SERIAL DATA COMMUNICATIONS

**FOR USE WITH DC25, HF25 AND UB25
(version 2)**

USER MANUAL

REVISION RECORD

Revision	EO	Date	Basis of Revision
A	18987	10/01	Original Release.
B	19214	02/02	Software Upgrade.
C	19673	07/03	Software Upgrade, Inclusion of HF25.
D	42861	11/13	Updated to Miyachi America name and logo.
E	45829	12/19	Update Company Name (Amada Weld Tech) + Updated content.
F	46300	04/21	See ECO for Details
G	47205	01/24	Update Manual Title

FOREWORD

Thank you for purchasing an AMADA WELD TECH Power Supply. This manual describes the details of serial data communications with the DC25, HF25 and UB25 Linear DC Power Supplies.

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**
>
> **Phone:**   **(626) 303-5676**
>
> **FAX:**   **(626) 358-8048**
>
> **E-mail:**   **info@amadaweldtech.com**

For additional information, and updated technical bulletins called *Nuggets*, log on to our website:

<div align="center">

www.amadaweldtech.com

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We have made every effort to ensure that the information in this manual is accurate and adequate. The contents of this manual are subject to change without notice. Should questions arise, or if you have suggestions for improvement of this manual, please contact us at the above location/numbers.

AMADA WELD TECH is not responsible for any loss or injury due to improper use of this product.

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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 the 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.

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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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(c) All patents, trademarks, copyrights or other intellectual property rights embodied in the Goods, including without limitation the Software, are owned by Seller and its licensors. Seller and its licensors retain all right, title and interest in such intellectual property rights. Except as expressly set forth herein, no license rights or ownership in or to any of the foregoing is granted or transferred hereunder, either directly or by implication. ALL RIGHTS RESERVED.

(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 Acknowledgement, 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, OR ARISING 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.**

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(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 SELLER AT 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).

SERIAL DATA COMMUNICATIONS

CHAPTER 1
Description

Serial Data Communications allows you to connect a single Control, or multiple Controls, to a printer or a computer in order to:

- Retrieve, store, import, and export weld history data, display weld history data in different graphic formats for detailed analysis.
- Remotely program weld schedules on the Control(s).
- Remotely program menu items on the Control(s).

There are two types of Serial Data Communications; RS-485 and RS-232.
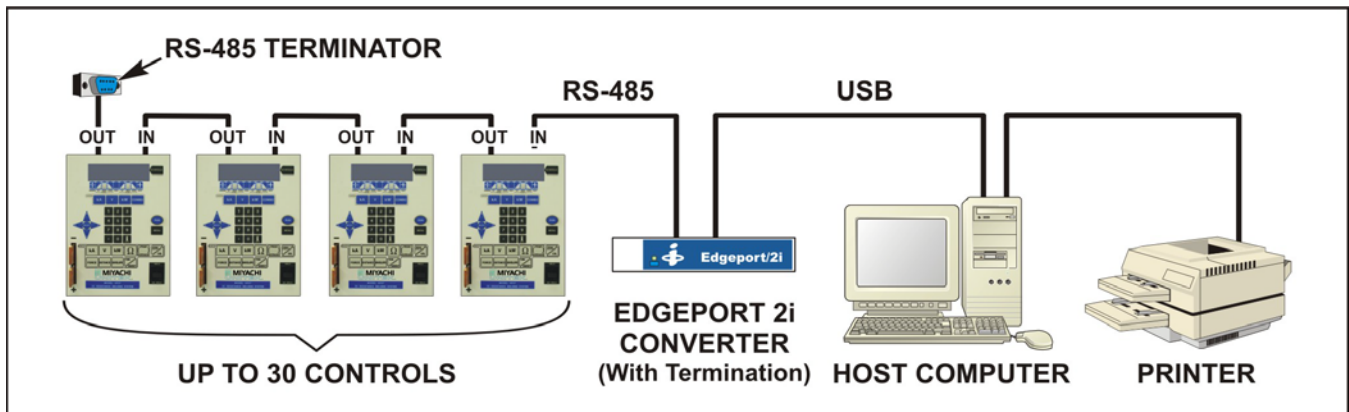
RS-485 connection allows up to 20 Controls to be connected to a computer. This is used for weld history retrieval, storage and remote weld schedule programming.

The only difference between RS-232 operation and RS-485 operation is that RS-485 can be "Daisy Chained" for multiple controls, and RS-232 cannot.

CHAPTER 2
Communications Syntax

Data and Display Formats

Weld History Data in Text (.TXT) Format

1,1,0,550,549,913,914,408,833,88,121,0,0,0,0,931,1246,1250,1941,1475,2427,124,17,0,0

UNIT NUMBER
SCHEDULE NUMBER
STATUS
AVERAGE CURRENT (A)
AVERAGE VOLTAGE (mV)
PEAK CURRENT (A)
PEAK VOLTAGE (mV)
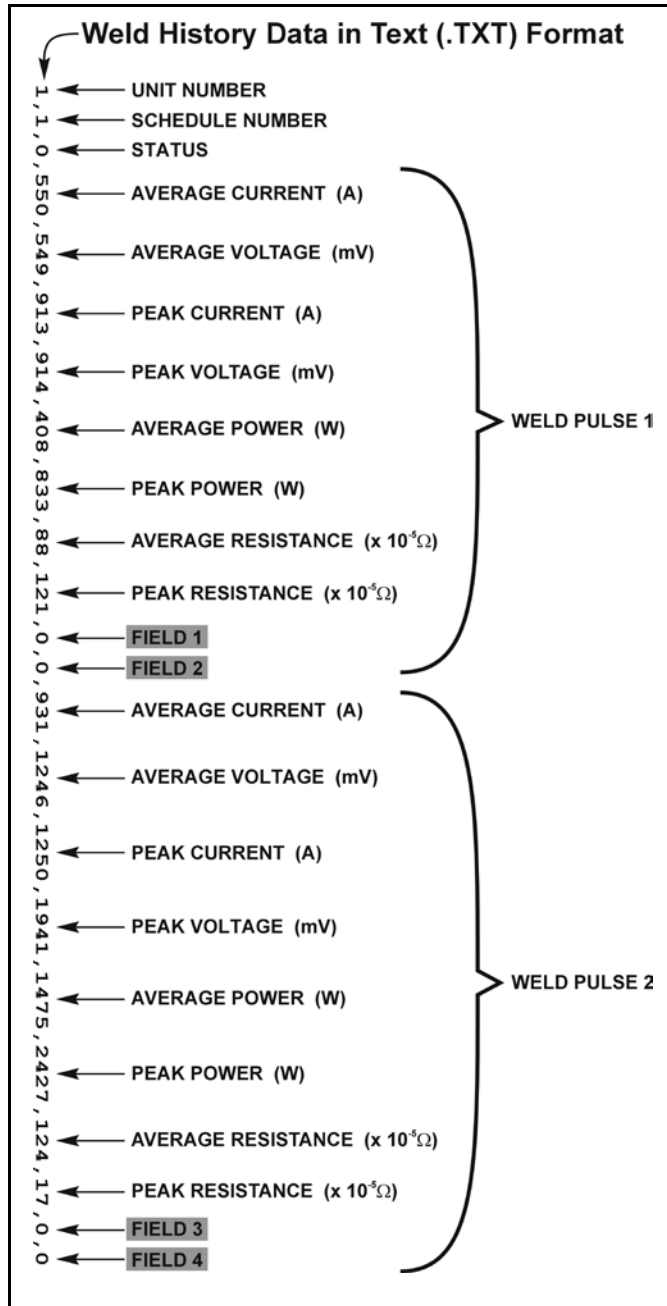AVERAGE POWER (W)
PEAK POWER (W)
AVERAGE RESISTANCE (x 10⁻⁵Ω)
PEAK RESISTANCE (x 10⁻⁵Ω)
FIELD 1
FIELD 2
— WELD PULSE 1

AVERAGE CURRENT (A)
AVERAGE VOLTAGE (mV)
PEAK CURRENT (A)
PEAK VOLTAGE (mV)
AVERAGE POWER (W)
PEAK POWER (W)
AVERAGE RESISTANCE (x 10⁻⁵Ω)
PEAK RESISTANCE (x 10⁻⁵Ω)
FIELD 3
FIELD 4
— WELD PULSE 2

Most of the data fields are the same for all Power Supplies. However, **Field 1**, **Field 2**, **Field 3**, and **Field 4** for the DC25 and UB25 contain *different* data than the HF 25. An HF25D produces 7 extra fields of data ***not*** produced by the DC25 or UB25. These differences are described below.

DC25/UB25

Field 1 = Waveform stability result (% average deviation).
Field 2 = Waveform capacity result (% of deviation).
Field 3 = Waveform stability result (% average deviation).
Field 4 = Waveform capacity result (% of deviation).

HF25

Field 1 = % of capacity control to reach Pulse 1.
Field 2 = Always zero.
Field 3 = % of capacity control to reach Pulse 2.
Field 4 = Always zero.

