MODEL 2480
SOLARFLOW PLUS

DANIEL MEASUREMENT AND CONTROL
HOUSTON, TEXAS

"AGA-3 2480 PRD"

HHDT EPROM 8-2480-151
2480 EPROM 8-2481-004

Part Number: 3-9004-006
Revision D

June 1999

DANIEL

Year 2000 Warranty

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ii) recognize and accept the year 2000 and every succeeding fourth year as leap years;

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DANIEL MEASUREMENT AND CONTROL
MODEL 2480 SOLARFLOW PLUS
SINGLE METER RUN AGA-3
APPLICATION MANUAL

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LIST OF ILLUSTRATIONS

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SECTION 1

1.0 INTRODUCTION

1.1 SCOPE OF THIS MANUAL

A SolarFlow Plus unit delivered from the factory is fitted with a erasable, programmable, read-only memory (EPROM) configured for the application(s) for which the SolarFlow Plus is intended. The Hand Held Data Terminal (HHDT) provided with SolarFlow Plus is compatible with all applications for which the Model 2480 SolarFlow Plus is configured. This manual provides specific information on a Model 2480 SolarFlow Plus system configured for a single-meter run, AGA-3 application. However this application keeps running averages and totals for current volumes and flow times, average temperatures and static and differential pressures. Basic reference information on the Model 2480 SolarFlow Plus system is provided in the System Reference Manual (Daniel part number 3-9000-497). The System Reference Manual includes sections on system hardware, software, installation, and operating procedures for both the SolarFlow Plus computer and the HHDT. The System Reference manual, together with this application manual provides a complete information package for a specific installation of the Model 2480 SolarFlow Plus system. This manual provides references to the System Reference Manual whenever more detailed information is provided in that manual.

This manual includes sections on:

- Calculation modules for the AGA-3 single-meter run application
- Field wiring connections for applicable inputs and outputs
- SETUP LOCATION menu parameters for the Hand Held Data Terminal (HHDT)
- SETUP UNIT menu parameters for the HHDT
- DISPLAY, CALIBRATE UNIT, and MONITOR menus for the HHDT
- Default user report listing
- Channel assignments for the unit

- Default data log list
- Default security codes
- Default alarm list

1.2 INSTALLATION CONFIGURATION FOR A SINGLE METER RUN AGA-3 APPLICATION WITH ONE DP TRANSMITTER

The SolarFlow Plus standard single-meter run AGA-3 application (AGA-3 2480 PRD) is designed for installations with a single orifice-meter tube that has one differential pressure (DP) transmitter, one static pressure transducer, and one RTD temperature input.

SECTION 2

2.0 AGA-3 SINGLE (AGA-3 2480 PRD) CALCULATION MODULE

This manual supports a SolarFlow Plus computer configured to calculate orifice-meter measurements in accordance with the American Gas Association (AGA) Gas Measurement Committee Report No.3 (AGA-3), Orifice Metering of Natural Gas, (ANSI/API 2530 Second Edition, September 1985). Supercompressibility is calculated in accordance with AGA Standard NX-19 - Manual for the Determination of Supercompressibility Factors for Natural Gas.

2.1 FLOW RATE

In general, the equation for calculating flow rate is:

$$Q_h = C' \sqrt{h_w (P_f)}$$

Where:

Q_h = the corrected flow rate in thousands of standard cubic feet per hour (MCF/HR)

C' = the orifice flow constant calculated using the equation in 2.2

h_w = the differential pressure in inches of water

P_f = the static pressure in pounds per square inch, absolute (PSIA)

2.2 ORIFICE FLOW CONSTANT (C′)

The equation for calculating the orifice flow constant (C′) is:

$$C' = (F_b \times F_{pb} \times F_{tb} \times F_g \times F_{pv} \times F_r \times Y \times F_{tf} \times f_a) \times \frac{1}{1000}$$

Where:

F_b = basic orifice factor (Reference equation 61, ANSI/API 2530).

F_{pb} = pressure base factor (Reference equation 66, ANSI/API 2530).

F_{tb} = temperature base factor (Reference equation 67, ANSI/API 2530).

F_g = specific gravity factor (Reference equation 69, ANSI/API 2530).

F_{pv} = supercompressibility factor (Reference equation 72, ANSI/API 2530).

F_{pv} calculations are limited to adjusted pressures of 0 (zero) to 2000 pounds per square inch, gauge and adjusted temperatures of -40 to 240 degrees Fahrenheit (^oF).

F_r = Reynolds number factor (Reference equation 62, ANSI/API 2530).

Y = expansion factor (Reference equation 17 or 18, ANSI/API 2530).

F_{tf} = flowing temperature factor (Reference equation 68, ANSI/API 2530).

F_a = orifice thermal expansion factor (Reference equation E2 or E3, ANSI/API 2530).

2.3 CALCULATION CYCLES

During normal SolarFlow Plus operation, calculations are performed continuously. Each complete set of calculations is based on a calculation cycle. The time required to complete a calculation cycle depends on processor speed and the extent of data communication required by the application calculation module.

