	15000	20000	25000	30000	35000	4000
Low Reading 0.000 (m	Low Va	due Setting (ims-kAmp)	TAKE ZERO ME	ASUREMENT		10000	15000	20000 Tene	23000	xoice	3500	40000
Low Reading	skAmp) gr	Aus Setting (rms-kAmp)	Col 6K	ASUREMENT	21- 2- 3- 4- 5- 6- 7- 6- 5000 Coll 60K	10000	15000	2000 Tane	23000	zoice	3500	4000
Low Reading 0.000 (rm	s kAmp) (0	Aut Setting (rms-kAmp) Coll 2K 0.00000	Call 6K	Cail 20K	Partitive 	10000 Coll	13000 1 200K 00000	20000 Tese	23000 BK.22	30000	33000 K	40000
Low Reading 0 000 (rm High Low	Low Vi s-kAmp) g 0	Aue Setting (rms-kAmp) Coll 2K 0 000000 0 000000	TAKE ZERO ME           Coli 6K           0.00000           0.00000	ASUREMENT Coll 20K 6 000000 0 000000	Presentation 2	10000 Coll 0.04 0.04	13000 1200K 00000 00000	2000 Tene	23000 GK.20 EXT	30000 IK 60K, 200 ENDED CAU	35000 K	4000
Low Reading 0.000 (m High Low Scale Factor	Leev Vi s kAmp) ∰ 0 Shunt 3.60000 0.00000 0.95617	Aue Setting (rms-kAmp) Coil 2K 0.00000 0.000000 10.000000	Cal 6K 0.00000 0.00000 2.815000	ASUREMENT Cail 20K 0.00000 0.00000 52.70000	21- 2- 3- 4- 5- 6- 7- 0 5000 Coli 60K 0.00000 0.00000 0.00000 211.60000	10000 Col 0.0 916	13086 1205K 00000 00000 400000	2000 Tene	23000 GK.20 EXT	30000 K. 60K, 200 ENDED CA	JSÓOC	4000

## CHAPTER 6: DIAGNOSTICS, CALIBRATION, AND MAINTENANCE

On this screen the real time voltage on the current input channel is displayed in the upper center part of the screen. The real time current factored with the present calibration factors is displayed below the voltage signal.

The table at the bottom of the screen displays the present calibration factors for the current input channel.

The graph on the right side of the screen is for reference information *only* and is not specifically used by the calibration procedure.

The calibration procedure determines a scale factor (slope) and offset (y intercept). The scaling formula is displayed in the upper right corner of the screen.

#### **Calibration Procedure for Current Channel for Shunt**

#### **Equipment required:**

- a. MPJA HY5003 power supply or equivalent
- b. shunt cable (Sensor Interface Module to HY5003 power supply)

#### Procedure

- 1. From the Main menu, click on the **Calibration Button** then click on the **Current Calibration** button.
- 2. Set Current Measure Type to Shunt.
- 3. Set **Set Manually** to **No**.
- 4. Set **Type** to **DC**.
- 5. Set Data Source to Automatic.
- 6. Connect one end of Shunt cable to HY5003 power supply and the other end to the Sensor Interface Module.
- 7. Set HY5003 power supply to **0.00 Volts**.
- 8. Press Take Zero Measurement.
- 9. Enter **0** Volts in Low Value Setting. Press the Enter Key.
- 10. Set HY5003 Power Supply to output approximately 4.00 Volts.
- 11. Press Take High Measurement.
- 12. Enter the HY5003 output voltage level in High Value Setting. Press the Enter Key.
- 13. Click Save.

/ Coil

Shunt

#### Calibration Procedure for Current Channel for Current Coil

#### **Equipment required:**

- a. Variable transformer with switch capable of 0 to 115 VAC at 10 Amps
- b. Five foot piece of 2 AWG insulated wire terminated (between shunt and output of transformer)
- c. Calibrated shunt resistor of 1.000 milliohms rated at 40 watts minimum
- d. Miyachi Unitek transformer part number 4-34419-01A1 or equivalent
- e. True RMS digital voltmeter with a range of zero to one volt RMS

#### Automated Procedure to Calibrate 2K Coil Range



Do *not* connect primary of transformer until instructed to do so per this procedure.

1. Connect equipment specified above per the following diagram. Ensure that there are 5 turns passing through the center of the Rowgowski coil.



- 2. Set the voltage to zero on variable transformer, then increase until the meter reads 200 mV AC. This will simulate a current of 1000 amps.
- 3. Turn the current OFF with the switch.

**NOTE:** If shunt resistor is not 1.000 milliohms, calculate a current to use instead of the above 200 mV AC current based on the resistance value of the shunt.

4. Go to the Current Calibration Screen. Set Current Measure Type to Coil.

Shunt	
✓ Coil	

## CHAPTER 6: DIAGNOSTICS, CALIBRATION, AND MAINTENANCE

- 5. Select 2K for Maximum Current Range.
- 6. Select **No** for **Set Manually**.
- 7. Select **AC** for **Type**.
- 8. Select Automatic for Data Source.
- 9. Confirm current is **OFF**.
- 10. Click Take Zero Measurement.
- 11. Enter **0** in Low Value Setting.
- 12. Turn current ON.
- 13. Click **Take High Measurement**. After a brief delay a sine wave should appear on the screen. Enter **1.00** in **High Value Setting**.
- 14. Click **Save**, then click **OK**.
- 15. Turn the current **OFF**.