ADDITIONAL HF25D Fields

Field A = Displacement measurement units (inches/1000) ***or*** (mm) depending on the display units selected.
Field B = Displacement initial thickness value.
Field C = Displacement final thickness value.
Field D = Displacement value (initial *minus* final).
Field E = Time reached in msec.
Field F = SEA limit reached.
Field G = Limit time in msec.

SERIAL DATA COMMUNICATIONS

Status Message Codes

As shown on the previous page, the **STATUS** of the weld is the third entry in a line of text data, represented by a one or two-digit number. Status Messages are defined below.

NOTE: Most Status Messages apply to all Power Supplies, however *some* messages apply *only* to the DC25 and UB25, others apply *only* to the HF25D.

NUMBER	STATUS MESSAGE
0	GOOD
1	CHECK CONTROL SIGNALS INPUT STATUS
2	CHECK INPUT SWITCH STATUS
3	FIRING SWITCH BEFORE FOOT SWITCH
4	STOP ON CONTROL SIGNALS INPUT
5	POWER TRANSISTOR OVERHEATED
6	EMERGENCY STOP - OPERATOR ACTIVATED
7	FIRING SWITCH DIDN'T CLOSE IN 10 SECOND
8	WELD TRANSFORMER OVERHEATED
9	TEST WELD
10	VOLTAGE SELECTION PLUG IS MISSING
11	INHIBIT CONTROL SIGNALS ACTIVATED
12	LOW BATTERY
13	NO CURRENT READING
14	NO VOLTAGE READING
15	LOAD RESISTANCE TOO HIGH
16	NO WELD TRANSFORMER DETECTED
17	WELD SWITCH IN NO WELD POSITION
18	CHECK VOLTAGE CABLE & SECONDARY CIRCUIT
19	CALIBRATION RESET TO DEFAULT
20	LOWER LIMIT GREATER THAN UPPER LIMIT
21	COOL TIME ADDED FOR DIFFERENT FEEDBACK
22	ENERGY SETTING TOO SMALL
23	SYSTEM & SCHEDULE RESET TO DEFAULTS
24	LIMITS ROUND UP

NUMBER	STATUS MESSAGE	
25	CHAINED TO NEXT SCHEDULE	
26	SAFE ENERGY LIMIT REACHED	
27	P1 LOWER LIMIT DELAYS ADJUSTED	
28	P1 UPPER LIMIT DELAYS ADJUSTED	
29	P2 LOWER LIMIT DELAYS ADJUSTED	
30	P2 UPPER LIMIT DELAYS ADJUSTED	
31	UPSLOPE REQUIRED FOR LOWER LIMIT	
32	INPUT TOO LARGE	
33	INPUT TOO SMALL	
34	PRESS RUN BEFORE WELDING	
35	ERASE FAILED	
36	PROGRAM FAILED	
37	NO LOWER LIMIT WITH STOP P1 ACTION	
38	LIMIT DELAYS RESET TO 0	
39	ACCESS DENIED! SYSTEM SECURITY ON	
40	ILLEGAL SECURITY CODE ENTERED	
41	NOT USED	
42	NOT USED	
43	NOT USED	
44	NOT USED	
45	NOT USED	
46	NOT USED	
47	ACCESS DENIED! SCHEDULE LOCK ON	
48	LVDT INITIAL THICKNESS LOW READING	(**HF 25D**)
49	LVDT INITIAL THICKNESS HIGH READING	(**HF 25D**)
50	LVDT FINAL THICKNESS LOW READING	(**HF 25D**)
51	LVDT FINIAL THICKNESS HIGH READING	(**HF 25D**)
52	LVDT DISPLACEMENT LOW READING	(**HF 25D**)
53	LVDT DISPLACEMENT HIGH READING	(**HF 25D**)
54	LVDT WELD STOP DISPLACEMENT REACHED	(**HF 25D**)

SERIAL DATA COMMUNICATIONS

NUMBER	STATUS MESSAGE
55	CURRENT1 > UPPER LIMIT
56	CURRENT1 < LOWER LIMIT
57	VOLTAGE1 > UPPER LIMIT
58	VOLTAGE1 < LOWER LIMIT
59	POWER1 > UPPER LIMIT
60	POWER1 < LOWER LIMIT
61	RESISTANCE1 > UPPER LIMIT
62	RESISTANCE1 < LOWER LIMIT
63	NOT USED
64	NOT USED
65	SCHEDULES ARE RESET
66	SYSTEM PARAMETERS ARE RESET
67	PULSE 1 LOWER LIMIT REACHED
68	PULSE 1 UPPER LIMIT REACHED
69	WELD TIME TOO SMALL
70	P2 INHIBITED - CAP BANK DEPLETED (**DC & UB 25**)
71	CURRENT2 > UPPER LIMIT
72	CURRENT2 < LOWER LIMIT
73	VOLTAGE2 > UPPER LIMIT
74	VOLTAGE2 < LOWER LIMIT
75	POWER2 > UPPER LIMIT
76	POWER2 < LOWER LIMIT
77	RESISTANCE2 > UPPER LIMIT
78	RESISTANCE2 < LOWER LIMIT
79	INHIBIT 2ND PULSE
80	WELD STOP - LIMIT REACHED
81	SYSTEM ERROR: BUS ERROR
82	SYSTEM ERROR: SOFTWARE INTERRUPT
83	SYSTEM ERROR: ILLEGAL INSTRUCTION
84	SYSTEM ERROR: DIVIDED BY ZERO

SERIAL DATA COMMUNICATIONS

NUMBER	STATUS MESSAGE	
85	SYSTEM ERROR: SPURIOUS INTERRUPT	
86	COOL TIME MINIMUM	
87	TEST WELD? [MENU]=NO [RUN]=YES	
88	CAPACITY EXCEEDED P1	(**DC & UB 25**)
89	CAPACITY EXCEEDED P2	(**DC & UB 25**)
90	STABILITY LIMIT EXCEEDED	(**DC & UB 25**)
91	STABILITY LIMIT EXCEEDED	(**DC & UB 25**)
92	WELD FIRE LOCKOUT	

Communication Set-up

The following menu screens tell you how to set the Power Supplies communication options. You will need to select between "Host" and "Client" communications role (see below for details) and data options such as baud rate, RS-232 or RS-485 protocol, and the ID number for the weld control.

Rear-mounted RS-232 and RS-485 connectors allow for remote programming, weld schedule selection, and data logging for SPC purposes. Data output provides the necessary process documentation for critical applications and permits data logging for SPC purposes.

Appendix E, Communications in this manual lists all of the commands that the Power Supply will respond to, and instructions on how to format commands sent to the Power Supply so it will respond properly.

The Power Supply contains internal software that gives you a great deal of flexibility in the setup and use of your welding system. The Power Supply software displays various menu screens on the LCD, each containing prompts telling you which of the Power Supplies front panel controls to use in order to customize operating parameters, set the Power Supply for use in an automated welding system, and program communication settings for use with data-gathering devices such as a host computer.

1. Communication Role

1. From the **MAIN MENU,** press the **6** key to go to the **COMMUNICATION** menu (shown with default settings).
    From the **COMMUNICATION** menu, toggle the **1** key to select **HOST** or **CLIENT**. The **COMMUNICATION ROLE** line will now reflect your role selection.

```
            <COMMUNICATION>

1. COMMUNICATION ROLE    : CLIENT
2. BAUD RATE             : 9600
3. RS232/485 SELECT      : RS232
4. I.D. NUMBER           : 1

NUMBERS Select an item, RUN or MENU
```

- In the **HOST** role, the Power Supply will:
    - Send weld data to the host computer after each weld operation.
    - Send text data to a serial printer, providing a printout of the average voltage and current values for each weld, generating a "paper history" of welds performed.

- In the **CLIENT** role, the Power Supply will send weld data only when requested by the host computer. You *must* use this role for RS-485 installations with mulitple Power Supplies on one communications channel.

2. Press **MENU** to return to the **MAIN MENU**.

2. Baud Rate

The baud rate at which the data is sent must match the baud rate of the host computer. To enter the baud rate, proceed as follows:

1. From the **COMMUNICATION** menu, press the **2** key to get the **BAUD RATE** selection screen.

   Use the numeric keypad to select the baud rate of the receiving device. The display automatically returns to the **COMMUNICATION** menu, which shows the new baud rate.

2. Press **MENU** to return to the **MAIN MENU.**

```
        <BAUD RATE>

1.  1200          6.  19.2K
2.  2400          7.  28.8K
3.  4800          8.  38.4K
4.  9600
5.  14.4K

 Number  Select,  ▲ Page, RUN or MENU
```

3. RS-232/485 SELECT

Pressing the 3 key will alternately select either RS-232 or RS-485 communications. The default selection is RS-232.

