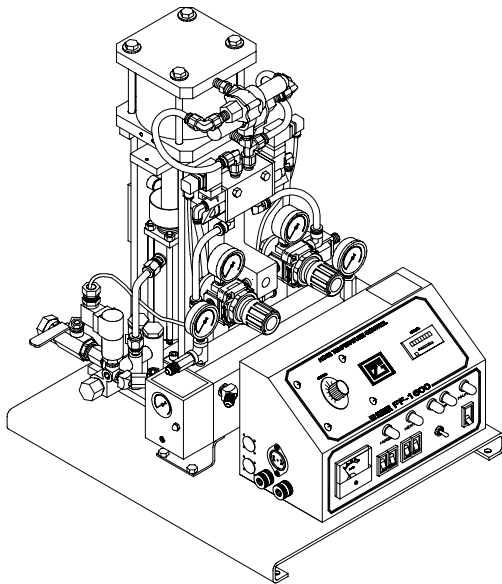


# **GUSMER**<sup>®</sup> CORPORATION

*"Success through Unity"*



## **Model FF-1600 Proportioning Unit**

### **Parts Identification Manual 17942-ID**

**December 2, 2002**

**Issue 7**

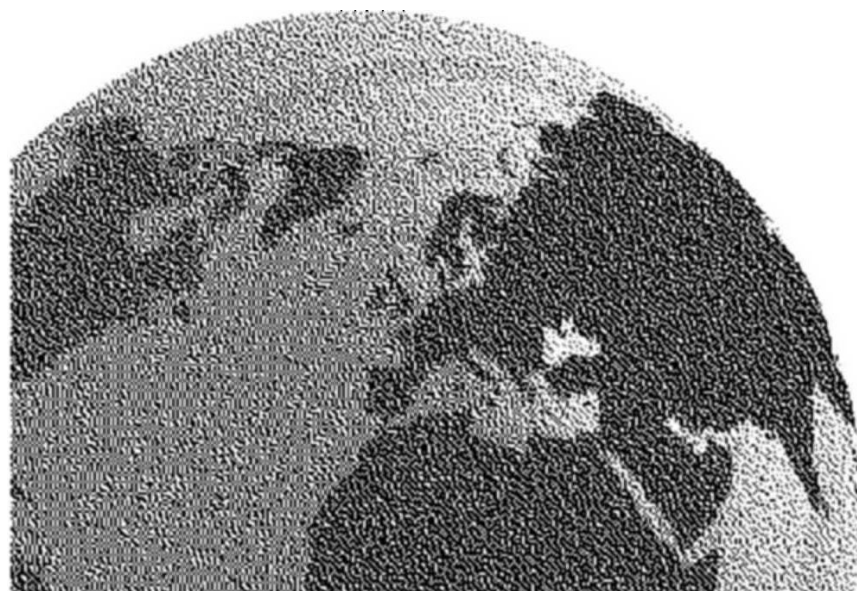
**GUSMER CORPORATION**<sup>®</sup>

A Subsidiary of Gusmer Machinery Group, Inc.  
One Gusmer Drive  
Lakewood, New Jersey, USA 08701-8055

Toll Free 1-800-367-4767 (USA & Canada)  
Phone: (732) 370-9000  
Fax: (732) 905-8968

Copyright 2002, GUSMER CORPORATION<sup>®</sup>

<http://www.gusmer.com>



---

**NOTICE:** This manual contains important information about your GUSMER equipment. Read and retain for future reference.

---

---

---

***NOTICE:** The equipment described in this technical manual must only be operated or serviced by properly trained individuals, thoroughly familiar with the operating instructions and limitations of the equipment. For technical service, call your local distributor. Call: 1-800-FOR-GSMR (1-800-367-4767) for the name and telephone number of your local distributor.*

---

---

---

---

***NOTICE:** All statements, information, and data given herein are believed to be accurate and reliable but are presented without guarantee, warranty, or responsibility of any kind expressed or implied. Statements or suggestions concerning possible use of GUSMER equipment are made without representation or warranty that any such use is free of patent infringement, and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated or that other measures may not be required.*