#### **Confirm the Current Coil Calibration**

- 1. Create a Schedule for an AC Current with coil on the 2K range, pre-trigger of 0, post-trigger of 500 milliseconds and a current trigger.
- 2. Go to Weld Monitoring Tab on the Monitor Program Screen.
- 3. Click **Press to Start**.
- 4. Turn on current for **1** second.
- 5. Click the **Expand** button for **Current**. Measure peak voltage divided by 1.414. The value should be **1k** amps if the calibration is correct.

#### Procedure to Calibrate 6K, 20K, 60K, and 200K Coil Ranges

The 6K, 20K, 60K, and 200K ranges can be calibrated following two methods. One method is to click the **6K**, **20K**, **60K**, **200K EXTENDED COIL** button on the **Current Calibration** screen after the 2K range has been calibrated. When this button is clicked the 6K, 20K, 60K, and 200K columns in the table at the bottom of the **Current Calibration** screen will be updated with values based on factors of the 2K calibration results. When the button is clicked and the table updated, there will not be any messages displayed on the screen.

The 6K, 20K, 60K, and 200K ranges can also be calibrated by using a current source that can provide a current suitable to those ranges. Please contact the AMADA WELD TECH Service Department for further information.



#### Manual Procedure to Enter Scale Factor and Offset for Current

- 1. While on the Current Calibration Screen, select the desired Current Measure Type (shunt or coil). If coil was selected for the Current Measure Type then also select the desired Maximum Current Range (2K, 6K, 20K, 60K, or 200K).
- 2. Set Manually to Yes. Scaled Factor and Offset text entry boxes will appear to the right of the Set Manually area.



- 3. Enter your desired scaled factor and offset into the text boxes.
- 4. Click Save.
- 5. A window will open asking Are you sure? Click OK.



6. Repeat this procedure for the remaining coil ranges.

#### **Voltage Calibration**

To calibrate the voltage channel, click the **Voltage** button on the **Calibration Menu** to access the **Voltage Calibration** screen.

Parameter Voltage		Set Ma	Manu	al F		y = mx + b	slope (m) 44.0000	y-intercept (b)
		No	Automat	tic 🖾		Calibration Graph		
High 2.4766 (V)	HIGH		EASURED	TAKE HIGH MEASU	REMENT	0.75- 0.5- 0.25- 20- 5- -0.25-	مور حرق الالم الا ولا الازير الالا الا ولا الازير الالا الا	
Low 0.0000 (V)	LOW	VALUE M	EASURED	TAKE LOW MEASU	REMENT	-0.5 - -0.75 - -1 - -1 -0.75	-0.5 -0.25 0 1	0.25 0.5 0.75 1
							Volts	

## CHAPTER 6: DIAGNOSTICS, CALIBRATION, AND MAINTENANCE

On this screen the real time voltage factored with the present calibration factors is displayed in the upper center part of the screen. The table at the bottom of the screen displays the present calibration factors for the voltage input channel.

The graph on the right side of the screen is for reference information only and is *not* specifically used by the calibration procedure. The calibration procedure determines a scale factor (slope) and offset (y intercept). The scaling formula is displayed in the upper right corner of the screen.

#### **Equipment required**

- a. MPJA HY5003 power supply or equivalent
- b. Voltage Calibration cable (Sensor Interface Module to HY5003 power supply)

#### Automated Calibration Procedure for Voltage

- 1. Go to Voltage Calibration Screen.
- 2. Set Manually to No.
- 3. Set Data Source to Automatic.
- 4. Disconnect Voltage Lead cable from **Sensor Interface Module**.
- 5. Set HY5003 Power Supply to **0.00** volts output.
- 6. Connect the Voltage calibration cable from Sensor Interface Module to HY5003 Power Supply.
- 7. Press Take Low Measurement.
- 8. Set HY5003 Power Supply to approximately **1.00** Volts.
- 9. Enter the HY5003 output voltage in Low Value Setting.
- 10. Press Take High Measurement.
- 11. Set HY5003 power supply to approximately 4.00 volts.
- 12. Enter the HY5003 output voltage in High Value Setting. Press the Enter Key.
- 13. Click Save.
- 14. Disconnect Voltage Calibration cable from the Sensor Interface Module.
- 15. Reconnect Voltage Lead Cable to the Sensor Interface Module.

#### Manual Procedure to Enter Scale Factor and Offset for Voltage

1. While on the Voltage Calibration Screen, set Set Manually to Yes. Scaled Factor and Offset text entry boxes will appear to the right of the Set Manually area.

Yes	0.0000
No	offset

- 2. Enter your desired scaled factor and offset into the text boxes.
- 3. Click Save.
- 4. A window will open asking Are you sure?
- 5. Click **OK**.

## **Force Calibration**

Set Manually Yes No No Scaled factor 8.0710 offset 0.0563

The Force 1 and Force 2 input channels are calibrated separately. To calibrate the Force 1 channel, click the **Force1/Pressure** button on the **Calibration Menu** to access the **Force1/Pressure Calibration** screen.