4. I.D. Number

The host computer may be used to talk with multiple Power Supplies using a single RS-485 communications line. Each Power Supply sharing that line *must* have a unique identification number. To enter an identification number for the Power Supply, proceed as follows:

1. From the **MAIN MENU**, press the **6** key to go to the **COMMUNICATIONS MENU.**

2. From the **COMMUNICATIONS MENU** screen, press the **3** key to get the **I.D. NUMBER** entry screen.

```
        <I.D. NUMBER>
I.D. NUMBER        :  01




 Number  Select,  ▲ Page, RUN or MENU
```
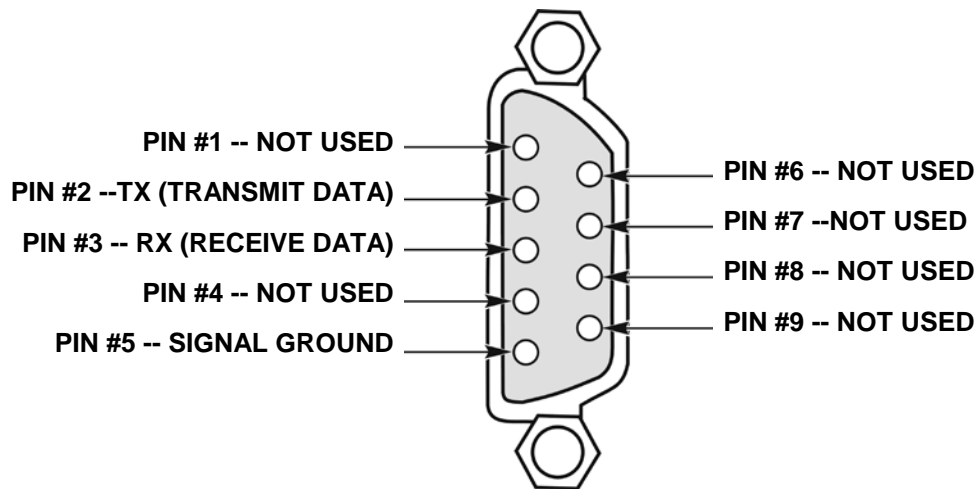
3. Enter a two-digit number, from **01** to **30**, in the **I.D. NUMBER** field.

4. Press the **MENU** key to get the **COMMUNICATION** menu screen. This time the **I.D. NUMBER** line will display your I.D. number entry.

5. Press **MENU** to return to the **MAIN MENU.**

SERIAL DATA COMMUNICATIONS

APPENDIX A

RS-232 and RS-485 Connections

RS-232 Connector

PIN #1 -- NOT USED

PIN #2 --TX (TRANSMIT DATA)

PIN #3 -- RX (RECEIVE DATA)

PIN #4 -- NOT USED

PIN #5 -- SIGNAL GROUND

PIN #6 -- NOT USED

PIN #7 --NOT USED

PIN #8 -- NOT USED

PIN #9 -- NOT USED

RS-232 CONNECTOR SPECIFICATIONS		
PIN NUMBER.	DESCRIPTION	PIN TYPE
1	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	Not Used	

SERIAL DATA COMMUNICATIONS

RS-485 IN and Out Connectors

NOTE: Pin connections and specifications for both **RS-485** connectors are identical.

PIN #1 -- SIGNAL GROUND

PIN #2 --NOT USED

PIN #3 --NOT USED

PIN #4 --TRANSMIT +

PIN #5 --TRANSMIT -

PIN #6 -- NOT USED

PIN #7 --NOT USED

PIN #8 --RS-485 RECEIVE +

PIN #9 -- RS-485 RECEIVE -
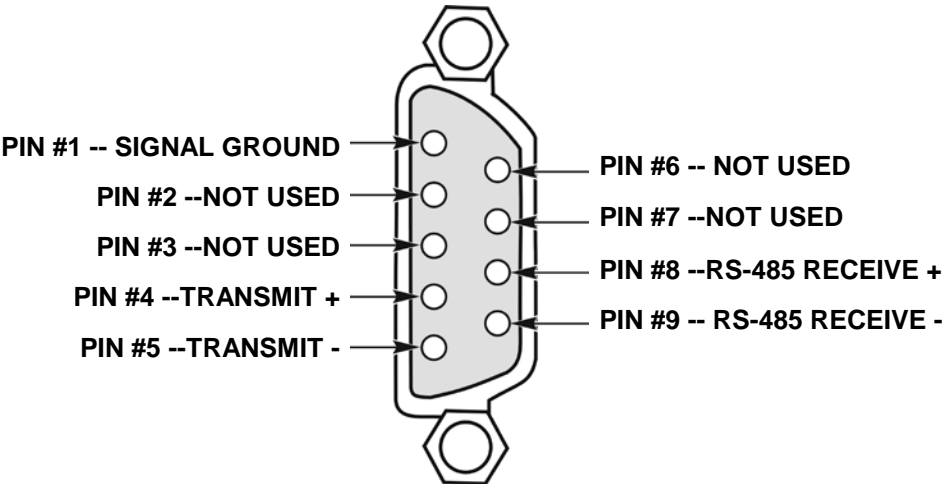
| RS-485 IN/OUT CONNECTOR SPECIFICATIONS		
PIN NO.	DESCRIPTION	PIN TYPE
1	Signal Ground	Isolated ground (1 kVDC Isolation)
2	Not used	
3	Not used	
4	Transmit +	RS-485 Driver +
5	Transmit -	RS-485 Driver -
6	Not used	
7	Not used	
8	Receive +	RS-485 Receive +
9	Receive -	RS-485 Receive -

RS-485 Connections

The following illustrations show these RS-485 connections:

- RS-232-to-RS-485 Converter Connection
- RS-485 Full-Duplex Connection
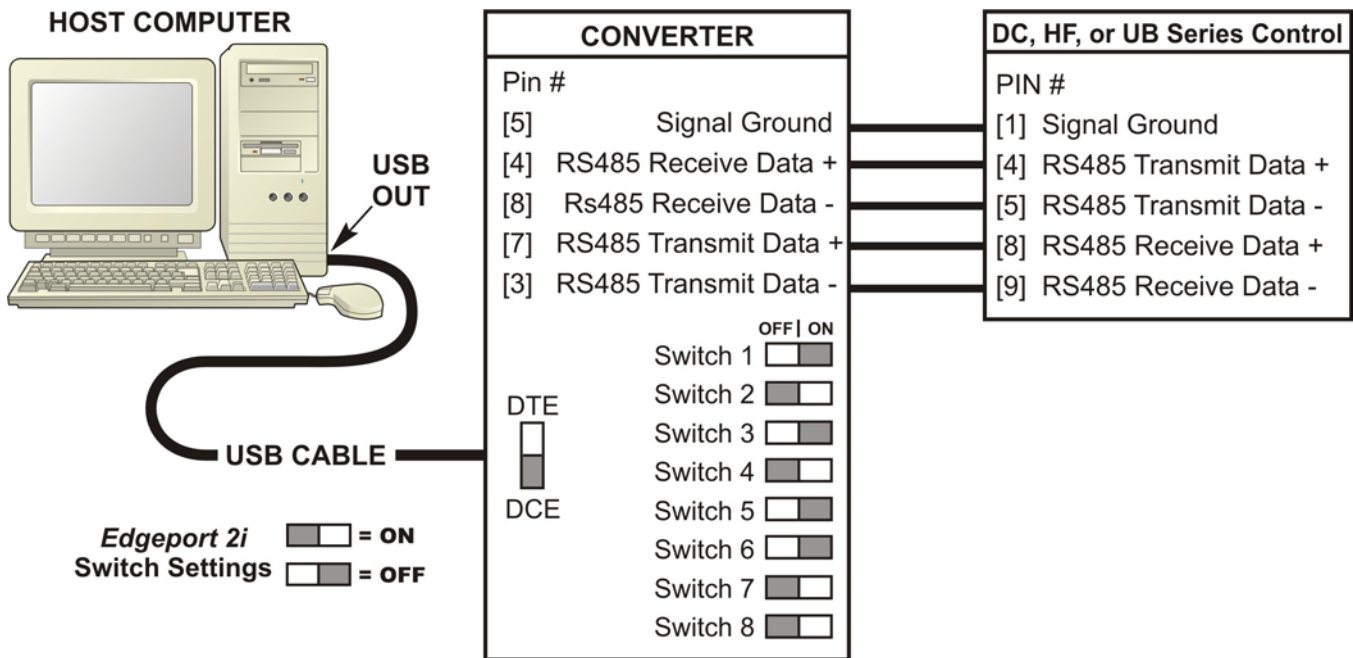
RS-232-to-RS-485 Converter Connection
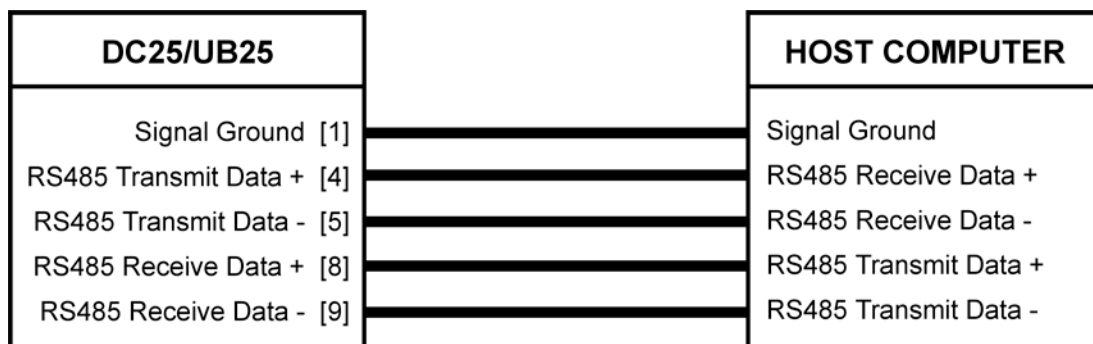
RS-485 Full-Duplex Connection

APPENDIX B

Serial Data Communications Programming Codes

Section I. Remote Data Collection and Programming

The Power Supply data communication protocol includes the capability of collecting basic weld information for each individual weld. The Power Supply stores weld information for the last 1,200 welds.