---

---

# CONTENTS

**LIST OF FIGURES .....4**

**LIST OF TABLES .....4**

**WARRANTY.....5**

**MODEL FF-1600 PROPORTIONING UNIT ASSEMBLIES.....6**

    FINAL ASSEMBLY, MANUAL HOSE HEAT (17000A-SIZE)..... 6

    ELECTRIC CONSOLE ASSEMBLY, MANUAL HOSE HEAT..... 8

    FINAL ASSEMBLY, DIGITAL HOSE HEAT (17000B-SIZE-DGT)..... 14

    ELECTRIC CONSOLE ASSEMBLY, DIGITAL HOSE HEAT ..... 16

    AIR MOTOR ASSEMBLIES..... 22

*16:1 Ratio* ..... 22

*10:1 Ratio (Optional)*..... 24

    REVERSING SWITCH ASSEMBLY..... 26

    AIR CONTROL SYSTEM ASSEMBLY ..... 28

    PRIMARY HEATER ASSEMBLY ..... 30

    PROPORTIONING PUMP ASSEMBLY ..... 32

    HOSE HEAT POWER PACK ASSEMBLIES ..... 36

*Manual Hose Heat*..... 36

*Digital Hose Heat*..... 38

**ELECTRICAL SCHEMATIC DIAGRAMS.....40**

    MANUAL HOSE HEAT SCHEMATIC DIAGRAMS..... 40

*220V Single Phase 50/60Hz*..... 40

*380V Three Phase 50Hz* ..... 42

    DIGITAL HOSE HEAT SCHEMATIC DIAGRAMS..... 46

*220V Single Phase 50/60Hz*..... 46

*380V Three Phase 50Hz* ..... 48

**NOTES.....52**

**INSTRUCTION MANUAL DISCREPANCY REPORT .....53**

## LIST OF FIGURES

FIGURE 1. FF-1600 ASSEMBLY (PART No. 17000A-SIZE), EXPLODED VIEW.....	6
FIGURE 2. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART No. 17650A-220/380), EXPLODED VIEW, SHEET 1 OF 3.....	8
FIGURE 3. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART No. 17650A-220/380), EXPLODED VIEW, SHEET 2 OF 3.....	10
FIGURE 4. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART No. 17650A-220/380), EXPLODED VIEW, SHEET 3 OF 3.....	12
FIGURE 5. FF-1600 ASSEMBLY (PART No. 17000B-SIZE-DGT), EXPLODED VIEW .....	14
FIGURE 6. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), EXPLODED VIEW, SHEET 1 OF 3..	16
FIGURE 7. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), EXPLODED VIEW, SHEET 2 OF 3..	18
FIGURE 8. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), EXPLODED VIEW, SHEET 3 OF 3..	20
FIGURE 9. 16:1 RATIO AIR MOTOR (PART No. 17755), EXPLODED VIEW .....	22
FIGURE 10. 10:1 RATIO AIR MOTOR (PART No. 17796), EXPLODED VIEW .....	24
FIGURE 11. REVERSING SWITCH (PART No. 17745-10), EXPLODED VIEW .....	26
FIGURE 12. AIR CONTROL SYSTEM (PART No. 17756), EXPLODED VIEW .....	28
FIGURE 13. PRIMARY HEATER (PART No. 18300), EXPLODED VIEW .....	30
FIGURE 14. PROPORTIONING PUMP (PART No. 17400/17450-SIZE), EXPLODED VIEW.....	32
FIGURE 15. MANUAL HOSE HEAT POWER PACK (PART No. 17276), EXPLODED VIEW .....	36
FIGURE 16. DIGITAL HOSE HEAT POWER PACK (PART No. 17277), EXPLODED VIEW.....	38
FIGURE 17. FF-1600 ELECTRICAL SCHEMATIC (SD17000A-220), SHEET 1 OF 2 .....	40
FIGURE 18. FF-1600 ELECTRICAL SCHEMATIC (SD17000A-220), SHEET 2 OF 2 .....	41
FIGURE 19. FF-1600 ELECTRICAL SCHEMATIC (SD17000A-380), SHEET 1 OF 2 .....	42
FIGURE 20. FF-1600 ELECTRICAL SCHEMATIC (SD17000A-380), SHEET 2 OF 2 .....	43
FIGURE 21. FF-1600 ELECTRICAL SCHEMATIC (SD17000B-220), SHEET 1 OF 2 .....	46
FIGURE 22. FF-1600 ELECTRICAL SCHEMATIC (SD17000B-220), SHEET 2 OF 2.....	47
FIGURE 23. FF-1600 ELECTRICAL SCHEMATIC (SD17000B-380), SHEET 1 OF 2.....	48
FIGURE 24. FF-1600 ELECTRICAL SCHEMATIC (SD17000B-380), SHEET 2 OF 2.....	49

## LIST OF TABLES

TABLE 1. FF-1600 ASSEMBLY (PART No. 17000A-SIZE), PARTS .....	7
TABLE 2. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART No. 17650A-220/380), PARTS, SHEET 1 OF 3.....	9
TABLE 3. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART No. 17650A-220/380), PARTS, SHEET 2 OF 3 .....	11
TABLE 4. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART No. 17650A-220/380), PARTS, SHEET 3 OF 3 .....	13
TABLE 5. FF-1600 ASSEMBLY (PART No. 17000B-SIZE-DGT), PARTS.....	15
TABLE 6. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), PARTS, SHEET 1 OF 3 .....	17
TABLE 7. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), PARTS, SHEET 2 OF 3 .....	19
TABLE 8. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), PARTS, SHEET 3 OF 3 .....	21
TABLE 9. 16:1 RATIO AIR MOTOR (PART No. 17755), PARTS.....	23
TABLE 10. 10:1 RATIO AIR MOTOR (PART No. 17796), PARTS.....	25
TABLE 11. REVERSING SWITCH (PART No. 17745-10), PARTS.....	27
TABLE 12. AIR CONTROL SYSTEM (PART No. 17756), PARTS.....	29
TABLE 13. PRIMARY HEATERS (PART No. 18300), PARTS .....	31
TABLE 14. PROPORTIONING PUMP (PART No. 17400/17450-SIZE), PARTS .....	33
TABLE 15. SCHEDULE OF PARTS .....	35
TABLE 16. SCHEDULE OF PARTS .....	35
TABLE 17. MANUAL HOSE HEAT POWER PACK (PART No. 17276), PARTS.....	37
TABLE 18. DIGITAL HOSE HEAT POWER PACK (PART No. 17277), PARTS .....	39
TABLE 19. FF-1600 ELECTRICAL SCHEMATIC (SD17000A-220/380), PARTS .....	44
TABLE 20. FF-1600 ELECTRICAL SCHEMATIC (SD17000B-220/380), PARTS .....	50

---

## WARRANTY

---

Gusmer Corporation (Gusmer) provides a limited warranty to the original purchaser (Customer) of Gusmer manufactured parts and equipment (Product) against any defects in material or workmanship for a period of one year from the date of shipment from Gusmer facilities.

In the event Product is suspected to be defective in material or workmanship, it must be returned to Gusmer, freight prepaid. If Product is found to be defective in material or workmanship, as determined solely by Gusmer, Gusmer will issue full credit to Customer for the freight charges incurred in returning the defective Product, and either credit will be issued for the replacement cost of the Product or a replacement part will be forwarded no-charge, freight prepaid to Customer.

This warranty shall not apply to Product Gusmer finds to be defective resulting from: installation, use, maintenance, or procedures not accomplished in accordance with our instructions; normal wear; accident; negligence; alterations not authorized in writing by Gusmer; use of "look alike" parts not manufactured or supplied by Gusmer; or Product used in conjunction with any other manufacturer's pumping or proportioning equipment. Further, the terms and conditions of this warranty shall not apply to services or repairs made to Product by any third party not authorized in writing by Gusmer. For such Product, a written estimate will be submitted to Customer at a nominal service charge, itemizing the cost for repair. Disposition of Product will be done in accordance with the terms stated on the written estimate.

The warranty provisions applied to product that are not manufactured by Gusmer will be solely in accordance with the warranty provided by the original manufacturer of the product.

GUSMER MAKES NO WARRANTY WHATSOEVER AS TO THE MERCHANTABILITY OF, OR SUITABILITY FOR, ITS PRODUCT TO PERFORM ANY PARTICULAR PURPOSE. CREDIT FOR, OR REPLACEMENT OF, PRODUCT DEFECTIVE IN MATERIAL OR WORKMANSHIP SHALL CONSTITUTE COMPLETE FULFILLMENT OF GUSMER OBLIGATIONS TO CUSTOMER. NO OTHER WARRANTY, EXPRESS OR IMPLIED ON ANY PRODUCT IT MANUFACTURES AND/OR SELLS, WILL BE RECOGNIZED BY GUSMER UNLESS SAID WARRANTY IS IN WRITING AND APPROVED BY AN OFFICER OF GUSMER.