The SolarFlow Plus computer calculates the critical part of the flow rate calculation, extension factor, $(h_w \cdot P_f)^{.5}$, every half second. The computer calculates the factors included in the flow constant (C′), at an interval defined by the application program, typically every 15 to 25 seconds. The factors in C′ that are dependent upon sampled input values use the average of the 0.5-second samples in each calculation.

For example, if an application takes 20 seconds to calculate a new C′ value, a total of 40 extension factors are calculated during the C′ calculation interval. In addition, 40 samples of each analog input are obtained and averaged during the same period of time. SolarFlow Plus sums up and averages the individual extension factors then multiplies the result by the latest calculated value of C′ to produce an updated value for flow rate.

At the end of each flow rate calculation cycle, SolarFlow Plus updates channel values that are dependent on the calculated value of flow rate, such as flow rate, and total volume.

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SECTION 3

3.0 FIELD WIRING CONNECTIONS

3.1 ANALOG INPUT CONNECTIONS

Analog inputs for the single-meter AGA-3 application of the Model 2480 SolarFlow Plus are connected in accordance with the following table.

A field wiring diagram is provided in Appendix C of the Model 2480 System Reference Manual. Drawing number DE-11284 sheet 2, in Appendix C of the Model 2480 System Reference Manual provides field wiring detail for connecting the inputs. Figure 3-1 illustrates the terminal board connections for this application.

The following table shows the SolarFlow Plus channels assigned for connecting analog inputs to the unit.

CH	TRANSMITTER TYPE	WIRE COLOR	TB2 PIN NO.	TB2 PIN LABEL
20	Daniel Model 224 millivolt static pressure transmitter, (Factory wired, if installed inside SolarFlow Plus enclosure.)	Yellow Green White Black	10 11 12 13	PWR + SIG + SIG - PWR -
	- or -			
20	Statham Series 36, 1-5 VDC static pressure transmitter, (Factory wired, if installed inside SolarFlow Plus enclosure.)	Blue Red Black	7 8 9	SP +12 V GND
21	External, RTD temperature transducer, (To be installed by user, cable supplied.)	* # #	14 15 16	TEMP GND GND
22	External DP transmitter, (To be installed by user.)	Blue Red Black	4 5 6	DP1 +12 V GND