		Set Manua	ily Data Sour	ce		Formula	since (n)	winterrent (b)
	1	Yes (	Manual	-		y = mx + b	2.6295	-0.3912
		No I	Automatic	8				
	1					Calibration Graph		
Service and the service of the servi						0.75-		
High Reading	High Va	lue Setting	ſ	TAKE HIGH MEASU	REMENT	0.5-		
(v)	31.					者 o-		
						-0.5-		
Low Reading	Low Val	Lbs	ſ	TAKE LOW MEASU	REMENT	-0.75-		
,	0.					-1 -0.75	-0.5 -0.25 0 Volts	0.25 0.5 0.75 i
	High	Low	Scaled Factor	Offset	ř.			
		0.000	0.0004	0.3645				

On this screen the real time force value factored with the present calibration factors is displayed in the upper center part of the screen. The table at the bottom of the screen displays the present calibration factors for the force input channel.

The graph on the right side of the screen is for reference information *only* and is not specifically used by the calibration procedure.

## CHAPTER 6: DIAGNOSTICS, CALIBRATION, AND MAINTENANCE

The calibration procedure determines a scale factor (slope) and offset (y intercept). The scaling formula is displayed in the upper right corner of the screen.

#### **Equipment required**

- a. MPJA HY5003 power supply or equivalent
- b. Force Calibration cable (Sensor Interface Module to HY5003 power supply)

#### **Automated Calibration Procedure for Force 1**

This procedure calibrates the Weld Monitor for an application with forces typically in the 5 to 15 lb range. Select an upper and lower force level to use based on the forces typical for your weld application.

- 1. Go to Force 1 Calibration Screen.
- 2. Set Manually to No.
- 3. Set **Data Source** to Automatic.
- 4. Set **Weldhead** to approximately 5.00 lb. force.
- 5. Set **Power Supply** to a **No Weld** condition such that the weldhead can be actuated but the power supply will not apply weld current.
- 6. Put force gauge between electrodes and use footswitch to apply force.
- 7. Click Take Low Measurement.
- 8. Enter Force Gauge reading into Low Value Setting then release the footswitch.
- 9. Set Weldhead to approximately 15.00 lb. force.
- 10. Put force gauge between electrodes and use footswitch to apply force.
- 11. Click Take High Measurement.
- 12. Enter Force Gauge reading into High Value Setting. Click Save.
- 13. Switch Power Supply from No Weld to Weld.

## **CHAPTER 6: DIAGNOSTICS, CALIBRATION, AND MAINTENANCE**

#### Manual Procedure to Enter Scale Factor and Offset for Force 1

1. While on the Force 1 Calibration Screen, set Set Manually to Yes. Scaled Factor and Offset text entry boxes will appear to the right of the Set Manually area.



- 2. Enter your desired scaled factor and offset into the text boxes.
- 3. Click Save.
- 4. A window will open asking Are you sure? Click OK.

Set Manually	scaled factor
Yes 🔽	8.0710
No 🗆	0.0563

#### **Calibration Procedures for Force 2**

To calibrate the **Force2** channel, click the **Force2/Pressure** button on the **Calibration Menu** to access the **Force2/Pressure Calibration** screen. Follow the calibration procedure for the **Force 1** Channel to calibrate the **Force2** channel.

For	ce 2 C	alibr	ation	3.8268	Lbs			
		Set Manua Yes 「	lly Data Sour	ice		y = mx + b	slope (m) 2.4680	y-intercept (b) 0.0263
		No 5	Automatic			Calibration Graph		
Low Reading	Low Val	ue Setting Lbs	[	TAKE LOW MEAS	UREMENT	4 0- 0.25- 0.75- 0.75- -1-	0.5 0.25 0	0.25 0.5 0.75 1
							Volta	
	High	Low	Scaled Factor	Offset	Т			
Force	4.1700	2.5700	2.4680	0.0263	]			
					-			

#### **Alternate Sensor Calibration**

To calibrate the Alternate Sensor channel, click the Alternate button on the Calibration Menu to access the Alternate Sensor Calibration screen.



On this screen the real-time alternate sensor value factored with the present calibration factors is displayed in the upper center part of the screen. The table at the bottom of the screen displays the present calibration factors for the alternate sensor input channel.

The graph on the right side of the screen is for reference information *only* and is not specifically used by the calibration procedure. The calibration procedure determines a scale factor (slope) and offset (y intercept). The scaling formula is displayed in the upper right corner of the screen.

#### **Equipment required**

- a. MPJA HY5003 power supply or equivalent
- b. Alternate Sensor Calibration cable, AMADA WELD TECH Part Number 4-38481-01 (Sensor Interface Module to HY5003 power supply)
#### Automated Calibration Procedure for Alternate Sensor

- 1. Go to the Alternate Sensor Calibration screen.
- 2. Set Manually to No.
- 3. Set Data Source to Automatic.
- 4. Set the HY5003 Power supply to approximately **0** Volts.
- 5. Connect the Alternate Sensor Cable from Sensor Interface Module to HY5003.
- 6. Set the HY5003 Power Supply to approximately **1.00** Volts.
- 7. Press Take Low Measurement.
- 8. Enter the HY5003 output voltage into the Low Value Setting.
- 9. Press Take High Measurement.
- 10. Set the HY5003 power supply to approximately 8 Volts.
- 11. Enter the HY5003 output voltage into the High Value Setting.
- 12. Click Save.