An example string would look like "#*ID* **REPORT OLD** *number<crlf><lf>* ". The string must begin with a " # ", then the *ID* or identification number of the Power Supply you wish data from. The "**REPORT OLD**" is one command from the command list in Section III.

> **NOTES:**
> - The letters *<cr>* (13) represent "carriage return."
> - The letters *<lf>* (10) represent "line feed."
> - For additional remote data collection commands, see *Section III, Computer Originated Commands and Section IV, Power Supply Originated Commands.)*

The "***number"*** is the quantity of welds you would like to acquire from the Power Supply. This number can be greater or lesser than the number of welds made since the last data collection. The carriage return line feed line feed sequence "***<crlf><lf>"*** terminates the command and is required.

The Power Supply will then send the requested number of weld reports up to the amount stored into the Power Supply since the last data collection. The Power Supply erases all the weld data sent from the weld data buffer. Each weld report data is separated with a carriage return line feed sequence **"*<crlf>"*.** The fields within the report are separated with a comma. This allows you to import this data into a spreadsheet program like *Microsoft Excel*.

The Host is requesting the Power Supply with *ID* #1 to send the last 10 weld reports from the stored accumulated weld reports by sending the following command:

> **#1 REPORT OLD 10** *<crlf><lf>*

The weld data counter in the Power Supply is decremented by 10. The corresponding Power Supply with *ID* #1 responds with:

> **#1 REPORT 10** *<crlf>*
> **1,1,0,551,552,908,920,410,835,89,123,0,0,931,1246,1250,1941,1476,2427,122,15,9,0,0** *<crlf>*
> **1,1,0,551,550,908,920,409,835,89,123,0,0,932,1248,1250,1941,1478,2427,122,15,9,0,0** *<crlf>*
> **1,1,0,551,550,912,914,410,829,89,121,0,0,932,1249,1250,1941,1479,2427,124,16,5,0,0** *<crlf>*
> **1,1,0,550,550,912,914,409,833,89,119,0,0,931,1246,1250,1941,1476,2427,122,16,1,0,0** *<crlf>*
> **1,1,0,551,552,912,914,410,833,89,121,0,0,932,1249,1250,1945,1480,2431,123,15,8,0,0** *<crlf>*
> **1,1,0,551,554,912,933,411,842,89,122,0,0,931,1248,1250,1948,1478,2435,123,15,6,0,0** *<crlf>*
> **1,1,0,551,554,908,927,412,839,89,120,0,0,932,1249,1250,1941,1480,2427,123,15,6,0,0** *<crlf>*
> *<lf>*

Section II. Command Format

#*ID* **KEYWORD** *parameters* <crlf><lf>

UNIT IDENTIFICATION: #*ID* (*ID* is any number from "00" to "30", must be a two digit number).

COMMAND KEYWORDS: BOLD.

VARIABLE: *italics.*

REQUIRED PARAMETERS: {enclosed in braces} (one required and only one parameter allowed).

CHOICE OF PARAMETERS: separated by vertical bar **"|"** indicates one *OR* another of choices presented.

REQUIRED/OPTIONAL PARAMETERS: [enclosed in brackets] (one or more allowed, used in the **SET** parameter)(zero allowed in the **READ** parameter).

RANGE OF PARAMETERS: *low_end - high_end* (separated by hyphen).

END OF PARAMETER TERMINATOR: <crlf> (carriage return followed by linefeed).

TERMINATION OF COMMAND: <lf> (linefeed - must be preceded by the end of line terminator <crlf>).

Each unit identifier, command keyword, and parameters must be separated by one or more spaces except the termination of command <lf> must follow the end of parameter terminator<crlf> immediately. I.E. **"<crlf><lf>"**

Section III. Computer Originated Commands

These are the commands sent by the host computer, via RS-485 or RS-232 to a Power Supply.

Command	**STATUS**<crlf><lf>
Control State	Any
Description	Requests the Power Supply to report the status of the weld data buffer. Power Supply returns **STATUS** with either "**OK**" or "**OVERRUN.**"

Command	**TYPE**<crlf><lf>
Control State	Any
Description	Requests the Power Supply to return the type of welder, release number, and revision letters. **NOTE:** Power Supply software lower than version 1.22, or HF25D software without the **Displacement** feature will *not* display release number or revision letter.

Command	**COUNT**<crlf><lf>
Control State	Any
Description	Requests the Power Supply to report the number of weld data accumulated since the last data collection. Power Supply returns the COUNT even if there is no weld data available.

Command	**ERASE**<crlf><lf>
Control State	Any
Description	Requests the Power Supply to erase all the weld reports.

Command	**SYNC**<crlf><lf>
Control State	Any
Description	Provides synchronization of the commands. The Power Supply returns SYNC command back to the host computer.

Command	**CURRENT**<crlf><lf>
Control State	Any
Description	Requests the Power Supply to report the sampled Current data of the last weld. Power Supply shall return with the CURRENT report. See CURRENT command under the Power Supply Originating Commands section.

Command	**VOLTAGE** <crlf><lf>
Control State	Any
Description	Requests the Power Supply to report the sampled Current data of the last weld. Power Supply shall return with VOLTAGE report. See VOLTAGE command under Power Supply Originating Commands section.

APPENDIX B: SERIAL DATA COMMUNICATIONS PROGRAMMING CODES

Command	**POWER** <crlf><lf>
Control State	Any
Description	Requests the Power Supply to report the sampled Current data of the last weld. Power Supply shall return with POWER report. See POWER command under Power Supply Originating Commands section.

Command	**COUNTER** {**TOTAL**	**HIGH**	**LOW**	**GOOD**}<crlf><lf>
Control State	Any
Description	Requests the Power Supply to return the Power Supply weld counter contents.
	TOTAL returns the total number of weld counter.
	HIGH returns the out of limits high counter.
	LOW returns the out of limits low counter.
	GOOD returns the within limits counter.

Command	**REPORT** {**OLD**	**NEW**	**ERASE**} *number* <crlf><lf>
Control State	Any
Description	Requests the Power Supply to send the weld report.
	OLD: requests to send the number of oldest weld reports since the last data collection.
	NEW: requests to send the number of newest weld reports.
	DC 25 & UB 25: OLD and **NEW** will erase the number of welds requested from the buffer after requesting them.
	HF25D: OLD will **NOT** erase the number of welds requested from the buffer after requesting them. You must use the **ERASE** command which will then erase the number of oldest weld reports.
	number: the quantity of weld data to be sent or erased.
	If the number is greater than the number of weld data in the buffer, than the number of welds stored will be sent. **NOTE:** There must be a space between two fields.

Command	**STATE {READ	RUN	MENU	MONITOR}**<crlf><lf>
Control State	Any
Description	Commands the Power Supply to identify its current state ("READ" keyword, see STATE under *Power Supply Originated Commands* section) or go to either RUN state or PROGRAM state.
	NOTE: The MONITOR is only available on the DC 25 and UB 25.

Command	**LOAD** {*schedule_number*}<crlf><lf>
Control State	RUN state
Description	Selects the schedule_number as the currently loaded schedule. schedule_number may be any number from 0 to 99. There must be a space between LOAD and schedule_number.

Command	**COPY** {*from_schedule_number*} {*to_schedule_number*}<crlf><lf>
Control State	Any
Description	Allows one schedule to be copied to another schedule number. From_schedule_number and to_schedule_number may be any number from 0 to 99. Copying a schedule to itself has no effect other than to invoke a schedule printout when "PRINT SCHEDULES/PROGRAMS" is enabled.

SERIAL DATA COMMUNICATIONS

Command   **SCHEDULE**<crlf><lf>

Control State   Any state *except* while welding.

Description   Requests the Power Supply to return the currently selected schedule number.