Under no circumstances shall Gusmer be liable for loss of prospective or speculative profits, or special, indirect, incidental or consequential damages. Further, Gusmer shall have no liability for any expenses including, but not limited to personal injury or property damage resulting from failure of performance of the product, use of the product, or application of the material dispensed through the product. Any information provided by Gusmer that is based on data received from a third source, or that pertains to product not manufactured by Gusmer, while believed to be accurate and reliable, is presented without guarantee, warranty, or responsibility of any kind, express or implied.

Gusmer through the sale, lease, or rental of Product in no way expresses or implies a license for the use of, nor encourages the infringement of any patents or licenses.

To insure proper validation of your warranty, please complete the warranty card and return it to Gusmer within two weeks of receipt of equipment.

Revised 11/12/98

---

# MODEL FF-1600 PROPORTIONING UNIT ASSEMBLIES

## FINAL ASSEMBLY, MANUAL HOSE HEAT (17000A-SIZE)

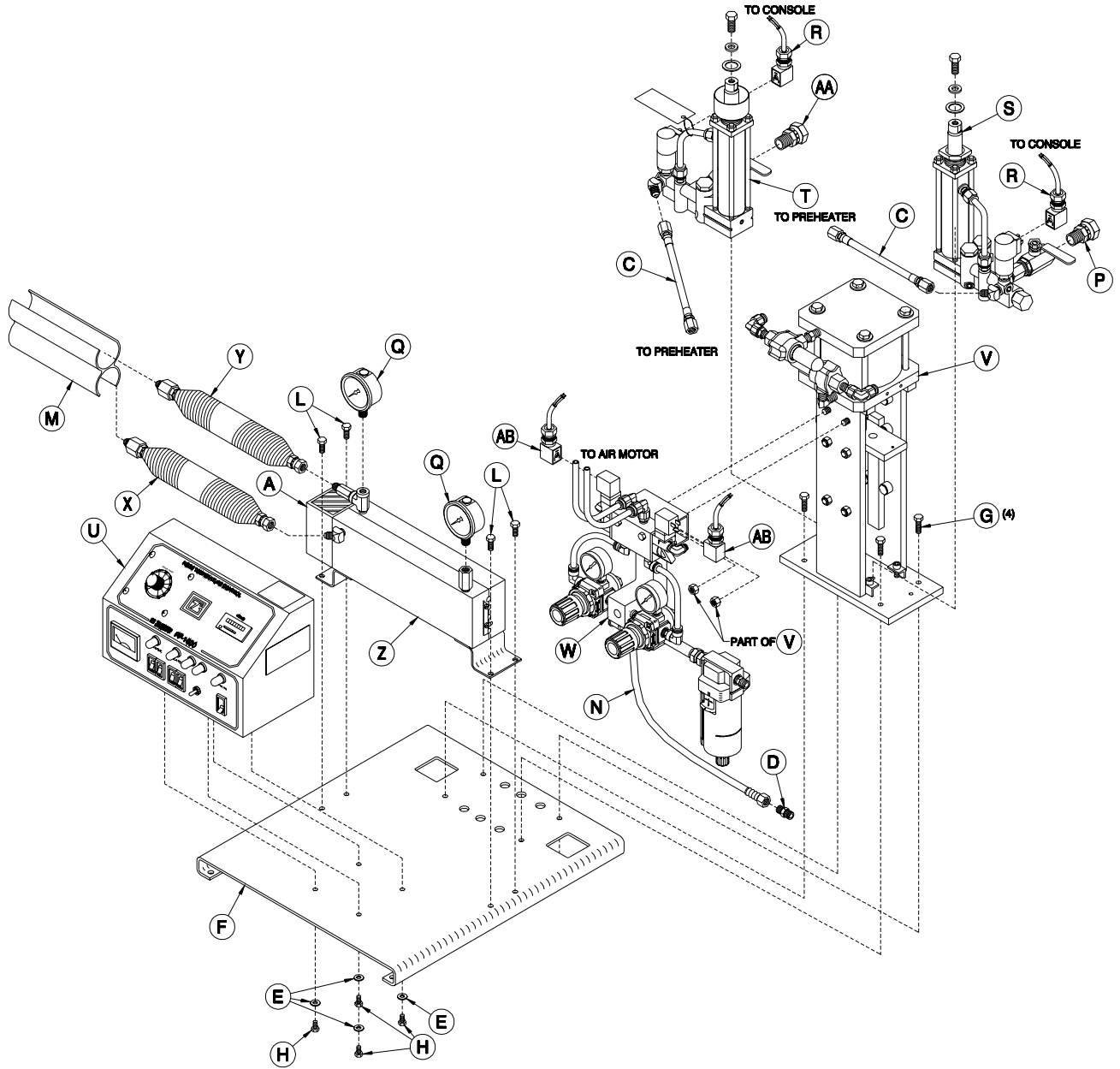


Figure 1. FF-1600 Assembly (Part No. 17000A-SIZE), Exploded View

TABLE 1. FF-1600 ASSEMBLY (PART NO. 17000A-SIZE), PARTS

Reference Letter	Part Number	Description	Quantity
A	0355B	Thermostat Cover Box	1
C	0372	Interconnect Hose	2
D	0561	Hex Nipple	1
E	0562-11-3	Flat Washer	4
F	0750A	Machine Base	1
G	0759	Hex Head Cap Screw	4
H	0760-3	Hex Head Cap Screw	4
L	1701-4	Hex Head Cap Screw	4
*M	5204	Electrical Isolator	1
*N	5270A-4	Air Hose	1
*P	10420	Swivel Union	1
Q	17001	0-3000 PSI Gauge	2
R	6690-16-76-2	DIN Connector	2
S	17400-SIZE	Resin Proportioning Pump Assembly	1
T	17450-SIZE	Iso Proportioning Pump Assembly	1
U	17650A-220	Electric Console (220V)	1
	17650A-380	Electric Console (380V)	1
V	17755	Air Motor Assembly	1
	17796	Air Motor Assembly (10:1 Ratio)	1
W	17756	Air Control System	1
*X	56273	R-Isolation Hose	1
*Y	56274	A-Isolation Hose	1
Z	18300	Primary Heater (Includes A)	1
*AA	OP179-6	Swivel Union	1
AB	8680-3-3	DIN Connector	2

\* Part of Accessory Package (AP17000), shown for reference only.