#### Manual Procedure to Enter Scale Factor and Offset for Alternate Sensor

1. While on the Alternate Sensor Calibration Screen, set Set Manually to Yes. Scaled Factor and Offset text entry boxes will appear to the right of the Set Manually area.



- 2. Enter your desired scaled factor and offset into the text boxes.
- 3. Click Save.
- 4. A window will open asking Are you sure?
- 5. Click **OK**.



#### **Sensor Module Calibration**

There is a potentiometer in the **Sensor Interface Module** that provides a calibration adjustment for the current channel for a current coil sensor. This calibration is performed by accessing the **Sensor Module** Calibration screen by pressing the **Sensor Module** button on the **Calibration Menu**.



This **Sensor Module** calibration is performed during the factory calibration. Contact the AMADA WELD TECH Service Department to schedule Calibration.

If the Sensor Module Calibration Screen is accessed, pressing the **Test Start** button will not affect the **Weld Monitor's** calibration or operation. When the **Test Start** button is pressed, there will not be any messages on the **Sensor Module Calibration** screen nor will any new window be displayed. Click the **Return** button to exit the screen.

## Section III. Maintenance & Repair

### Repair

There are no user-serviceable parts inside the **Data Processing Module**, **Sensor Interface Module**, computer monitor, keyboard or mouse. If you have problems with any of the WM-100A components that you cannot resolve, please contact our service department at the address, phone number, or e-mail address listed under **Contact Us** in the front of this manual.

### Cleaning

Clean the exterior of the **Data Processing Module**, **Sensor Interface Module**, computer monitor, keyboard and mouse with a slightly moistened micro-fiber cloth and mild soap solution. Dry items with an antistatic lint-free cloth.

### Inspection

Check all electrical connections weekly for damage and confirm proper connections are in place.

#### Maintenance

Calibrate all input channels yearly. Contact the AMADA WELD TECH Service Department to schedule calibration.

# Appendix A Technical Specifications



#### APPENDIX A. TECHNICAL SPECIFICATIONS

#### **Technical Parameters**

PARAMETER	SPECIFICATIONS					
	Туре	Range	Accuracy	Resolution		
	Current: AC or DC (Coil input channel)	0 – 200,000 amps	1.5% of full scale	Three significant digits		
	Current: AC or DC (Shunt input channel)	0 – 10,000 amps with 1 milliohm shunt	± 1% of reading ± 20 amps	Three significant digits		
	Voltage	0 – 15V	$\pm$ 1% of reading $\pm$ 0.020 volts	Three significant digits		
Measurement Channels	Force 1	0 - 10V	$\pm$ 1% of reading $\pm$ 0.020 volts	Three significant digits		
	Force 2	0 - 10V	$\pm$ 1% of reading $\pm$ 0.020 volts	Three significant digits		
	*Displacement 1 and *Displacement 2	0 – 12mm, 0 – 25mm, 0 – 30mm*	± 0.0005" or ± 0.01mm	0.0001" or 0.01 mm		
	Alternate Voltage	0 - 10V	$\pm$ 1% of reading $\pm$ 0.020 volts	Three significant digits		
	*determined by displacement sensor installed					
Current Coil Ranges	2, 6, 20, 60, 200 kA					
Weld Time	1 to 2,000 milliseconds					
Sampling Rate	125 kHz for all channels					
Measurement Time	1 to 2,000 milliseconds					
Repetition Rate	1 weld per second for a 1	00 millisecond measureme	ent period			
Database	Microsoft SQL Server Express					
Counters	2 resettable counters with	h user assigned messages				
Schedules	Unlimited number of schedules can be stored based on available hard drive space. 127 schedules can be selected through schedule inputs.					
Minimum Current Rise	25 amps/millisecond for	1X coil in 2k range				
(Current Coil Applications)	5 amps/millisecond for 10x coil in 2k range					
(	Minimum current rise is proportionally greater for higher coil ranges					