Command   **SCHEDULE {READ | SET}** <crlf>
                     [*parameter_name value*<crlf>] <lf>

Control State   RUN state

Description   Provides control over the Power Supply schedule parameters. When used with the "READ" keyword, all parameters pertaining to the currently loaded schedule are returned (see SCHEDULE under *Power Supply Originated Commands*). When the "SET" keyword is used, the host may set (change) the value of one or more of the parameters pertaining to the currently loaded schedule. The following is a list of valid literal substitutions for the parameter_name and value variables:

ENG1	{ *weld_energy* }	energy amount for pulse 1
FEEDBACK1	{ **KA | V | kW** }	feedback type for pulse 1
ENG2	{ *weld_energy* }	energy amount for pulse 2
FEEDBACK 2	{ **KA | V | kW**}	feedback type for pulse 2
SQUEEZE	{ *squeeze_time* }	squeeze time
UP1	{ *weld_time* }	up slope time of pulse 1
WELD1	{ *weld_time* }	weld time of pulse 1
DOWN1	{ *weld_time* }	down slope time of pulse 1
COOL	{ *weld_time* }	cool time
UP2	{ *weld_time* }	up slope time of pulse 2
WELD2	{ *weld_time* }	weld time of pulse 2
DOWN2	{ *weld_time* }	down slope time of pulse 2
HOLD	{ *hold_time* }	hold time

DC25/UB25

PIDG1	{ *pid gain* }	PID Gain for Pulse 1 [Change in value is seen after a weld is made]
PIDG2	{ *pid gain* }	PID Gain for Pulse 2 [You will not be able to see this change]

HF25D

VMULT	{ *volt multiplier* }	voltage PID multiplier
RINDEX1	{ *resistance index* }	index value into PID resistance table for pulse 1
RINDEX2	{ *resistance index* }	index value into PID resistance table for pulse 2
EINDEX1	{ *energy index* }	index value into PID energy table for pulse 1
EINDEX2	{ *energy index* }	index value into PID energy table for pulse 2

NOTES:
- If your UB25 Power Supply has a software version *lower* than **1.22**, you will see **VMULT**. This parameter is not used, ignore.

- If your UB25 Power Supply has a software version *lower* than **1.23**, you will not see either **PIDG1** or **PIDG2**.

- *squeeze_time* and **hold_time** are the parameter that defines the time for the given period in 1 msec. Valid range is from 0 to 999.

- *weld_time* is the parameter that defines the time for the given period. Valid ranges are shown below.

NOTES (continued):

- *weld_energy* is the parameter that specifies the amount of weld energy. In the current feedback mode, weld_energy is in unit of 0.001KA. In the voltage feedback mode, weld_energy is in units of 0.001V. In the power feedback mode, weld_energy is in units of 0.001kW.

- *volt multiplier* is an index value for a table of resistance vs. a PID multiplier for voltage mode. Note: Not used in versions where RINDEXx and EINDEXx are present.

- *resistance index* is an index value into a table of resistance vs. energy PID tables. If 0, then a test pulse will occur on the next weld to determine the actual resistance. (Note: customer control of this value is *not recommended*)

- *energy index* is an index value into a PID energy vs. PID values table.
  (Note: customer control of this value is *not recommended*)

MODEL	Power Supply		HOST	
	Time Range	Increments	Increments	Range
DC25/UB25	0 - 0.1ms	0.01ms	1	0 - 100
	1.1 - 10ms	0.1ms	10	110 - 1000
	11 - 99ms	1.0ms	100	1100 - 9900
HF25D	0 - 9.9ms	0.1ms	1	0 - 99
	10 - 99ms	1ms	10	100 - 990
Weld Time for UB25 = 0 - 99ms				
Weld Time for DC25 = 0 - 9.9ms				

Command **MONITOR {READ | SET}**<crlf>
[*parameter_name value*<crlf>] <lf>

Control State Any except while welding

Description Provides control over the basic weld monitor settings of the Power Supply schedule. When used with the "READ" keyword, the basic weld monitor settings of the currently loaded schedule are returned (see MONITOR under *Power Supply Originated Commands*). When the "SET" keyword is used, the host may set (change) the value of one or more of the parameters of the basic weld monitor settings pertaining to the currently loaded schedule. The following is a list of valid literal substitutions for the parameter_name and value variables:

MONTYPE1	**{ KA	V	KW }**	Monitor Type for pulse 1
UPPER1	**{** *limit_value* **}**	Upper Limit for pulse 1
LOWER1	**{** *limit_value* **}**	Lower Limit for pulse 1
ACTION1	**{ none	STOP	INHIBIT	APC }**	Out of Limit Action for pulse 1
MONTYPE2	**{ KA	V	KW }**	Monitor Type for pulse 2
UPPER2	**{** *limit_value* **}**	Upper Limit for pulse 2
LOWER2	**{** *limit_value* **}**	Lower Limit for pulse 2
ACTION2	**{ none	STOP }**	Out of Limit Action for pulse 2

NOTE: If your UB25 Power Supply has a software version *lower* than **1.22**, you will *not* see the parameters below.

P1LDLY1	{*delay_value*}	Pulse 1 Lower Delay Start Time For Lower Limit
P1LDLY2	{*delay_value*}	Pulse 1 Lower Delay End Time For Lower Limit
P1UDLY1	{*delay_value*}	Pulse 1 Upper Delay Start Time For Upper Limit
P1UDLY2	{*delay_value*}	Pulse 1 Upper Delay End Time For Upper Limit
P2LDLY1	{*delay_value*}	Pulse 2 Lower Delay Start Time For Lower Limit
P2LDLY2	{*delay_value*}	Pulse 2 Lower Delay End Time For Lower Limit
P2UDLY1	{*delay_value*}	Pulse 2 Upper Delay Start Time For Upper Limit
P2UDLY2	{*delay_value*}	Pulse 2 Upper Delay End Time For Upper Limit

limit_value is the parameter that specifies the range of the valid readings. If the reading was within the range of the *limit_value*, no alarm will occur. If the reading was out of the valid range, an alarm will occur. If the monitor type is KA, the *limit_value* is in unit of 1A. If the monitor type is V, the *limit_*value is in unit of 1mV. If the monitor type is kW, the *limit_*value is in unit of 1W. The valid number for *limit_value* is 1 through 9999 and 0 is for none.

The *delay_value* is the parameter that defines the time for the given period in 0.1ms. Valid range is from 0 to 99. Lower delay value is only valid during WELD time. Upper delay value is valid during UP time, WELD time, and DOWN time.

Command   **RELAY {READ | SET}** <crlf>
          [*parameter_name value*<crlf>] <lf>

Control State   Any except while welding

Description   Provides control over the Power Supply schedule parameters for relay settings. When used with the "**READ**" keyword, the relay settings of the currently loaded schedule are returned (see **RELAY** under *Power Supply Originated Commands*). When the "**SET**" keyword is used, the host may set (change) the value of one or more of the relay settings of the currently loaded schedule. The following is a list of valid literal substitutions for the *parameter_name* and *value* variables:

DC25 and UB25:

ACTIVE1	**{ HIGH	LOW }**	Relay 1 Active High or Active Low
CONDITION1	*condition_value*	Relay 1 Active Conditions
ACTIVE2	**{ HIGH	LOW }**	Relay 2 Active High or Active Low
CONDITION2	*condition_value*	Relay 2 Active Conditions
ACTIVE3	**{ HIGH	LOW }**	Relay 3 Active High or Active Low
CONDITION3	*condition_value*	Relay 3 Active Conditions
ACTIVE4	**{ HIGH	LOW }**	Relay 4 Active High or Active Low
CONDITION4	*condition_value*	Relay 4 Active Conditions
	condition_value is	**{ WELD	END	ALARM	LIMITS	P1HI	P1LOW	P2HI	P2LOW }**

HF25D:

ACTIVE1	**{ HIGH	LOW }**	Relay 1 Active High or Active Low
CONDITION1	*condition_value*	Relay 1 Active Conditions
DISPCOND1	*disp condition value*	Relay 1 Displacement Conditions
ACTIVE2	**{ HIGH	LOW }**	Relay 2 Active High or Active Low
CONDITION2	*condition_value*	Relay 2 Active Conditions
DISPCOND2	*disp condition value*	Relay 2 Displacement Conditions
ACTIVE3	**{ HIGH	LOW }**	Relay 3 Active High or Active Low
CONDITION3	*condition_value*	Relay 3 Active Conditions
DISPCOND3	*disp condition value*	Relay 3 Displacement Conditions
ACTIVE4	**{ HIGH	LOW }**	Relay 4 Active High or Active Low
CONDITION4	*condition_value*	Relay 4 Active Conditions
DISPCOND4	*disp condition value*	Relay 4 Displacement Conditions
	condition_value is	**{ WELD	END	ALARM	LIMITS	P1HI	P1LOW	P2HI	P2LOW	DISP	MG3 }**
	disp_condition_value is	**{ ANY	ILO	IHI	FLO	FHI	DLO	DHI	INI	DSP	SEA }**

NOTES:

condition value of **MG3** is only active when the MG3 option is installed.

disp condition value is not valid unless *condition value* is **DISP** (displacement).