**ELECTRIC CONSOLE ASSEMBLY, MANUAL HOSE HEAT**

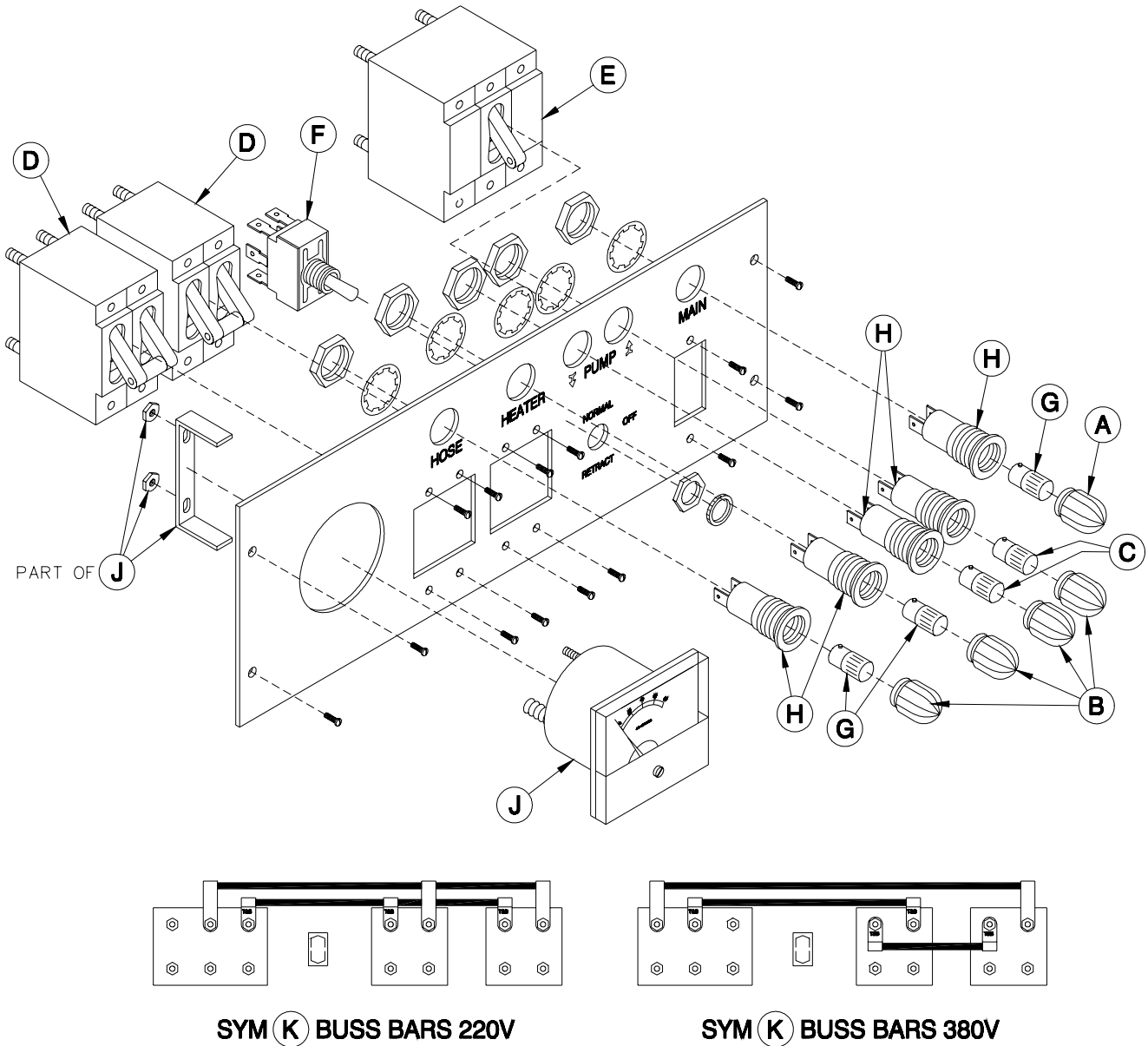


Figure 2. Electric Console, Manual Hose Heat (Part No. 17650A-220/380), Exploded View, Sheet 1 of 3



TABLE 2. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART NO. 17650A-220/380), PARTS, SHEET 1 OF 3

Reference Letter	Part Number	Description	Quantity
A	0656	White Lens	1
B	0660	Amber Lens	4
C	0662A	Incandescent Bulb	2
D	0692-1-25	25 AMP Circuit Breaker	2
E	6690-16-10	Switch	1
F	6690-16-6	Toggle Switch	1
G	6690-19-24	Bulb	3
H	6690-19-25	Light Base	5
J	5616-KIT	Ammeter	1
K	17650-5	Buss Bar (220V)	1
	17650-5-380	Buss Bar (380V)	1