#### **APPENDIX A. TECHNICAL SPECIFICATIONS**

PARAMETER	SPE	ECIFICATIONS	
Monitored Parameters with Upper and Lower Limits	Peak Current Pulse 1 & 2 RMS Current Pulse 1 & 2 Peak Voltage Pulse 1 & 2 RMS Voltage Pulse 1 & 2 Peak Resistance Pulse 1 & 2 RMS Resistance Pulse 1 & 2 Peak Power Pulse 1 & 2 RMS Power Pulse 1 & 2	Initial Thickness 1 & 2 Final Thickness 1 & 2 Thickness Change 1 & 2 Force 1 & 2 Alternate Formula 1 & 2 Weld Time	
Monitored Parameters with Upper and Lower Warning Levels	Peak Current Pulse 1 & 2 RMS Current Pulse 1 & 2 Peak Voltage Pulse 1 & 2 RMS Voltage Pulse 1 & 2 Peak Resistance Pulse 1 & 2 RMS Resistance Pulse 1 & 2	Peak Power Pulse 1 & 2 RMS Power Pulse 1 & 2 Initial Thickness 1 & 2 Final Thickness 1 & 2 Thickness Change 1 & 2 Formula 1 & 2	
Elements Stored in Database	Time Stamp (Time and date) Test Record ID Part serial Part Lot (Lot number) Schedule ID Schedule name Weld Time Weld time result Peak current 1 & 2 RMS current 1 & 2 Current result Peak voltage 1 & 2 RMS voltage 1 & 2 RMS voltage 1 & 2 Voltage result Peak power 1 & 2 RMS power 1 & 2 Power result	Peak resistance 1 & 2 RMS resistance 1 & 2 Resistance result Peak force / Pressure 1 & 2 Force result 1 & 2 Initial thickness 1 & 2 Displacement (Thickness Change) 1 & 2 Final thickness 1 & 2 Displacement result 1 & 2 Alternate sensor maximum Alternate sensor minimum Alternate Result Weld status Counter 1 & 2 Formula 1 & 2	
Waveforms	Current, Voltage, Force 1, Force 2, Displacement 1, Displacement 2, Alternate Input, Resistance, Power		
Digital Inputs	Refer to Appendix B		
Digital Outputs	Refer to Appendix B		
Relay Outputs	Refer to Appendix B		
Communications	Ethernet TCP/IP to read database, RS-	232 for weld data output after each weld	
Ambient Temperature	10 – 40 °C		
Relative humidity	10% to 80% non-condensing		

# Appendix B Electrical & Data Connections

#### Introduction

This Appendix describes the electrical and data connectors located on the front and rear panel of the Sensor Interface Module and the RS-232 connector located on the **Data Processing Module**.

**NOTE:** The specification listed in this Appendix may be changed without notice.

#### **Current Input Connector (Shunt)**



CURRENT INPUT CONNECTOR (SHUNT) SPECIFICATIONS						
	SIGNAL		МАХ	MAX		
PIN #	VOLTAGE	I/O	VOLTAGE	CURRENT	COMMENTS	
Center	+V	Ι	10 V	0.2 A	Signal is differential between Shell V-	
Shell	-V	Ι	10 V	0.2 A	and Center V+.	

## **Current Input Connector (Coil)**



CURRENT INPUT CONNECTOR (COIL) SPECIFICATIONS			
PIN #	SIGNAL NAME	I/O	
1	Coil Input #1	Ι	
2	Coil Input #2 I		

### **Voltage Sense Input Connector**



VOLTAGE SENSE INPUT CONNECTOR SPECIFICATIONS						
	SIGNA	L	МАХ	МАХ	1/0	COMMENTS
PIN#	NAME	TYPE	VOLTAGE	CURRENT	1/0	
1	Not Used Not Used					Not Used
2	Input #1 V+	Pulse	15 V	0.1 A	Ι	Signal is differential between Input #1
3	Input #2 V-	Pulse	15 V	0.1 A	Ι	and Input #2

### Force 1 and Force 2 – Input Connectors



	FORCE1 and FORCE 2 INPUT CONNECTOR SPECIFICATIONS				
DIN #		SIGNAL		MAX CURRENT	
FIN#	NAME	TYPE	WAX VOLTAGE		
1		N	ot used		
2		N	ot used		
3	Not used				
4	Not used				
5	Not used				
6	Ground Ground		Ν	I/A	
7	V-	Signal Input return		0.1.4	
8	V+	Signal Input			
9	+24 Volts Power		N	I/A	

### Alternate Sensor Input Connector



ALTERNATE SENSOR INPUT CONNECTOR SPECIFICATIONS					
DIN #	SI	GNAL			
PIN #	NAME	TYPE	MAX VOLTAGE	WAA CURRENT	
1	+24 Volts Power N/A			N/A	
2	Ground Ground		]	N/A	
3	Signal Return	Signal Input Return		0.1.4	
4	Signal	Signal Input	10 v	0.1 A	
5	Not used				

#### **Displacement 1 and 2 – Input Connectors**



PIN #	SIGNAL			
	NAME	TYPE		
1	Encoder Signal A+	Signal		
2	Ground	Ground		
3	Encoder Signal B+ Signal			
4	+5 V Power			
5 – 15	Not Used			

#### WM-100A - ADVANCED DATA ANALYSIS MONITOR

#### **RS 232 Connector**

The RS-232 Connector is located on the back of the Data Processing Module.

The Monitor has only one RS-232 function. The Monitor automatically outputs weld results after the weld data has been processed for a weld. The weld results are output as one comma delimited ASCII string. The Monitor acts as Master and there is not any handshaking.

The Monitor will output the weld results that are selected in the Logger Setup. The individual weld result variables, will appear in the string in the order that the variables are listed in the logger.



<b>RS-232 CONNECTOR SPECIFICATIONS</b>				
PIN #	DESCRIPTION	PIN TYPE		
1	ľ	Not Used		
2	Tx (Transmit Data)	RS-232 Driver		
3	Rx (Receive Data)	RS-232 Receiver		
4	Not Used			
5	Signal Ground Analog Ground (ISOGND1)			
6	Not Used			
7	Not Used			
8	Not Used			
9	1	Not Used		

### APPENDIX B. ELECTRICAL AND DATA CONNECTIONS

The comma delimited ASCII string will contain the following:

- Unit ID Number (three characters)
- Schedule Number (the number of characters of the schedule number)
- Weld Result (0 if there were not any limits exceeded, 1 if one or more limits were exceeded)
- Date / Time Stamp
- Data items selected in the Logger Setup (these items will be listed in the order that they appear in the Logger)
- Carriage Return [0x0D]
- Line Feed [0x0A]
- Line Feed [0x0A]

Sample String for Schedule number 124 with weld data for Peak Current, Peak Power, Peak Resistance, and Weld Time:

The Unit ID Number, which must be three characters in length, and Baud Rate must be set in the **System Setup Screen**.