* Amber with Black tracer or Red
\# Amber or White

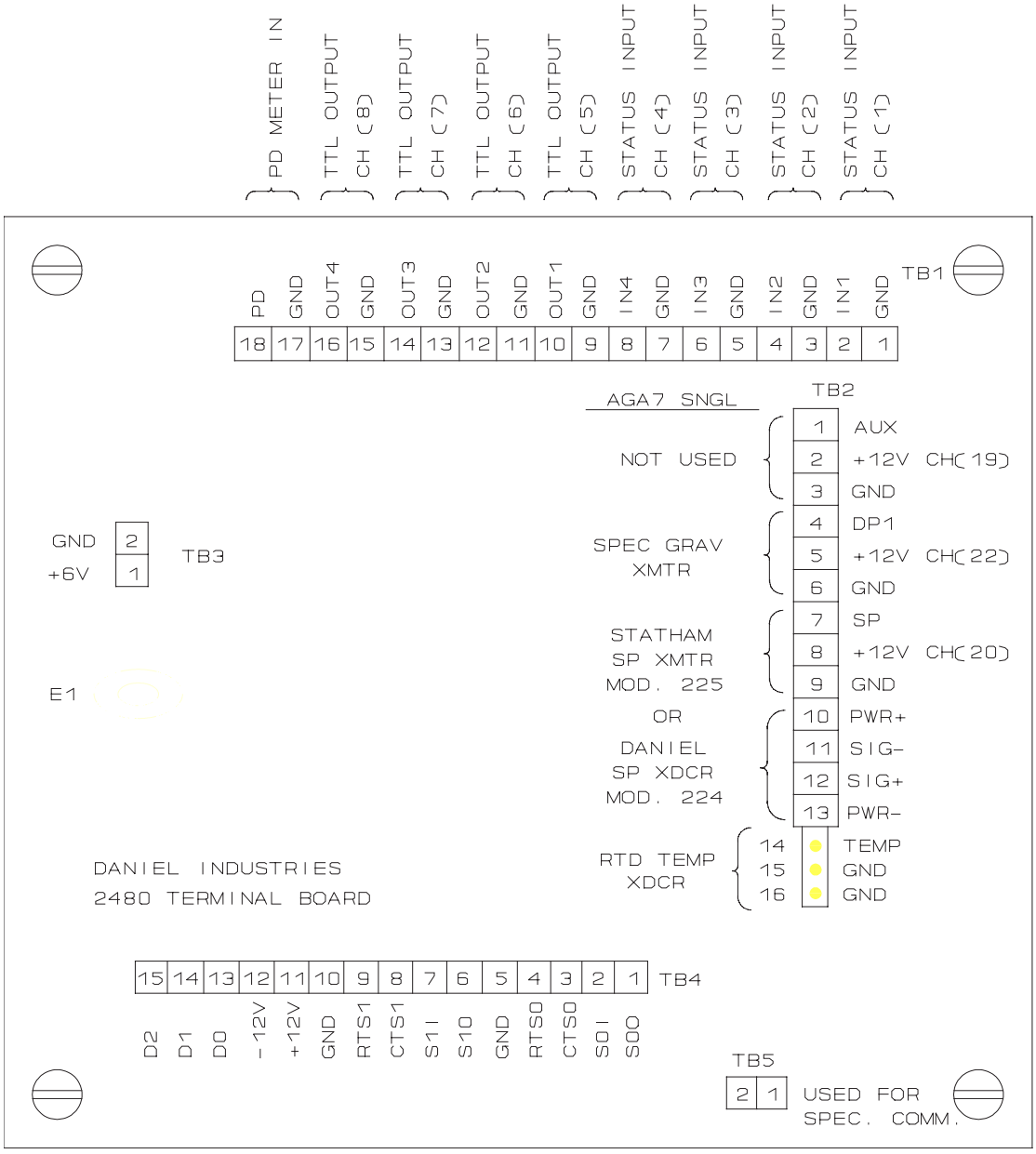

Figure 3-1. Terminal Board Connections

3.2 OUTPUT SIGNAL CONNECTIONS

All output signals from a SolarFlow Plus unit installed in a hazardous location must be isolated by means of intrinsic safety barriers.

This application has one TTL output for corrected station volume on channel 5. The volume per pulse and the pulse period of the output may be changed using the HHDT. Prompts for changing the volume per pulse (VPP1) and pulse period (PP1) are included in the discussion of the CONFIG submenu of the SETUP UNIT menu.

3.2.1 TTL LEVEL SIGNAL OUTPUTS

TTL level output for channel FIVE (5) is available at the terminal board TB1 shown in the following table.

CH	SIGNAL DESCRIPTION	LABEL	TB1 PIN NO.	TB1 LABEL	SIGNAL TYPE
5	Volume pulse output 1	VP1	10	OUT1	TTL Output
			9	GND	Common

3.3 STATUS INPUT CONNECTIONS

This application supports one status input that is activated by means of a dry contact closure between the status input channel and common. The following details the pin-out arrangement for the status input.

CH	SIGNAL DESCRIPTION	LABEL	TB1 PIN NO.	TB1 LABEL	SIGNAL TYPE
1	Pushbutton input for average transfer	RESET AVGS	2	IN1	Status in
			1	GND	Common

SECTION 4

4.0 SETUP LOCATION MENU

The SolarFlow Plus operating parameters for the single-meter run AGA-3 application that can be changed in the SETUP LOCATION menu are shown in the following table described by the HHDT prompt for the parameter, the factory-installed default value, and a blank space for entering the desired value if different from the factory default. Additional information on the SETUP LOCATION menu is provided in section 5.10.1 of the Model 2480 System Reference Manual.

HHDT PROMPT	DEFAULT	DESIRED
LOC NAME	BLANK LOCATION	_____
LOC ID	0	_____
DATE	010180 MMDDYY	_____
WEEK DAY	1 (1-7)	_____
TIME	0000 HHMM	_____
SEC CODE (1)	120	_____
PCOMM RATE (2)	300 BPS	_____
RTS DELAY (3)	0 1/100 SEC	_____

NOTE:

(1) Refer to section 5.10.1.6 in the Model 2480 System Reference Manual for a complete discussion of the SEC CODE prompt.

(2) Refer to section 5.10.1.8 in the Model 2480 System Reference Manual for a complete discussion of the PCOMM RATE prompt.

(3) Refer to section 5.10.1.9 in the Model 2480 System Reference Manual for a complete discussion of the RTS DELAY prompt.

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SECTION 5

5.0 SECURITY CODE LIST

The default security code list for this application is: 120, 101, 111, 121, 131, 141, 102, 112, 122, 132, 142.

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SECTION 6

6.0 SETUP UNIT MENU

The parameters for the single-meter AGA-3 application of SolarFlow Plus that can be changed in the five submenus of the SETUP UNIT menu using the HHDT are tabulated as follows. The parameters are tabulated by the HHDT prompt for the parameter, the factory-installed default, and a blank space for entering the desired value if different from the factory default.

6.1 GENERAL SUBMENU

The following parameters can be changed in the GENERAL submenu of the SETUP UNIT menu of the HHDT.

HHDT PROMPT	DEFAULT	DESIRED
UNIT NAME	BLANK UNIT	_____
UNIT ID	BLANK ID	_____
CONTRCT HR	7 (0-23)	_____
LOG INTRVL	1 HR	_____
LOG DEFINE (1)		_____
RESET CMOD (2)	OFF	_____

NOTE:

(1) Before making changes in the LOG DEFINE Submenu, collect all data logs in SolarFlow Plus memory. All data logs in SolarFlow Plus memory are automatically erased and can no longer be recovered any time a change is made in the LOG DEFINE menu. Refer to section 11.3 for a description of the LOG DEFINE prompt.

(2) The calculations module in Model 2480 is established upon initial startup. Refer to section 5.10.2 in the System Reference Manual.