Disp condition value explanations:

- *Any*   Any displacement error.
- *ILO, IHI*   Initial thickness low/hi error.
- *FLO, FHI*   Final thickness low/hi error.
- *DLO, DHI*   Final displacement low/hi error.
- *DSP*   Any final displacement error.
- *INI*   Initial thickness error.
- *SEA*   Stop energy at error.

NOTE: The following **Command** *only* applies to the DC25 and UB25.

Command	**CHECK { READ | SET }**<crlf> [*parameter_name value* <crlf>] <lf>
Control State	Any except while welding
Description	Requests the Power Supply to return the waveform check values. When used with the "**READ**" keyword, all parameters pertaining to the waveform check values are returned (see **CHECK** under *Power Supply Originated Commands*). When the "**SET**" keyword is used, the host may set (change) the value of one or more of the waveform check parameters. The following is a list of valid literal substitutions for the *parameter_name* and *value* variables:

ENABLE	{**OFF** | **ON**}	Enable waveform check
STABILITY	{*stability_value*}	Stability check % limit
DELAY	{*delay_value*}	Stability check delay in ms
CAPACITY	{*capacity_value*}	Energy capacity % limit

stability_value is the limit of the allowable average deviation from the set point for the weld pulse after the delay period.

NOTE: The valid number for the delay value is 0 through 99, representing 0.0 through 9.9ms delay time.

delay_value is the delay period, in milliseconds. This delay period, at the start of the pulse, will not be used when the average deviation is calculated.

capicity_value is the capacity % limit. This limit is the % below the set point the energy is allowed to be at the end of the weld pulse.

NOTE: The following **Command** *only* applies to the **HF25D.**

Command	**DISPZERO {READ | CLEAR}**<crlf> <lf>
Control State	Any except while welding
Description	Provides control over the Power Supplies displacement measuring "zero setting". When used with the "**READ**" keyword, the A/D converter counts (not actual position) for the current zero setting of the upper electrode is returned. When used with the "**CLEAR**" keyword, the host may clear the zero setting and the upper electrode position at the start of the next weld will establish the new zero setting. This zero setting is the reference position for the initial and final thickness measurements.

SERIAL DATA COMMUNICATIONS

NOTE: The following **Command** *only* applies to the **HF25D.**

Command	**DISP {READ	SET}** <crlf> [*parameter_name value*<crlf>] <lf>
Control State	Any except while welding
Description	Provides control over the displacement limit check parameters. When used with the "**READ**" keyword, all parameters pertaining to the currently loaded schedule are returned (see **DISP** under *Power Supply Originated Commands*). When the "**SET**" keyword is used, the host may set (change) the value of one or more of the parameters pertaining to the currently loaded schedule. The following is a list of valid literal substitutions for the parameter_name and value variables:

INITLO	{ *initial_thick_lo* }	low limit for initial thickness
INITHI	{ *initial_thick_hi* }	high limit for initial thickness
FINALLO	{ *final_thick_lo* }	low limit for final thickness
FINALHI	{ *final_thick_hi* }	high limit for final thickness
DISPLO	{ *displacement_lo* }	low limit for final displacement
DISPHI	{ *displacement_hi* }	high limit for final displacement
DISPWT	{ *displacement_wtd* }	limit for "weld to" displacement
UNITS	**{ IN/1000	MM }**	displacement limit units
INITERR	**{ CONT	STOP }**	initial thickness error action

NOTES:

The units of the limit fields parameters depend on the value of the **UNITS** parameter as follows:

IN/1000:	1 = 0.0001 inches; 10 = 0.001 inches
MM:	1 = 0.01 mm; 10 = 0.1 mm

Initial and final thickness are positive if the electrodes move farther apart and negative if they move closer together (in relation to the "zero setting"). The reference "zero setting" for thickness measurements may be set using the **DISPZERO** command.

Displacement is positive if the electrodes moved closer together during the weld and negative if they moved further apart.

INITERR controls the HF25D action if an Initial Thickness limit is reached. **CONT** continues the weld and gives an alarm at the end of the weld. **STOP** terminates the weld operation after squeeze time (when the initial thickness is measured).

Command	**SYSTEM {READ	SET}**<crlf> [*parameter_name value*<crlf>] <lf>
Control State	Any
Description	Provides control over the Power Supplies system parameters. When used with the "**READ**" keyword, all system parameters are returned (see **SYSTEM** under *Power Supply Originated Commands*). When used with the "**SET**" keyword, the host may set (change) the value of one or more of the system parameters.

The following is a list of valid literal substitutions for the *parameter_name* and *value* variables:

LIGHT	**{ *light_value* }**	LCD contrast
LOUDNESS	**{ *loudness_value* }**	Buzzer Loudness
BUZZER	**{ OFF	ON }**	end of cycle buzzer
DISPLAY	**{ PEAK	AVG }**	Display mode
SWTYPE	**{ MECHANICAL	OPTO	PLC}**	Input Switch Type
SWSTATE	**{ OPEN	CLOSED }**	Input Switch State
CTTYPE	**{ MECHANICAL	OPTO	PLC}**	Control Signals Type
CTSTATE	**{ OPEN	CLOSED }**	Control Signals State
FIRESW	**{ AUTO	REMOTE	NONE }**	Firing Switch Type
GRAPH	**{ OFF	ON }**	Update Graph
WELDABORT	**{ OFF	ON }**	Footswitch weld abort
DEBOUNCE	**{ NONE	10	20	30 }**	Switch debounce time in msec

These parameters pertain to the settings of the option menus available via the front panel user interface.

light_value is a number 0 to 100 for brightness of the LCD. 0 is dark and 100 is the brightest.

loudness_value is a number 0 to 100 for buzzer loudness. 0 is off and 100 is the loudest.

Command	**ALARM {READ	CLEAR	SET** *error_number* **| DISPLAY** *alarm_message_string*}<crlf><lf>
Control State	Any
Description	Provides access to the Power Supply alarm logic. When used with the "READ" keyword, the current error condition value is returned. See Appendix A. for list of alarm messages. When the "CLEAR" keyword is used, all alarm conditions are canceled. When the "SET" keyword is used, the host may invoke an error identified by error_number. When the "DISPLAY" keyword is used, an error condition can be created with any message desired. The length of the error message must be limited to 40 characters or less. No help message will be available in connection with this created error message.

Command	**SECURITY {OFF	SCHEDULE	SYSTEM	CALIBRATION}**<crlf><lf>
Control State	Any
Description	Allows control of the system security mode.
	"OFF" sets all security status Power Supply to "OFF."
	"SCHEDULE" sets the schedule lock to "ON."
	"SYSTEM" sets the system lock to "ON."
	"CALIBRATION" sets the calibration lock to "ON."

APPENDIX B: SERIAL DATA COMMUNICATIONS PROGRAMMING CODES

Command   **KEY** {*key_code*}<crlf><lf>

Control State   Some key codes only function in certain states.

Description   Process the key_code as if it was pressed from the front panel.

                    The followings are the key_code:

KEY	DEC	HEX	KEY	DEC	HEX
SQUEEZE	58	3A	5	53	35
UP 1	59	3B	6	54	36
WELD 1	60	3C	7	55	37
DOWN 1	61	3D	8	56	38
COOL	62	3E	9	57	39
UP 2	63	3F	PERIOD	46	2E
WELD 2	64	40	KA	4	04
DOWN 2	65	41	V	5	05
HOLD	66	42	kW	6	06
UP	30	1E	RUN	15	0F
DOWN	31	1F	MENU	23	17
0	48	30	ENERGY	10	0A
1	49	31	PEAK	3	03
2	50	32	OHMS MONITOR	47	2F
3	51	33	SCHEDULE	8	08
4	52	34	INFO	22	16

Section IV. Power Supply Originated Commands

These are the commands sent from a Power Supply to a host computer.

Command	**STATUS** *state_name* <crlf><lf>
Control State	Any
Description	Identifies the current status of the weld data buffer. May be in response with "OK" or "OVERRUN." "OK" means that the Power Supply weld buffer did not over-run since the last data collection and all the data are intact. "OVERRUN" means that the Power Supply weld buffer did over-run since the last data collection and only the latest 1200 weld data are available to report.
Command	**TYPE** *type, release numbers, revision letters*<crlf><lf>
	NOTE: UB25 software *lower* than version **1.22** will not display release number or revision letter.
Control State	Any
Description	Returns **"UB25 1.22E"** for a UB25, **"DC25 1.22E"** for a DC25, and **"HF25 1.01B"** for an HF25D.
Command	**COUNT** *number* <crlf><lf>
Control State	Any
Description	Returns the number of weld data available in the Power Supply. The total number of weld data that the Power Supply holds in the buffer is 1,500.
Command	**SCHEDULE** *schedule_number* <crlf><lf>
Control State	Any
Description	Returns the current schedule number to the host. schedule_number may be any number from 0 to 99.