#### Input / Output Signal Connectors



WM-100A - ADVANCED DATA ANALYSIS MONITOR

### Input / Output Signal Configurations

#### J105 – Process Digital Inputs and Outputs



#### J105 Process Inputs and Outputs

PIN #	NAME	DESCRIPTION	MINIMUM ACTIVE TIME	
J105-1	Digital Trigger + (INPUT)	Bidirectional Input Referenced to Input Common at Pin 12 of J110	125 ms	
J105-2		Not Used		
J105-3	Power Supply Cutoff A (OUTPUT)	The Power Supply Cutoff outputs will switch active when the weld to displacement values are reached for the two displacement channels. The user should	The outputs will be active as	
J105-4	Power Supply Cutoff B (OUTPUT)	connect to two of the three output terminals per the following selections: Pins 3 and 4: For displacement channel 1	When the weldhead retracts the electrode past the weld value,	
J105-5	Power Supply Cutoff C (OUTPUT)	Pins 4 and 5: For displacement channel 2 Pins 3 and 5: For the OR of displacement channels 1 & 2	these outputs will switch low.	
J105-6	Force Fire (OUTPUT)	Signal	When the Monitor is in the <b>Monitor Mode</b> , this output will	
J105-7	Force Fire (OUTPUT)	Ground	switch active when the force channel reading is higher than the user set force fire level and will switch inactive when the force reading drops below the user set force fire level. When the Monitor is <i>not</i> in <b>Monitor Mode</b> , this output will remain inactive.	
J105-8		Not Used		

Digital Output Rating: Digital Input Rating: Up to 28 VDC, up to 120 milliamp Internal load resistor of 5 k $\Omega$ . Maximum input voltage of 28 VDC. Minimum detectable voltage of 5 VDC.

#### J108 – Relay Outputs



**Relay Rating:** 

Up to 30 VDC, up to 1 A.

#### J109 – Digital Outputs



PIN #	NAME	DESCRIPTION
J109-1	Ready to Measure	This output will be active when the Monitor is ready to receive trigger.
J109-2	Measurement in Progress	Used during the Part Measurement Mode as an acknowledgement that the input, Start Part Measurement was received and Monitor is ready to continue process. This output will be set active as acknowledgement.

#### WM-100A - ADVANCED DATA ANALYSIS MONITOR

### APPENDIX B. ELECTRICAL AND DATA CONNECTIONS

PIN #	NAME	DESCRIPTION
J109-3	Last Weld In Limits	This output will be set active after processing of weld data has been completed if weld was in all limits that are being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-4	Last Weld Out of Limits	This output will be set active after processing of weld data has been completed if weld was out of any limit that is being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-5	Last Weld In Warning	This output will be set active after processing of weld data has been completed if weld was in all limits that are being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-6	Last Weld Out of Warning	This output will be set active after processing of weld data has been completed if weld was out of any limit that is being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-7	Initial Thickness Pass	This output will be set active after processing of weld data has been completed if weld was within the upper and lower limits for Initial Thickness if this limit is being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-8	Initial Thickness Fail	This output will be set active after processing of weld data has been completed if weld was out of either the upper or lower limits for Initial Thickness if these limits are being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-9	Final Thickness Pass	This output will be set active after processing of weld data has been completed if weld was within the upper and lower limits for Final Thickness if this limit is being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-10	Final Thickness Fail	This output will be set active after processing of weld data has been completed if weld was out of either the upper or lower limit for Final Thickness if it is being monitored. It will remain active until the Reset input is switched active or another weld is completed.
J109-11	Weld Counter 1 Reached Limit	This output will be set active when weld counter 1 has reached the limit set in the schedule. It will remain active until the Clear Weld Counter 1 is switched to active.
J109-12	Weld Counter 2 Reached Limit	This output will be set active when weld counter 1 has reached the limit set in the schedule. It will remain active until the Clear Weld Counter 1 is switched to active.
J109-14	Common	Bidirectional Common for Pins 1-12. This is internally connected to J114 Pin 16.

**Digital Output Rating:** 

Up to 28 VDC, up to 120 mA.