6.2 INPUTS SUBMENU

The INPUTS submenu of the SETUP UNIT menu of the HHDT provides for switching between LIVE and FIXED values of the following analog inputs. Refer to section 5.10.2.2 in the Model 2480 System Reference Manual for additional information.

HHDT PROMPT	DEFAULT
METR PRES	XXXXX PSIG
METR TEMP	XXXXX DEGF
DIFF PRES	XXXXX INH2O

6.3 SCALES SUBMENU

The high- and low-scale setpoints for the analog inputs shown in the table below can be modified in the SCALES submenu of the SETUP UNIT menu of the HHDT. Refer to section 5.10.2.3 in the Model 2480 System Reference Manual for additional information.

HHDT PROMPT	DEFAULT		DESIRED
M PRES/LO	0	PSIG	_____
M PRES/HI	1000	PSIG	_____
M TEMP/LO	0	DEGF	_____
M TEMP/HI	150	DEGF	_____
D PRES/LO	0	INH20	_____
D PRES/HI	150	INH20	_____

6.4 CONFIG SUBMENU

The following default parameters can be changed in the CONFIG submenu of the SETUP UNIT menu of the HHDT. Refer to section 5.10.2.4 in the Model 2480 System Reference Manual for additional information.

HHDT PROMPT	DEFAULT		DESIRED
PIPE DIAM	8.071	IN	_____
ORIF DIAM	4.000	IN	_____
RESET MODE	DAILY		_____
ORIF MTRL	0		_____
			0 = STEEL 1 = MONEL
ZFLOW LIM	2.00	%	_____
ATMS PRES	14.73	PSIA	_____
PRES BASE	14.73	PSIA	_____
TEMP BASE	60	DEGF	_____
SPEC GRAV	0.600		_____
CO2	0.00	MOL%	_____
N2	0.00	MOL%	_____
TAP LCTN	0		_____
			0 = DOWNSTREAM 1 = UPSTREAM
TAP TYPE	0		_____
			0 = FLANGE 1 = PIPE
VPP 1[1]	0.1	MCF	_____
			MCF/PULSE
PP 1[2]	0	SEC	_____
			PULSE PERIOD
%DEV	0	%RANG	_____

NOTE:

(1) VPP1 is not the same as the output on channel 5 (VP1). VP1 is a output pulse representing corrected station volume. VPP1 is a scaling factor for VP1 in thousands of cubic feet per pulse (MCF per pulse). The number of cubic feet per pulse can be modified using the HHDT. As indicated in the table, the scaling factor in MCF per pulse is 0.1. To accommodate an external totalizer that advances in increments of 1000 standard cubic feet (SCF) per pulse, the default value of VPP1 would be reset to 1 MCF per pulse.

(2) The pulse period can be modified using the HHDT. As indicated in the table, no pulses are generated by PP1 since the pulse period is set at zero (0) seconds. The value can be changed to provide a pulse to drive an external device. For example, resetting PP1 to 1 would generate a pulse 1 second in duration. The value for PP1 must be an integer equal to 1 or greater. Fractions of a second are not permitted.

6.5 FACTORS SUBMENU

The FACTORS submenu of the SETUP UNIT menu of the HHDT provides for switching between LIVE and FIXED values for the calculated factors shown in the following table. Refer to section 5.10.2.5 in the Model 2480 System Reference Manual for additional information.

HHDT PROMPT	DEFAULT
FB FCTR	XXXX
FPB FCTR	XXXX
FTB FCTR	XXXX
FG FCTR	XXXX
FPV FCTR	XXXX
FR FCTR	XXXX
Y FCTR	XXXX
FTF FCTR	XXXX
FA FCTR	XXXX
FW FCTR	XXXX

SECTION 7

7.0 DISPLAY MENU

The DISPLAY Menu of the HHDT provides for viewing the various setup parameters and calculated values in a SolarFlow Plus unit at any given time. The menu is for display purposes only. No changes can be made to the values displayed using this menu. The Display menu has five selections: INPUTS, SCALES, CONFIG, FACTORS, RATE/VOLS, and FLOW AVERAGES.

INPUTS
- BATTERY
- METR PRES
- METR TEMP
- DIFF PRES

SCALES
- M PRES/LO
- M PRES/HI
- M TEMP/LO
- M TEMP/HI
- D PRES/LO
- D PRES/HI

CONFIG
- PIPE DIAM
- ORIF DIAM
- RESET MODE
- ORIF MTRL
- ZFLOW LIM
- ATMS PRES
- PRES BASE
- TEMP BASE
- SPEC GRAV
- CO2

N2
TAP LCTN
TAP TYPE
VPP 1
PP 1
%DEV

FACTORS
FB FCTR
FPB FCTR
FTB FCTR
FG FCTR
FPV FCTR
FR FCTR
Y FCTR
FTF FCTR
FA FCTR

RATE/VOLS
FLOW RATE
TOT VOL
CURR VOL
PREV VOL
TODAY VOL
YSDAY VOL
VP1
PC1

FLOW AVERAGES
CURR VOL
PREV VOL
CUR FLW TM
PRV FLW TM
CURR PRES
CURR DP
CURR TEMP
PREV PRES
PREV DP
PREV TEMP
FLW TIME H
FLW TIME D

SECTION 8

8.0 CALIBRATE UNIT MENU

The CALIBRATE UNIT menu provides for calibrating the SolarFlow Plus input circuitry to match the output of the transmitter for analog inputs to the SolarFlow Plus unit. The CALIBRATE UNIT menu has two selections: PRESSURES and OTHERS. Refer to section 5.11 in the Model 2480 System Reference Manual for additional information.