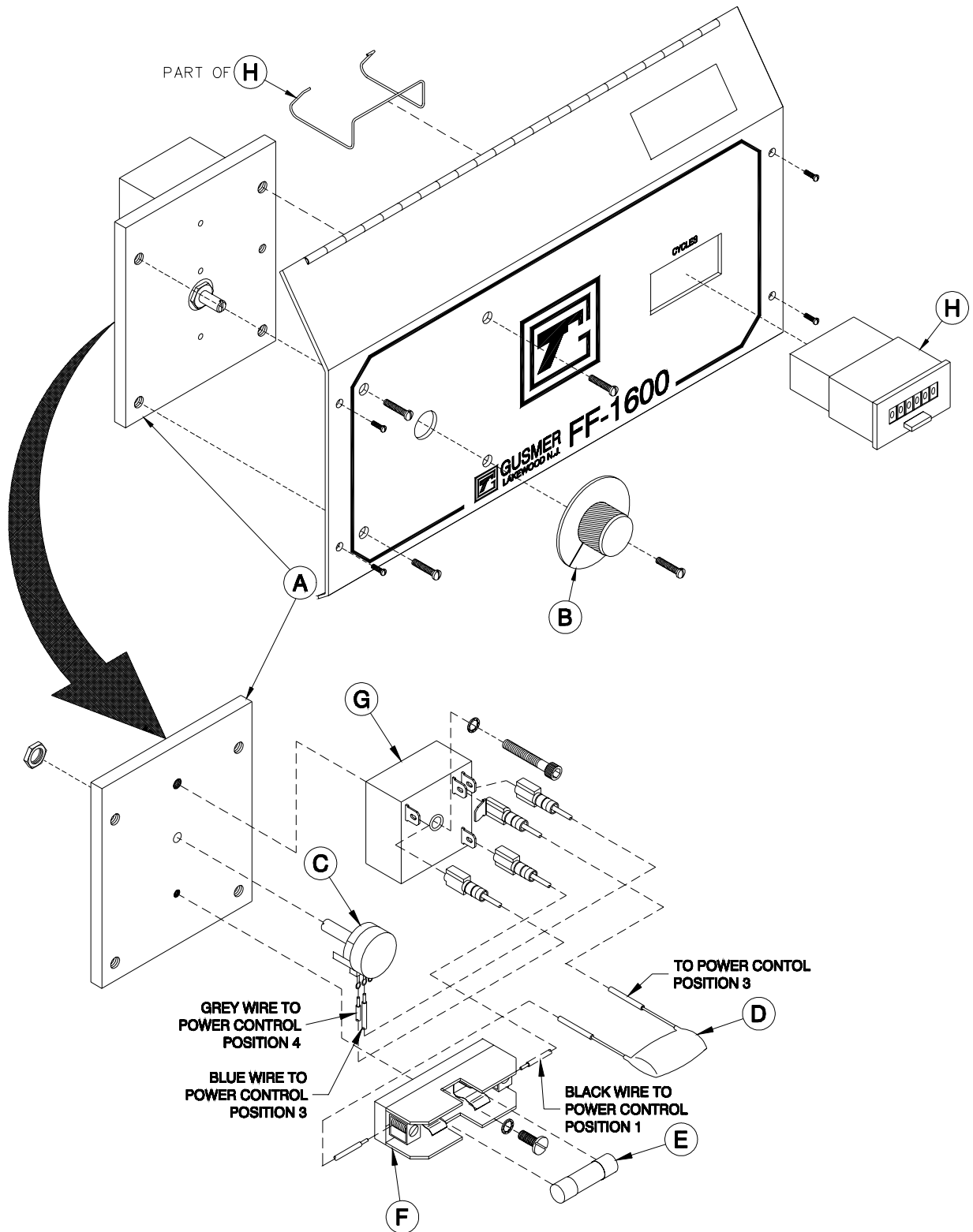


Figure 3. Electric Console, Manual Hose Heat (Part No. 17650A-220/380), Exploded View, Sheet 2 of 3

TABLE 3. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART NO. 17650A-220/380), PARTS, SHEET 2 OF 3

Reference Letter	Part Number	Description	Quantity