#### APPENDIX B. ELECTRICAL AND DATA CONNECTIONS

#### **Negative Logic Positive Logic** 1 1 RESET RESET 椏 芶 2 2 ZERO DISPLACEMENT ZERO DISPLACEMENT 岙 3 3 WELD TO DISPLACEMENT WELD TO DISPLACEMENT $^{\circ}$ 椏 椏 4 4 CLEAR WELD COUNT 1 CLEAR WELD COUNT 1 $^{\circ}$ $\sim 0$ 椏 椏 5 5 ∞∕0 **CLEAR WELD COUNT 2 CLEAR WELD COUNT 2** 椏 椏 6 6 START/STOP MONITOR START/STOP MONITOR 00 00 カロ 椏 7 7 START PART MEASURE 00 START PART MEASURE 00 冲 椏 8 8 INIT THICK MEASURE ∕^0 INIT THICK MEASURE ∕^0 椏 椏 9 9 PART MEASURE MODE ∕0 PART MEASURE MODE ∽₀ 椏 椏 10 10 N.C. N.C. 11 11 N.C N.C 12 12 COMMON COMMON 13 13 +24V +24V 14 14 +24V GND +24V GND

#### J110 – Digital Inputs

#### J110 Digital Inputs

PIN #	NAME	DESCRIPTION	MINIMUM ACTIVE TIME
J110-1	Reset	When switched to active, the Monitor program will set the eight weld result outputs, Last Weld In/Out of Limits, Last Weld In/Out of Warning, Initial Thickness Pass/Fail, Final Thickness Pass/Fail, to inactive.	20 ms
J110-2	Zero Displacement	If WM-100A is in not Ready to Measure state, this input will reset current position of both displacement channels to 0 Note: a total of 500 ms from when this input is set active must transpire before electrodes can be moved otherwise the zero positions set may be inaccurate.	20 ms
J110-3	Weld to Displacement	If this input is active, the Power Supply Cutoff Outputs will be operational and will switch based on position of displacement sensors. If this input is inactive, the Power Supply Cutoff Outputs will not operate.	Continuously active for as long as power supply cutoff outputs should be operational
J110-4	Clear Weld Counter 1	Resets Counter 1 to 0	50 ms
J110-5	Clear Weld Counter 2	Resets Counter 2 to 0	50 ms

#### J110 Digital Inputs (cont)

PIN #	NAME	DESCRIPTION	MINIMUM ACTIVE TIME
J110-6	Start/Stop Monitor	Monitor will be in Weld Monitoring Mode when this input is active.	Continuously as long as MONITOR should be in monitoring mode
J110-7	Start Part Measurement	Used during weld to displacement sequence. Set to active at start of process. WM-100A responds with Measurement in Progress output	Switches active when at the start of each weld and switches inactive after Monitor completes processing of weld information and Monitor has set Measurement in progress to inactive
J110-8	Initial Thickness Measurement	When this input is set to active, the Monitor will compare the present displacement position with Initial Thickness Error Min/Max setting in the schedule and then set the Initial Thickness Pass/Fail outputs to active or inactive based on comparison results. The Monitor will also set the current positions of the electrodes as the starting point for the weld to displacement measurement	20 ms
J110-9	Part Measurement Mode	<ul><li>When set to active, the Monitor will operate in the Part Measurement Mode.</li><li>When this input is switched from inactive to active, the Monitor will set the Schedule Outputs to the states of the Schedule Inputs</li></ul>	Continuously on for as long as the Monitor is to remain in Part Measurement Mode If the weld application is not using Part Measurement Mode and this input is only used to update the Schedule Outputs, this Part Measurement Mode Input should remain active for 50ms
J110-12	Common	Bidirectional common for Pins 1-11. This is internally connected to J114 Pin 8.	
J110-13	+24V	Internal +24V supply 0.2 Amp maximum.	
J110-14	24V GND	Internal 24V ground, 0.2 Amp maximum.	

**Digital Input Rating:** 

Bidirectional input. Internal load resistor of 5 k $\Omega$ . Maximum input voltage of 28 VDC. Minimum detectable voltage of 3 VDC.



#### J114 – Schedule Selection Digital Inputs and Outputs

The Monitor sets the Schedule Output Bits 0 through 6 and changes the loaded Schedule to the levels set on the Schedule Input Bits 0 through 6 when the Monitor is not in **Monitor Mode** and the **Part Measurement Mode** input is switched from inactive to active. The Schedule Output Bits will only be updated to the Input Bits' status when the **Part Measurement Mode** input is switched from inactive to active. If the Schedule Input Bits are switched while the **Part Measurement Mode** input remains continuously active or inactive, the Schedule Output Bits and the loaded Schedule will not be changed. Refer to the Timing Diagrams in Appendix C for additional information.

Digital Output Rating:	Up to 28 VDC, up to 120 mA
Digital Input Rating:	Internal load resistor of 5 k $\Omega$ . Maximum input voltage of 28 VDC
	Minimum detectable voltage of 3 VDC.

# Appendix C Timing Diagrams

### **Digital Inputs and Outputs**

The Monitor digital inputs and outputs are configured as Active Low and Inactive High.

### Timing for Part Measurement Mode with Optional Weld to Displacement

For Part Measurement Mode to function properly, the Initial Thickness limit parameters must be set on the Schedule Setup Page 2 screen. The Initial Thickness Delay must also be entered on the Schedule Weld Setup screen. If Weld to Displacement is required, the Weld Value(s) must also be entered on the Schedule Setup Page 2 screen. DIGITAL INPUTS



### APPENDIX C. TIMING DIAGRAMS

**NOTE:** Power supply cutoff outputs will remain active until the weld head is retracted past the user set weld displacement value.

The Weld Result Outputs that are set in the above timing diagram are:

Last Weld In Limits Last Weld Out of Limits Last Weld In Warning Limits Last Weld Out of Warning Limits Final Thickness Pass Final Thickness Fail

The Weld to Displacement input is optional for Part Measurement Mode. It only needs to be set to active if the Power Supply Cutoff outputs are to function during the weld process. If the Weld to Displacement input remains inactive, the Power Supply Cutoffs output will remain inactive.