8.1 PRESSURES

The PRESSURES selection of the CALIBRATE UNIT menu provides for calibrating the pressure inputs listed below. LOW BIAS is calibrated under the differential pressure entry.

METR PRES
DIFF PRES

8.2 OTHERS

The analog inputs listed below are calibrated in the OTHERS selection of the CALIBRATE UNIT menu.

METR TEMP

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SECTION 9

9.0 MONITOR MENU

The Monitor menu provides for witness testing analog inputs to the SolarFlow Plus unit. When the MONITOR menu is entered, all analog inputs are fixed at the values being transmitted to SolarFlow Plus when MONITOR is executed. The values remain fixed until the MONITOR menu is exited. This analog inputs listed below are available in the MONITOR menu in the single-meter AGA-3 application. Refer to section 5.13.8 in the Model 2480 System Reference Manual for additional information.

METR PRES
METR TEMP
DIFF PRES

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SECTION 10

10.0 MODEL 2480 AGA-3 SINGLE CHANNEL ASSIGNMENTS

10.1 USER REPORT (CHANNEL ZERO)

The SolarFlow Plus has a front panel display that provides a predefined report list. The report list contains the channel data shown in the table below and is displayed in a scrolling format. The list is factory defined for the application and cannot be changed by the user.

CHANNEL NUMBER	CHANNEL LABEL	DESCRIPTION
23	BATTERY	Battery voltage
20	METR PRES	Pressure in PSIG
21	METR TEMP	Temperature in DEG F
22	DIFF PRES	Differential Pressure in INH2O
55	FLOW RATE	Flow rate in MCF/HR
66	CURR VOL	Running volume in MCF
46	CUR FLW TM	Running flow time in HOURS
63	CURR PRES	Current flowing average in PSIG
64	CURR DP	Current flowing average in INH2O
65	CURR TEMP	Current flowing average in DEG F
72	PREV VOL	Previous volume in MCF
47	PRV FLW TM	Previous flow time in HOURS
69	PREV PRES	Previous flowing average in PSIG
70	PREV DP	Previous flowing average in INH2O
71	PREV TEMP	Previous flowing average in DEG F

10.2 CHANNEL ONE THROUGH 18 ASSIGNMENTS

Assignments for the single meter AGA-3 application channels one through 18 are tabulated as follows.

CH	LABEL	INPUT/ OUTPUT	0-LABEL	1-LABEL	DEFAULT	DESCRIPTION
1	RESET AVGS	IN	ON	OFF	OFF	Pushbutton input for average transfer
001 through 004 are reserved						
5	VP1	OUT	OFF	ON	OFF	Volume Pulse output 1
006 through 010 are reserved						
11	RESET MODE	IN	DAILY	MANUAL	DAILY	Average transfer mode
012 through 018 are reserved						

10.3 CHANNEL 19 THROUGH 92 ASSIGNMENTS

Assignments for the single meter run AGA-3 channels 19 through 92 are tabulated as follows. The column labeled DP in the table indicates the number of points displayed past the decimal point.

CH	REF	LABEL	UNITS	DP	DEFAULT	DESCRIPTION
19	Reserved for future use					Not used
20	P_f	METR PRES	PSIG	0	--	Meter 1 flowing pressure Scale 0-1000
21	T_f	METR TEMP	DEG F	0	--	Scale 0-150
22	H_w	DIFF PRES	IN H2O	1	--	Differential pressure Scale 0-150.0
23		BATTERY	VOLTS	2	--	Battery voltage
Channels 24 through 29 are reserved.						
30	D	PIPE DIAM	IN	3	8.071	Pipe diameter
31	d	ORIF DIAM	IN	3	4.000	Orifice diameter
32	P_a	ATMS PRES	PSIA	2	14.73	Atmospheric pressure
33	P_b	PRES BASE	PSIA	2	14.73	Pressure base
34	T_b	TEMP BASE	DEG F	0	60	Temperature base
35	G	SPEC GRAV	(None)	3	0.600	Specific gravity
36		CO2	MOL%	2	0.00	Carbon dioxide inert for Fpv calculation
37		N2	MOL%	2	0.00	Nitrogen inert for Fpv calculation
38		TAP LCTN	(None)	0	0	Tap location: Downstream = 0 Upstream = 1
39		TAP TYPE	(None)	0	0	Tap type: Flange = 0 Pipe = 1
40	F_b	FB FCTR	(None)	1	1.0	Orifice factor
41	F_{pb}	FPB FCTR	(None)	4	1.0000	Pressure base factor