Command	**REPORT** *number_of_reports* <crlf>
	report <crlf> report <crlf> . . . . *report* <crlf><lf>
Control State	Any
Description	Returns the requested number of weld reports. First field is the number of reports to be sent. Then follows the packets of report. One report pack hold all the information about a weld. Each report packet is separated by <crlf> and this Command ends with <crlf><lf>.

number_of_reports: This is the number of reports that shall be included in this command. If the host computer requests more weld data than is available in the weld data buffer, the Power Supply sends only the weld reports in the weld buffer and the *number_of_reports* is the number of weld reports available in the weld data buffer.   After the report is sent to the host computer, the Power Supply erases the weld data sent to the host from the weld data buffer.

DC25 and UB25:

The fields in the report packet are separated with a comma and all fields are in integer format. There are always 23 fields in a report packet.

report:{*unit_number, schedule_number , weld_status, average_current_1 , average_voltage_1, peak_current_1 , peak_voltage_1, average_power_1 , peak_power_1, average_resistance_1, peak_resistance_1, waveform_stability_1, energy_capacity_1, average_current_2 , average_voltage_2, peak_current_2 , peak_voltage_2, average_power_2 , peak_power_2, average_resistance_2, peak_resistance_2, waveform_stability_2, energy_capacity_2}*

The fields in the report packet are separated with a comma and all fields are in integer format. There are always 23 fields in a report packet.

unit_number:	The unit number assigned to the unit
schedule_number:	The schedule number of the weld
weld_status:	The status of the weld
average_current_1:	The average current of pulse 1 (in A)
average_voltage_1:	The average voltage of pulse 1(in mV)
peak_current_1:	The peak current of pulse 1 (in A)
peak_voltage_1:	The peak voltage of pulse 1 (in mV)
average_power_1:	The average power of pulse 1 (in W)
peak_power_1:	The peak power of pulse 1 (in W)
average_resistance_1:	The average resistance of pulse 1 (in $10^{-5}\Omega$)
peak_resistance_1:	The peak resistance of pulse 1 (in $10^{-5}\Omega$)
waveform_stability_1:	The waveform stability result (% average deviation)
energy_capacity_1:	The energy capacity result (% of deviation)
average_current_2:	The average current of pulse 2 (in A)
average_voltage_2:	The average voltage of pulse 2(in mV)
peak_current_2:	The peak current of pulse 2 (in A)
peak_voltage_2:	The peak voltage of pulse 2 (in mV)
average_power_2:	The average power of pulse 2 (in W)
peak_power_2:	The peak power of pulse 2 (in W)
average_resistance_2:	The average resistance of pulse 2 (in $10^{-5}\Omega$)
peak_resistance_2:	The peak resistance of pulse 2 (in $10^{-5}\Omega$)
waveform_stability_2:	The waveform stability result (% average deviation)
Energy capacity 2:	The energy capacity result (% average deviation)

HF25D:

The fields in the report packet are separated with a comma and all fields are in integer format. There are always 31 fields in a report packet.

unit_number:	The unit number assigned to the unit
schedule_number:	The schedule number of the weld
weld_status:	The status of the weld
average_current_1:	The average current of pulse 1 (in A)
average_voltage_1:	The average voltage of pulse 1(in mV)
peak_current_1:	The peak current of pulse 1 (in A)
peak_voltage_1:	The peak voltage of pulse 1 (in mV)
average_power_1:	The average power of pulse 1 (in W)
peak_power_1:	The peak power of pulse 1 (in W)
average_resistance_1:	The average resistance of pulse 1 (in $10^{-5}\Omega$)
peak_resistance_1:	The peak resistance of pulse 1 (in $10^{-5}\Omega$)
%_control_1:	The percent of capacity control needed to reach pulse 1
null_1:	Always zero
average_current_2:	The average current of pulse 2 (in A)
average_voltage_2:	The average voltage of pulse 2(in mV)
peak_current_2:	The peak current of pulse 2 (in A)
peak_voltage_2:	The peak voltage of pulse 2 (in mV)
average_power_2:	The average power of pulse 2 (in W)
peak_power_2:	The peak power of pulse 2 (in W)
average_resistance_2:	The average resistance of pulse 2 (in $10^{-5}\Omega$)
peak_resistance_2:	The peak resistance of pulse 2 (in $10^{-5}\Omega$)
%_control_2:	The percent of capacity control needed to reach pulse 2
null_2:	Always zero
disp_units:	Displacement measurement units (0 = inches/1000, 1 = mm)
disp_initial:	Displacement initial thickness value
disp_final:	Displacement final thickness value
disp_displacement:	Displacement value (initial minus final)
monitor_limit:	Time reached in ms
disp_SEA-Flag:	SEA Limit reached (0=FALSE, or 1=TRUE)
disp_SEA_Time:	Limit Time in ms
Weld_Count:	Weld Count

NOTE:

disp_xxxx values are signed integer values that have units that depend on **disp_units** as follows:
units = 0 = inches/1000:	1 = 0.0001 inches; 10 = 0.001 inches
units = 1 = mm:	1 = 0.01 mm; 10 = 0.10 mm

SERIAL DATA COMMUNICATIONS

Command	**STATE** *state_name*<crlf><lf>
Control State	Any
Description	Identifies the current state of operation of the Power Supply. May be in response to the **STATE READ** Command sent by the host, or may be sent as a result of a state change from the Power Supply front panel.

state_name may be "**RUN",** "**MENU**", **"PROGRAM",** or "**MONITOR**".

NOTE: The MONITOR state is only available on the DC 25 and UB 25.

Command	**COUNTER** *number* <crlf><lf>
Control State	Any
Description	Returns the requested current Power Supply weld counter number.

Command	**CURRENT** *number_of_data* <crlf> data <crlf> data <crlf> . . . . *data* <crlf><lf>
Control State	Any
Description	Returns the Current reading of the last weld. First field is the number of data to be sent. Then follows the packets of data. Each data is separated by <crlf> and this command ends with <crlf><lf>.

> *number_of_data:* This is the number of data that shall be included in this command. The Power Supply samples current every 40 μs. For a weld less than 80 ms weld time, the number of data will be approximately: *total weld time ÷ 40 μs.* This number will be always less than 2000.

> *data:* an integer number in unit of A.

Command	**VOLTAGE** *number_of_data* <crlf> data <crlf> data <crlf> . . . . *data* <crlf><lf>
Control State	Any
Description	Returns the Voltage reading of the last weld. First field is the number of data to be sent. Then follows the packets of data. Each data is separated by <crlf> and this command ends with <crlf><lf>.

> *number_of_data:*   This is the number of data that shall be included in this command. The Power Supply samples Voltage every 40 μs. For a weld less than 80 ms weld time, the number of data will be approximately: *total weld time ÷ 40 μs.* This number will be always less than 2000.

> *data:* *A*n integer number in unit of mV.

Command	**POWER** *number_of_data* <crlf> data <crlf> data <crlf> . . . . *data* <crlf><lf>
Control State	Any
Description	Returns the Power reading of the last weld. First field is the number of data to be sent. Then follows the packets of data. Each data is separated by <crlf> and this command ends with <crlf><lf>.

> *number_of_data:* This is the number of data that shall be included in this Command. The Power Supply samples Current and Voltage every 40 μs. For a weld less than 80 ms weld time, the number of data will be approximately: *total weld time ÷ 40 μs.* This number will be always less than 2000.

> *data:* *A*n integer number in unit of W.

Command		
	SCHEDULE	*schedule_number* <crlf>
	ENG1	*weld_energy* <crlf>
	FEEDBACK1	{ **KA** | **V** | **kW** } <crlf>
	ENG2	*weld_energy* <crlf>
	FEEDBACK2	{ **KA** | **V** | **kW** } <crlf>
	SQUEEZE	*squeeze_time* <crlf>
	UP1	*weld_time* <crlf>
	WELD1	*weld_time* <crlf>
	DOWN1	*weld_time* <crlf>
	COOL	*weld_time* <crlf>
	UP2	*weld_time* <crlf>
	WELD2	*weld_time* <crlf>
	DOWN2	*weld_time* <crlf>
	HOLD	*hold_time* <crlf>

DC25 and UB25:

PIDG1	*pid gain*<crlf>
PIDG2	*pid gain*<crlf>
<lf>	

NOTES:

- If your UB25 Power Supply has a software version *lower* than **1.22**, you will see **VMULT**. This parameter is not used, ignore.
- If your UB25 Power Supply has a software version *lower* than **1.23**, you will not see either **PIDG1** or **PIDG2**.

HF25D:

VMULT	*volt multiplier*<crlf>
RINDEX1	*resistance_index*<crlf>
RINDEX2	*resistance_index*<crlf>
EINDEX1	*energy_index*<crlf>
EINDEX2	*energy_index*<crlf>
<lf>	

Control State   Any

Description   Reports the settings of the currently loaded Power Supply schedule parameters. The *schedule_number:* variable identifies which schedule is currently loaded, and may be any value from 0 to 99.

squeeze_time and *hold_time* are the parameter that defines the time for the given period in 1 msec. Valid range is from 0 to 999.

weld_time is the parameter that defines the time for the given period in 0.01 msec. For the UB25, the valid range is from 0 to 9900 (0 to 99.00ms). For the DC25, the valid range is from 0 to 990 (0 to 9.90ms).