A	1662B	Heat Sink	1
B	17650-4	Knob	1
C	6690-5-17	Potentiometer	1
D	6690-21-4	Quencharc	1
E	6690-24-1	Fuse	1
F	6690-24-2	Fuse Block	1
G	6690-26-18	Phase Control	1
H	9651-6-2	Counter	1

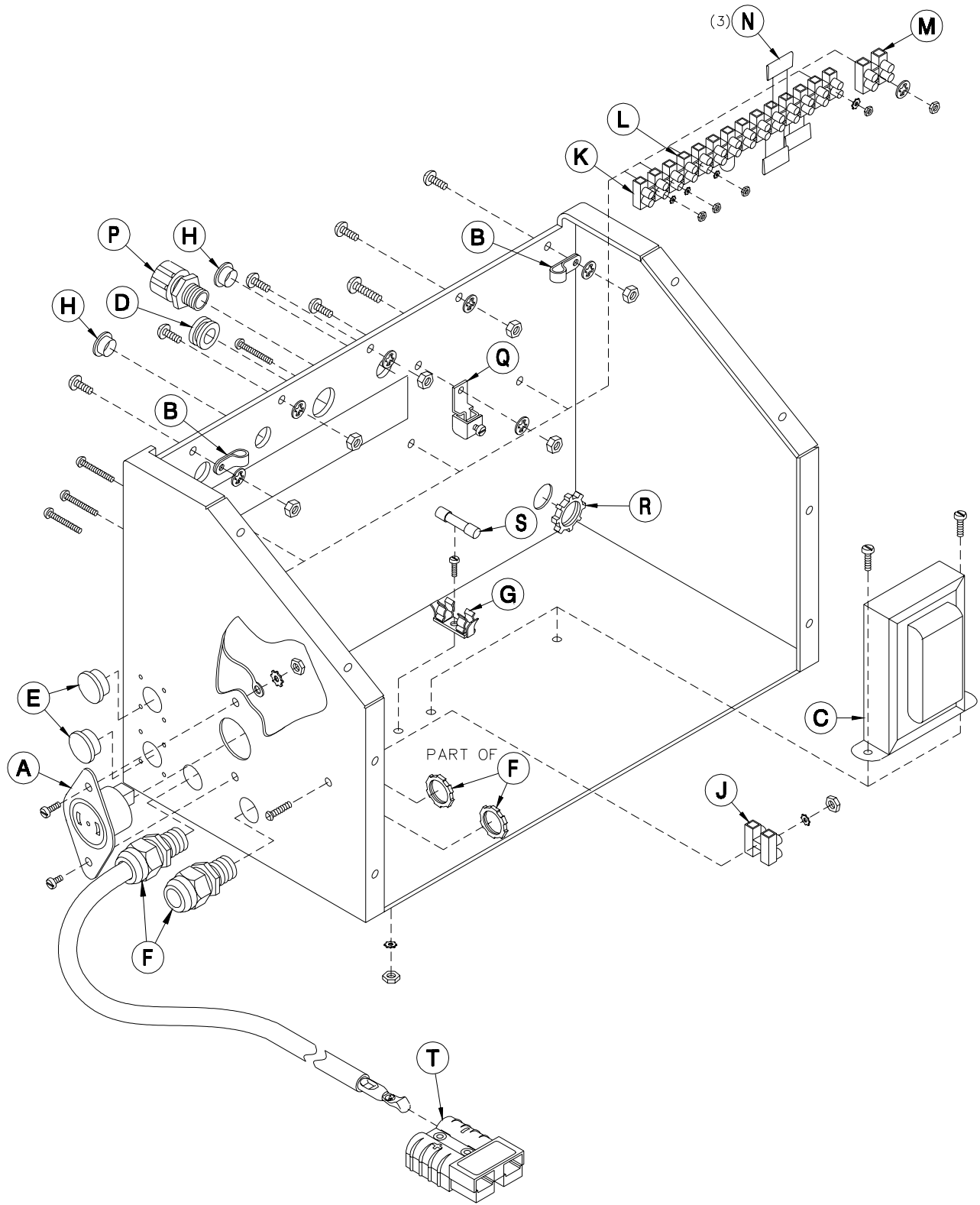
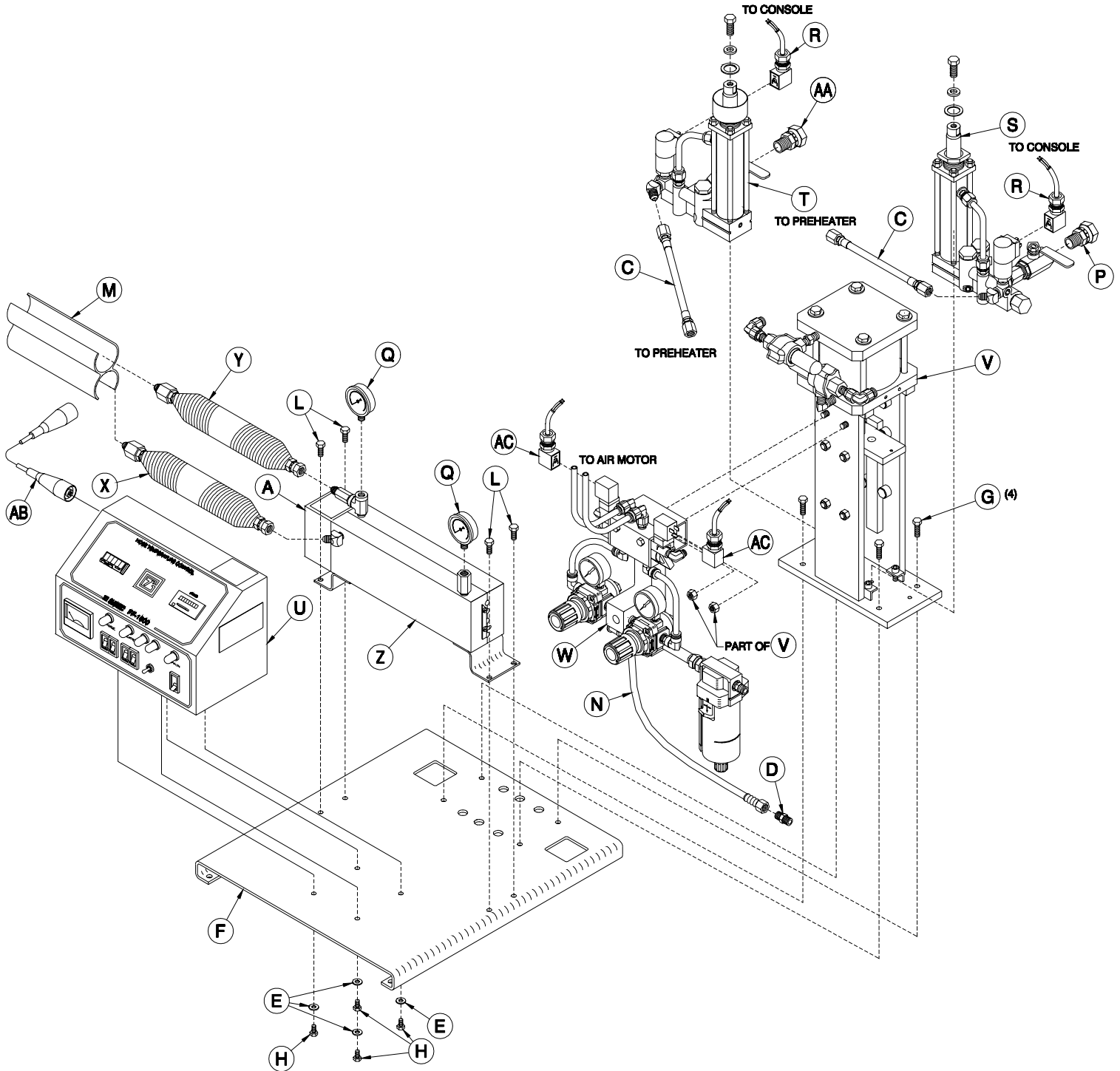