CH	REF	LABEL	UNITS	DP	DEFAULT	DESCRIPTION
42	F_{tb}	FTB FCTR	(None)	4	1.0000	Temperature base factor
43	F_g	FG FCTR	(None)	4	1.0000	Gravity factor
44	F_{pv}	FPV FCTR	(None)	4	1.0000	Supercompressibility factor
45	Reserved					
46		CUR FLW TM	HOURS	0	0	Current average period flow time
47		PRV FLW TM	HOURS	0	0	Previous average period flow time
48	F_r	FR FCTR	(None)	4	1.0000	Reynolds number factor
49	Y	Y FCTR	(None)	4	1.0000	Expansion factor
50	F_{tf}	FTF FCTR	(None)	4	1.0000	Flowing temperature factor
51	F_a	FA FCTR	(None)	4	1.0000	Thermal expansion factor
52		ORIF MTRL	(None)	0	0	Orifice material: 0 = steel 1 = monel
53		TOT VOL	MCF	1	0.0	Total accumulated volume
54		LOG VOL	MCF	1	0.0	Logged accumulated volume
55		FLOW RATE	MCF/HR	1	0.0	Flow rate
56		TODAY VOL	MCF	1	0.0	Today's volume
57		YSDAY VOL	MCF	1	0.0	Yesterday's volume
58		ZFLOW LIM	%	2	2.00	Low flow cutoff limit
59		VPP 1	MCF	1	0.100	Volume per pulse 1
60		PP 1	SEC	1	0.0	Pulse period 1
61		PC 1	(None)	0	0	Total pulses 1

CH	REF	LABEL	UNITS	DP	DEFAULT	DESCRIPTION
62		FLW TIME H	MINS	1	0.0	Flow time this hour
63		CURR PRES	PSIG	1	0.0	Running average of current pressure
64		CURR DP	INH2O	1	0.0	Running average of current differential pressure
65		CURR TEMP	DEG F	1	0.0	Running average of current temperature
66		CURR VOL	MCF	1	0.0	Running volume for this average period
67	Reserved					
68		FLW DIFF H	INH2O	1	0.0	Flowing differential last interval
69		PREV PRES	PSIG	1	0.0	Average pressure for previous period
70		PREV DP	INH2O	1	0.0	Average differential pressure for previous period
71		PREV TEMP	DEG F	1	0.0	Average temperature for previous period
72		PREV VOL	MCF	1	0.0	Running volume for previous average period
73-79 Reserved						
80		FLW TEMP H	INH2O	1	0.0	Flowing temperature last interval
81-84 Reserved						
85		FLW PRES H	DEG F	1	0.0	Flowing pressure last interval
86	Reserved					
87		FLW TIM LI	MINS	2	0.00	Flow time last log interval

CH	REF	LABEL	UNITS	DP	DEFAULT	DESCRIPTION
88		FLW TIME D	MINS	1	0.0	Flow time this day
89	Reserved					
90		% DEV	%RANG	0	0	0=Normal under/over range fault bits; see section 12.2.1
91		TIME		0	0	Current time in hhmmss format (read only)
92		DATE		0	0	Current date in MMDDYY format (read only)

SECTION 11

11.0 DATA LOG LIST AND HEADER BLOCK

11.1 DATA LOG LIST CONTENTS

The AGA-3 single meter application has one data log list, which is set to a one-hour interval with a contract hour at 7:00 AM. The following items are included on the data log.

CHANNEL NUMBER	CHANNEL LABEL	DECIMAL PLACES	DIGITS	LOGGING TYPE
21	METR TEMP	0	4	Average
20	METR PRES	0	6	Average
22	DIFF PRES	1	4	Average
54	LOG VOL	1	8	Snapshot and Zero
56	TODAY VOL	1	8	Snapshot
57	YSDAY VOL	1	8	Snapshot

11.2 DATA LOG HEADER BLOCK CONTENTS

M PRES/LO
M PRES/HI
M TEMP/LO
M TEMP/HI
D PRES/LO
D PRES/HI
PIPE DIAM
ORIF DIAM
ORIF MTRL
ZFLOW LIM
ATMS PRES
PRES BASE
TEMP BASE
SPEC GRAV
CO2
N2
RESET MODE
TAP LCTN
TAP TYPE
%DEV

11.3 LOG DEFINE PROMPT

A maximum of ten items can be included in a data log. The up and down arrow keys scroll through the list of items. The insert and delete keys are also active.

LOG DEFINE adds, deletes, or modifies items in the Data Log List. A five-character entry (represented by the alphanumerical group ChTLD shown in 6.1 in the Default column for the HHDT prompt LOG DEFINE) defines an entry in the log. The characters "Ch" represent the channel number. "T" represents the type of log; "L" the number of digits to be logged; and "D" the number of decimal places logged. The type of log (T) can be an "A" for average over the log interval, "S" for snapshot at the logging time, or "Z" for snapshot and zero at the logging time. The number of digits to be logged (L) must be an even number.

For example, if the character group ChTLD is 21A40:

Ch = 21, which is the channel number for METR TEMP.
T = A, means that the value logged is the average for METR TEMP over the log interval.
L = 4, which is the number of digits to be logged.
D = 0 (zero), which means that METR TEMP is logged with no numbers after the decimal point.