HOST			Power Supply
Increments	Range	Time Range	Increments
1	0 – 100	0 – 0.1ms	0.01ms
10	110 – 1000	1.1 – 10ms	0.1ms
100	1100 – 9900	11 – 99ms	1.0ms
Weld Time for UB25 = 0 – 99ms			
Weld Time for DC25 = 0 – 9.9ms			

weld_energy is the parameter that specifies the amount of weld energy.

- **Current Feedback** mode: the *weld_energy* range for the UB25 is from 5 to 1,000A (5-1000). For the DC25, the range is from 100-4,000A (100-4000).

- **Voltage Feedback** mode: *weld_energy* for the UB25 is in units of 0.01V, and the range is from 0.1 to 4.9V (100 to 4900). For the DC25, the range is from 0.1 to 9.9V (100 to 9900) for the DC25.

- **Power Feedback** mode: *weld_energy* for the UB25 is in units of 10W, and the range for the UB25 is from 10 to 4900W (10-4900). For the DC25, the range is from 100W to 9900W (100-9900).

pid gain: is the PID gain of the last weld.

This Command is for DC25 and UB25 *only*.

Command	**CHECK**<crlf>	
	ENABLE	{ **OFF**	**ON** }<crlf>
	STABILITY	*stability_value*<crlf>
	DELAY	*delay_value* <crlf>
	CAPACITY	*capicity_value*<crlf>
	<lf>	

Control State   Any except while welding

Description   Returns the parameters for the waveform check.

stability_value is the limit of the allowable average deviation from the set point for the weld pulse after the delay period.

delay_value is the delay period, in milliseconds. This delay period, at the start of the pulse, will not be used when the average deviation is calculated.

capicity_value is the capacity % limit. This limit is the % below the set point the energy is allowed to be at the end of the weld pulse.

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Command	**RELAY** <crlf>		

DC25 and UB25:

ACTIVE1	**{ HIGH | LOW }** <crlf>	
CONDITION1	*condition value* <crlf>	
ACTIVE2	**{ HIGH | LOW }** <crlf>	
CONDITION2	*condition value* <crlf>	
ACTIVE3	**{ HIGH | LOW }** <crlf>	
CONDITION3	*condition value* <crlf>	
ACTIVE4	**{ HIGH | LOW }** <crlf>	
CONDITION4	*condition value* <crlf>	

condition value is **{ WELD | END | ALARM | LIMITS | P1HI | PILOW | P2HI |P2LOW}**

HF25D:

ACTIVE1	**{ HIGH | LOW }** <crlf>	
CONDITION1	*condition value* <crlf>	Relay 1 Active Conditions
DISPCOND1	*disp condition value* <crlf>	Relay 1 Displacement Conditions
ACTIVE2	**{ HIGH | LOW }** <crlf>	
CONDITION2	*condition value* <crlf>	Relay 2 Active Conditions
DISPCOND2	*disp condition value* <crlf>	Relay 2 Displacement Conditions
ACTIVE3	**{ HIGH | LOW }** <crlf>	
CONDITION3	*condition value* <crlf>	Relay 3 Active Conditions
DISPCOND3	*disp condition value* <crlf>	Relay 3 Displacement Conditions
ACTIVE4	**{ HIGH | LOW }** <crlf>	
CONDITION4	*condition value* <crlf>	Relay 4 Active Conditions
DISPCOND4	*disp condition value* <crlf>	Relay 4 Displacement Conditions <lf>

condition value is	**{ WELD	END	ALARM	LIMITS	P1HI	PILOW	P2HI	P2LOW	DISP	MG3}**
disp_condition_value is	**{ANY	ILO	IHI	FLO	FHI	DLO	DHI	INI	DSP	SEA}**

Control State	Any
Description	Reports the relay settings

Command		
MONITOR	*schedule_number* <crlf>	
MONTYPE1	**{ KA	V	KW }** <crlf>	
UPPER1	**{** *limit_value* **}** <crlf>	
LOWER1	**{** *limit_value* **}** <crlf>	
ACTION1	**{ none	STOP	INHIBIT	APC }** <crlf>	
MONTYPE2	**{ KA	V	KW }** <crlf>	
UPPER2	**{** *limit_value* **}** <crlf>	
LOWER2	**{** *limit_value* **}** <crlf>	
ACTION2	**{ none	STOP }** <crlf>	

NOTE: If your UB25 Power Supply has a software version *lower* than **1.22**, you will *not* the parameters below.

P1LDLY1	{*delay_value*}<crlf>	
P1LDLY2	{*delay_value*}<crlf>	
P1UDLY1	{*delay_value*}<crlf>	
P1UDLY2	{*delay_value*}<crlf>	
P2LDLY1	{*delay_value*}<crlf>	
P2LDLY2	{*delay_value*}<crlf>	
P2UDLY1	{*delay_value*}<crlf>	
P2UDLY2	{*delay_value*}<crlf>	
<lf>		

Control State   Any

Description   Reports the settings of the weld monitor of the currently loaded Power Supply schedule. The *schedule_number* variable identifies which schedule is currently loaded, and may be any value from 0 to 99. The possible value for all variables listed after their parameter name correspond to the values listed under **MONITOR** in *Host Originated Commands* of this manual.

Command		
SYSTEM <crlf>		
LIGHT	**{** *light_value* **}** <crlf>	
BUZZER	**{ OFF	ON }** <crlf>	
LOUDNESS	**{** *loudness_value* **}** <crlf>	
DISPLAY	**{ PEAK	AVG }** <crlf>	
SWTYPE	**{ MECHANICAL	OPTO	PLC }** <crlf>	
SWSTATE	**{ OPEN	CLOSED }** <crlf>	
CTTYPE	**{ MECHANICAL	OPTO	PLC}** <crlf>	
CTSTATE	**{ OPEN	CLOSED }** <crlf>	
FIRESW	**{ AUTO	REMOTE	NONE }** <crlf>	
GRAPH	**{ OFF	ON }** <crlf>	
WELDABORT	**{ OFF	ON }** <crlf>	
DEBOUNCE	**{ NONE	10	20	30 }** <crlf>	
<lf>		

Control State   Any

Description   Reports the current settings of the Power Supply system parameters.

    light_value is a number 0 to 99 for brightness of the LCD. 0 is dark and 100 is the brightest.

    loudness_value is a number 0 to 99 for buzzer loudness. 0 is off and 100 is the loudest.

This Command is for HF25D *only*.

Command		
	DISP	*schedule_number* <crlf>
	INITLO	{ *initial_thick_lo* } <crlf>
	INITHI	{ *initial_thick_hi* } <crlf>
	FINALLO	{ *final_thick_lo* } <crlf>
	FINALHI	{ *final_thick_hi* } <crlf>
	DISPLO	{ *displacement_lo* } <crlf>
	DISPHI	{ *displacement_hi* } <crlf>
	DISPWT	{ *displacement_wtd* } <crlf>
	UNITS	{ **IN/1000	MM** } <crlf>
	INITERR	{ **CONT	STOP** } <crlf>
	<lf>	

Control State   Any except while welding

Description   Reports the current settings of the Power Supply system displacement limit checking parameters.

> **NOTES:**
>
> The units of the limit fields parameters depend on the value of the **UNITS** parameter as follows:
>
> **IN/1000:** $1 = 0.0001$ inches; $10 = 0.001$ inches
>
> **MM:** $1 = 0.01$ mm; $10 = 0.1$ mm
>
> Initial and final thickness are positive if the electrodes move farther apart and negative if they move closer together (in relation to the "zero setting"). The reference "zero setting" for thickness measurements may be set using the **DISPZERO** command (see *Host Originated Commands* section).
>
> Displacement is positive if the electrodes moved closer together during the weld and negative if they moved further apart.

This Command is for HF25D *only*.

Command   **DISPZERO** ad_counts<crlf><lf>

Control State   Any except while welding

Description   Reports the current "zero setting" of the Power Supply system displacement measuring device.

This value is in a/d converter counts (not actual position). If zero, the position of the upper electrode at the start of the next weld will establish the new zero setting.

NOTE: This zero setting is the reference position for the initial and final thickness measurements.

Command   **ALARM** *error_message*<crlf><lf>

Control State   Any

Description   Identifies the current error condition of operation of the Power Supply. May be in response to the **ALARM READ** command sent by the host, or may be sent as a result of an error condition occurring in the Power Supply. *error_message* is a text string describing the error message, which is the same error message that is displayed to the screen.

Command   **SYNC** <crlf><lf>

Control State   Any

Description   The Power Supply returns SYNC command back to the host computer when the SYNC command is received from the host computer.

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