Figure 4. Electric Console, Manual Hose Heat (Part No. 17650A-220/380), Exploded View, Sheet 3 of 3

TABLE 4. ELECTRIC CONSOLE, MANUAL HOSE HEAT (PART NO. 17650A-220/380), PARTS, SHEET 3 OF 3

Reference Letter	Part Number	Description	Quantity
A	0670A-1-1	Socket	1
B	0681A	Cable Clamp	2
C	0689-1	Transformer	1
D	1701-16	Grommet	1
E	1704-2	Hole Plug	2
F	5621-136-105	Straight Connector	2
G	5653B	Fuse Holder	1
H	5703D-10	Bushing	2
J	6690-20-1-2	Terminal Block	1
K	6690-20-1-3	Terminal Block	1
L	6690-20-1-12	Terminal Block	1
M	6690-20-5-2	Main Terminal Block	1
N	6690-21-1	Quencharc	3
P	17650-1	Strain Relief	1
Q	17650-2	Terminal Lug	1
R	OP482-17-2	Locknut	1
S	OP5193-3-3	1 Amp Fuse	1
T	0684-2	Power-Lock™ Connector Housing	1

**FINAL ASSEMBLY, DIGITAL HOSE HEAT (17000B-SIZE-DGT)**



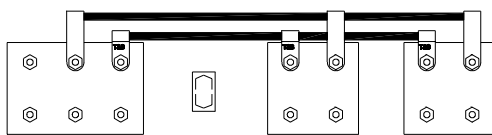
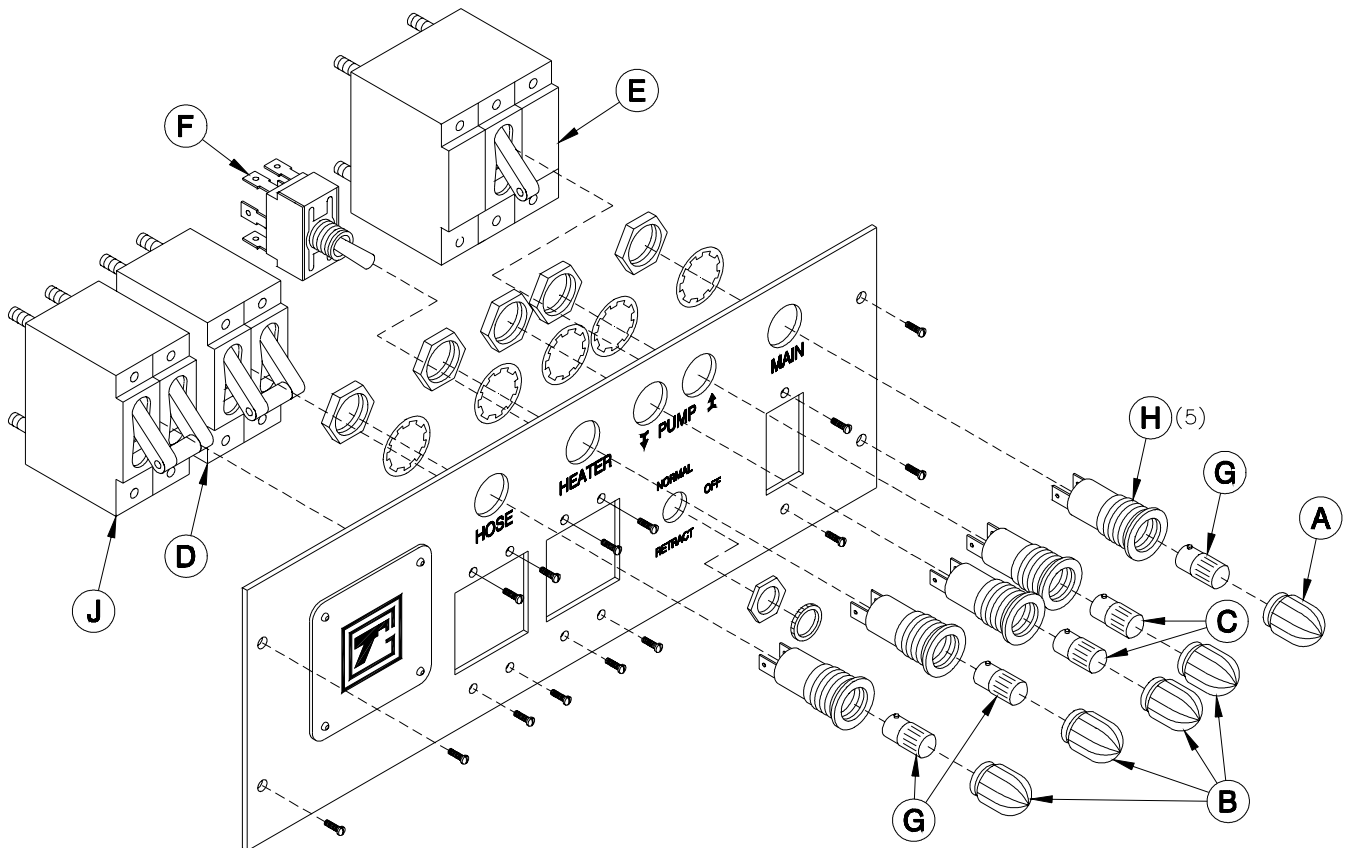
**Figure 5. FF-1600 Assembly (Part No. 17000B-SIZE-DGT), Exploded View**

TABLE 5. FF-1600 ASSEMBLY (PART No. 17000B-SIZE-DGT), PARTS

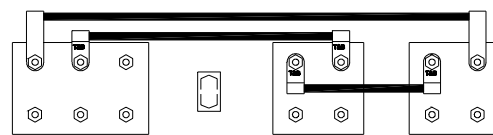
Reference Letter	Part Number	Description	Quantity
A	0355B	Thermostat Cover Box	1
C	0372	Interconnect Hose	2
D	0561	Hex Nipple	1
E	0562-11-3	Flat Washer	4
F	0750A	Machine Base	1
G	0759	Hex Head Cap Screw	4
H	0760-3	Hex Head Cap Screw	4
Not Shown	1257	JIC Cap	1
Not Shown	1258	JIC Cap	1
L	1701-4	Hex Head Cap Screw	4
*M	5204	Electrical Isolator	1
*N	5270A-4	Air Hose	1
*P	10420	Swivel Union	1
Q	17001	0-3000 PSI Gauge	2
R	6690-16-76-2	DIN Connector	2
S	17400-SIZE	Resin Proportioning Pump Assembly	1
T	17450-SIZE	Iso Proportioning Pump Assembly	1
U	17660B-220-DGT	Electric Console (220V)	1
	17660B-380-DGT	Electric Console (380V)	1
V	17755	Air Motor Assembly	1
	17796	Air Motor Assembly (10:1 Ratio)	1
W	17756	Air Control System	1
*X	56273	R-Isolation Hose	1
*Y	56274	A-Isolation Hose	1
Z	18300	Primary Heater (Includes A)	1
*AA	OP179-6	Swivel Union	1
*AB	20207-3	TSU Adapter	1
AC	8680-3-3	DIN Connector	2

\* Part of Accessory Package (API7000-DGT), shown for reference only.

**ELECTRIC CONSOLE ASSEMBLY, DIGITAL HOSE HEAT**



SYM (K) BUSS BARS 220V



SYM (K) BUSS BARS 380V

Figure 6. Electric Console, Digital Hose Heat (Part No. 17660B-220/380-DGT), Exploded View, Sheet 1 of 3



TABLE 6. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), PARTS, SHEET 1 OF 3

Reference Letter	Part Number	Description	Quantity
A	0656	White Lens	1
B	0660	Amber Lens	4
C	0662A	Incandescent Bulb	2
D	0692-1-25	25 AMP Circuit Breaker	1
E	6690-16-10	Switch	1
F	6690-16-6	Toggle Switch	1
G	6690-19-24	Bulb	3
H	6690-19-25	Light Base	5
J	6690-25-6	15 AMP Circuit Breaker	1
K	17650-5	Buss Bars (220V)	1
	17650-5-380	Buss Bars (380V)	1