I/O Sequence for Part Measurement Mode (same above timing diagram):

- A) PLC sets "Part Measurement Mode" active.
- **B**) PLC sets "Weld to Displacement" active (this step is optional and only needed if the process requires weld to displacement)
- C) PLC sets "Start/stop Monitor" active.
- D) Monitor sets "Ready to Measure" to active (if not already active).

The above steps A through D are completed once at the start of repetitive production. Once the above steps are completed, then go to Step 1 below.

- 1. PLC sets Start part Measurement to active.
- 2. Monitor sets Measurement in Progress to active.
- 3. PLC (brings head down).
- 4. PLC sets Initial Thickness Measurement to active at least 5 mseconds after the Monitor has set Measurement in Progress to active.
- 5. Monitor (compares initial thickness to limits) sets **Initial Thickness Pass** or **Initial Thickness Fail** to active or inactive based on comparison results. This step may take up to a time equal to 150 ms plus the **Initial Thickness Delay** set in the schedule.
- 6. PLC (fires power supply).
- 7. Monitor (Monitor detects trigger) then sets **Ready to Measure** to inactive.
- 8. Monitor (Monitor processes weld data) then sets **Measurement in Progress** to inactive.
- 9. Monitor (Monitor resets its internal states) then sets the six weld result digital outputs to their corresponding active or inactive states and then sets **Ready to Measure** to active.
- 10. PLC sets Start Part Measurement and Initial Thickness Measurement to inactive.
- 11. PLC sets Reset to active at least 50 mS after setting Start Part Measurement and Initial Thickness Measurement to inactive.

- 12. Monitor (Monitor detects Reset) then sets Ready to Measure to inactive
- 13. Monitor sets Initial Thickness Pass/Fail Outputs and the six weld result outputs to inactive
- 14. Monitor sets **Ready to Measure** to active. It may take up to 50 mS for the Monitor to set **Ready to Measure** after the PLC sets **Reset** to active.

Once the Monitor has set **Ready to Measure** to active, the process can start again at Step 1. Steps 1 through 14 will be repeated for repetitive production.

If the optional **Reset** input is not used, the **Initial Thickness Pass/Fail** and the six weld result outputs will remain in the state set by the Monitor unit these outputs are set again during the next weld.

During welding processes that do not use the initial thickness measurement digital input, the **Monitor** stores the initial thickness measurement value taken at the point of weld trigger in the database. The **Monitor** also determines and saves the **Initial Thickness** pass/fail result based on the initial thickness value taken at the point of weld trigger. For weld processes that do use the initial thickness measurement digital input, the **Monitor** stores the initial thickness measurement value and its corresponding pass/fail result in the database. The **Monitor** does not take a second initial thickness measurement at the point of weld trigger when the initial thickness measurement digital input is used.

If the PLC executes any of the **Part Measurement Mode** steps out of sequence or without the proper timing, the Monitor behavior will vary based on the situation. The Monitor may not recognize the weld trigger, the monitor may recognize the weld trigger and process the weld results but not continue in the **Part Measurement Mode** sequence, or some other result may occur.

#### Timing for Using Digital Inputs to ZERO Displacement

In order for the Zero Displacement input to register, the Monitor must *not* be in MONITOR Mode. If the Monitor is presently in MONITOR Mode, set the Start/Stop Monitor to inactive before setting the ZERO Displacement active. The Monitor can then be returned to Monitor mode by setting the Start/Stop Monitor input active at least 500 mS after the ZERO Displacement input was set active.

**ZERO Displacement** input will set the position of both Displacement channels to zero.



#### **Timing for Using Digital Inputs to Clear Weld Counters**

In order for the **Clear Counter** digital input to register, the **Monitor** must *not* be in **MONITOR Mode**. If the **Monitor** is presently in **MONITOR Mode**, set the **Start/Stop Monitor** to inactive before setting one or both of the **Clear Counter** inputs to active. The Monitor can then be returned to Monitor mode by setting the **Start/Stop Monitor** input active at least 500 mS after the **Clear Counter** input(s) were set active.



#### Timing for Weld to Displacement without Part Measurement Mode

For Weld to Displacement, the Weld Value(s) must be entered on the Schedule Setup Page 2 screen. The Initial Thickness Delay must also be entered on the Schedule Weld Setup screen.

If the user wants valid results of the initial thickness measurement, the **Initial thickness** limit parameters must be set on the **Schedule Setup Page 2** screen.



**NOTE:** Power supply cutoff outputs will remain active until the weld head is retracted past the user set weld displacement value.

### **Timing for Schedule Change Using Schedule Digital Inputs**

When the Schedule Digital Inputs are set for a schedule, the loaded Schedule is changed and the Schedule Output Bits 0 through 6 are updated only when the **Part Measurement Mode** input is switched from inactive to active and the Monitor is not in **MONITOR Mode**. If the **Monitor** is presently in **MONITOR Mode**, any changes to the **Schedule Inputs** will not be updated to the **Schedule Outputs** and the loaded schedule will not be changed.

The Part Measurement Mode input *must* remain active for at least 50 mS.



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