When a change is made to the LOG DEFINE sub-menu, previously recorded data logs *are automatically erased* and are no longer available for retrieval. For this reason, all data logs stored in SolarFlow Plus must be collected before making changes in the LOG DEFINE sub-menu.

SECTION 12

12.0 ALARM DEFINITIONS

When using the HHDT in the ALARMS menu to set-up alarm conditions, the HHDT displays the terms "LOW", "HIGH", and "ALT". The parameter that is modified by the operator is ALT, which is equivalent to the "Z" value shown in the following alarm conditions list. The values for LOW and HIGH are not applicable to this application. Any values displayed under these prompts are meaningless. If the user desires to change a setpoint for a specific alarm, the ALT parameter is the only parameter applicable.

The following is a listing of the Alarm definitions for the AGA-3 Single meter run application.

The number of retries for the alarms are:

5 for alarms 1 through 13
0 for alarm 14

ALARM #	ALARM CONDITION	VARIABLE VALUES		ALARM MESSAGES
		F	Z ALT	
1	C(19)<Z*S(19,F)		0	AUX LOW
2	C(19)>Z*S(19,F)		1.01	AUX HIGH
3	C(20)<Z*S(20,F)	1000	0	PRES LOW
4	C(20)>Z*S(20,F)	1000	1.01	PRES HIGH
5	C(21)<Z*S(21,F)	150	0	TEMP LOW
6	C(21)>Z*S(21,F)	150	1.01	TEMP HIGH
7	C(22)<Z*S(22,F)	150.0	0	DIFF LOW
8	C(22)>Z*S(22,F)	150.0	1.01	DIFF HIGH
9	C(55)<Z		0	FLOW LOW
10	C(55)>Z		999999.0	FLOW HIGH
11	C(53)<Z		0	VOL LOW
12	C(53)>Z		999999.0	VOL HIGH
13	BATT < 5.976*			BATT LOW
14				SYS FAIL

* This battery alarm is fixed at 5.976 VDC and cannot be changed.

12.1 CALCULATING ALARM SETPOINTS

Alarm setpoints are calculated using the equation shown under the Alarm Condition column in the table shown above. For example, to calculate the setpoint for Alarm #4, the equation shown is:

Setpoint = Z * S(20,F)

Where:

Z = 1.01
F = 1000
S(20,F) = The full scale value for channel 20, which is the meter pressure transmitter. The Model 2480 automatically generates this value based on the full scale value entered in the SETUP UNIT menu.

Therefore:

The setpoint for Alarm #4 is = 1.01 * 1000 = 1010.0

When the ALARM menu is entered using the HHDT the user may modify the Z value shown in the above alarm conditions by changing the value for ALT. This enables the user to adjust the alarm limit to match the requirements.

The value for Z is represented by ALT on the HHDT ALARM SETUP menu.

The ALARM menu is also used to acknowledge alarms and to activate or deactivate alarms.

To acknowledge an alarm condition displayed on the LCD of SolarFlow Plus, enter the ALARM menu of the HHDT and select the ACKNOWLEDGE sub-menu. Any existing un-acknowledged alarms are displayed and the HHDT prompts: "ACKNOWLEDGE ? Y/N". Press the ENTER key to acknowledge the alarm. Once this has been done and the user has logged off SolarFlow Plus, the activated alarm is displayed with the message "ACKNOWLEDGED" following the alarm condition. If the alarm condition no longer exists and has not been acknowledged it remains on the LCD until acknowledged.

To activate or deactivate alarms, enter the HHDT ALARM menu and select the SETUP sub-menu. The HHDT displays the various alarms that are available in the program. Scroll to the desired alarm and press the ENTER key at the desired alarm condition. The HHDT provides four options; STAT, LOW, HIGH, and ALT. Press ENTER at the STAT option. The HHDT shows either ON or OFF and prompts OK?. To turn off the alarm, press the NO key until OFF is displayed, then press ENTER.

12.2 OTHER SYSTEM CONDITIONS

There are system conditions, not strictly alarms, that will show up on the data log of the SolarFlow Plus. These system conditions may or may not require corrective action. A typical data log from the Model 2480 will be in the format shown as follows.

```
Date     Time   METR TEMP   METR PRES  DIFF PRESS  TODAY VOL
U-Range     O-Range     Misc.

MM/DD/YY HH:MM       XXXX        XXXX        XXXX       XXXX
........   ........    ........
```

The print-out will list each log item along with the respective date and time of the log item followed by a series of parameters which were defined to be included in the data log. In addition to the defined items three other sets of data are supplied with each log interval. On the line after the Date and Time, three labels are defined as follows:

a. U-Range which will list any of the analog inputs that were in an Under-Range condition any time during the log interval.

b. O-Range which will list any of the analog inputs that were in an Over-Range condition any time during the log interval.

c. Misc. which will list system conditions that have occurred during the log interval.

A series of eight decimal points (.....) are shown under the respective data log interval Date and Time. If none of the analog inputs were in an under or over range condition, decimal points will be displayed. If any of the factory defined analog inputs are out of range, a number will replace one of the decimal points. For example, if Channels 20 and 21 were Under Range the following would be displayed.

```
Date     Time
U-Range    O-Range

MM/DD/YY HH:MM
.23.....   ........
```

The "2" replacing the second decimal point indicates channel 20 is Under-Range. The "3" in place of the third decimal point indicates channel 21 is Under-Range and so-on. This same sequence applies to the Over-Range conditions.

The following table lists the applicable analog input for each of the decimal points under the "U-Range" and "O-Range" identifiers.

	AGA-3 2480 PRD ANALOG INPUT
1	Not Used, Channel 19
2	METER PRESSURE, CHANNEL 20
3	METER TEMPERATURE, CHANNEL 21
4	DIFFERENTIAL PRESSURE, CHANNEL 22
5	BATTERY, CHANNEL 23
6-8	Not Used

The "Misc." section is applicable for system conditions that were present during the log interval. The conditions defined as "1" through "8" are detailed as follows:

1 - Calibration over-deviation
2 - Fpv adjusted pressure out of range
3 - Fpv adjusted temperature out of range
4 - not used
5 - Designates daily log
6 - Warm start was enacted during interval
7 - Cold start was enacted during interval
8 - System fault

12.2.1 REDEFINED OVER/UNDER RANGE FAULT BITS

When Channel 90, %DEV, is zero, the under-range and over- range fault bits in the data log function normally. When %DEV is changed to some non-zero value, the meaning of the fault bits is changed such that the item labelled "under-range" indicates under or over range and the item labelled "over-range" indicates a deviation during the log interval. The deviation is computed internally in the SolarFlow Plus by:

- averaging each analog input over the log interval
- computing the maximum of each input over the log interval
- computing the minimum of each input over the log interval
- computing the deviation, as a percentage of full scale, of both maximum and minimum from the average.

If the deviation is greater than or equal to the non-zero value the operator has configured into %DEV, then the deviation fault bit for that input is set.

SECTION 13

13.0 RADIO COMMUNICATION

This software may be used for radio communication only with Daniel PC software that supports "Radio Packetized Logon". The "Radio Packetized Logon" is active in SolarFlow Plus whenever a radio interface is installed, no local HHDT cable is plugged in, and RTS DELAY is set to some non-zero value. Consult the manual for your Daniel PC software to determine whether it supports this feature.

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SECTION 14

14.0 USER LOGON EVENT

This application generates a "User logged on" record in the Event log only if the user performed an action (e.g. changed a measurement parameter, etc.) which generates another event. In other words, no event log entry is made when a user logs on and just reads current values.

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SECTION 15

15.0 HIGH SPEED CHANNEL READS

This application supports high speed channel reads with DSI protocol.

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WARRANTY CLAIM REQUIREMENTS

To make a warranty claim, you, the Purchaser, must:

1. Provide Daniel with proof of the Date of Purchase and proof of the Date of Shipment of the product in question.

2. Return the product to Daniel within twelve (12) months of the date of original shipment of the product, or within eighteen (18) months of the date of original shipment of the product to destinations outside of the United States. The Purchaser must prepay any shipping charges. In addition, the Purchaser is responsible for insuring any product shipped for return, and assumes the risk of loss of the product during shipment.

3. To obtain Warranty service or to locate the nearest Daniel office, sales, or service center call (281) 897-2900, Fax (281) 897-2901, or contact:

   Daniel Measurement Services
   19203 Hempstead Highway
   Houston, Texas 77065

   When contacting Daniel for product service, the purchaser is asked to provide information as indicated on the following "Customer Problem Report".

   Daniel Measurement Services offers both on call and contract maintenance service designed to afford single source responsibility for all its products.

   Daniel Industries, Inc. reserves the right to make changes at any time to any product to improve its design and to insure the best available product.

DANIEL INDUSTRIES, INC.
CUSTOMER PROBLEM REPORT

FOR FASTEST SERVICE, COMPLETE THIS FORM, AND RETURN IT ALONG WITH THE AFFECTED EQUIPMENT TO CUSTOMER SERVICE AT THE ADDRESS INDICATED BELOW.

COMPANY NAME:_____

TECHNICAL CONTACT:_____ PHONE:_____

REPAIR P. O. #:_____ IF WARRANTY, UNIT S/N: _____

INVOICE ADDRESS:_____

_____

_____

SHIPPING ADDRESS:_____

_____

_____

RETURN SHIPPING METHOD:_____

EQUIPMENT MODEL #:_____ S/N:_____FAILURE DATE: _____

DESCRIPTION OF PROBLEM: _____

_____

_____

WHAT WAS HAPPENING AT TIME OF FAILURE? _____

_____

ADDITIONAL COMMENTS: _____

_____

_____

REPORT PREPARED BY:_____ TITLE:_____

IF YOU REQUIRE TECHNICAL ASSISTANCE, PLEASE FAX OR WRITE THE MAIN CUSTOMER SERVICE DEPARTMENT AT:

DANIEL MEASUREMENT SERVICES
ATTN: CUSTOMER SERVICE
19203 HEMPSTEAD HIGHWAY
HOUSTON, TEXAS 77065

PHONE: (281) 897-2900
FAX: (281) 897-2901

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