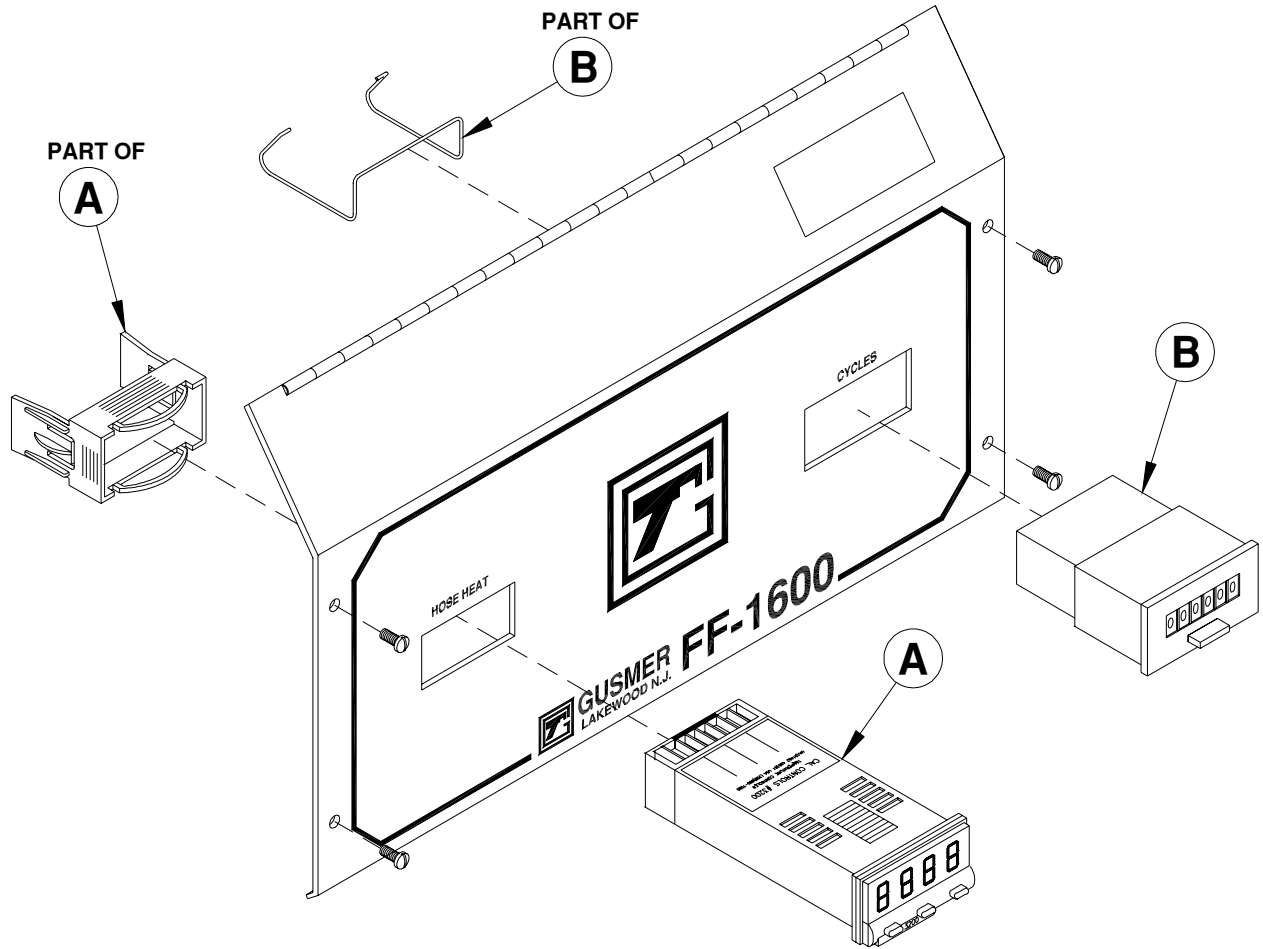


Figure 7. Electric Console, Digital Hose Heat (Part No. 17660B-220/380-DGT), Exploded View, Sheet 2 of 3

TABLE 7. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), PARTS, SHEET 2 OF 3

Reference Letter	Part Number	Description	Quantity
A	6690-26-17	Temperature Controller	1
B	9651-6-2	Counter	1

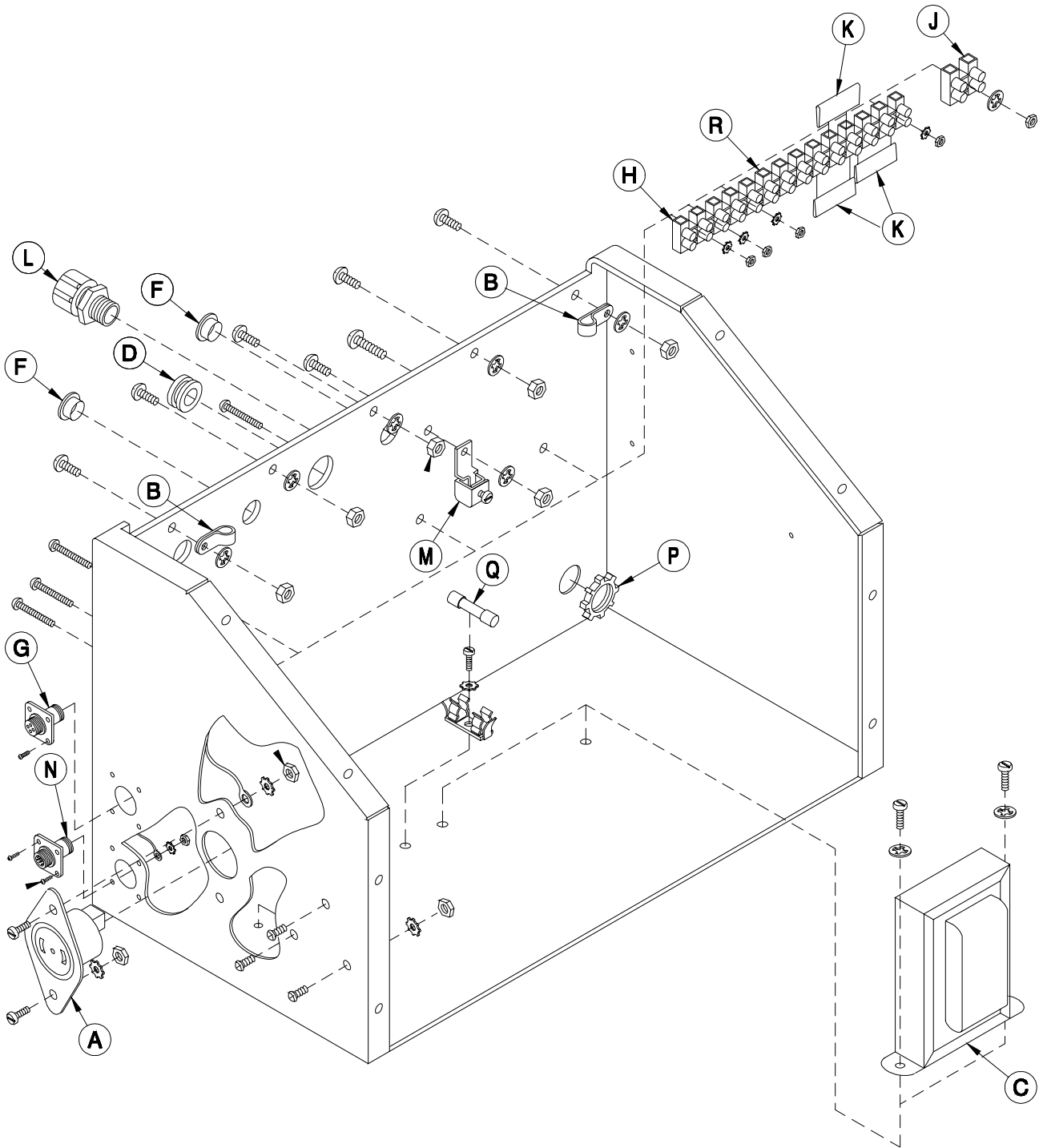


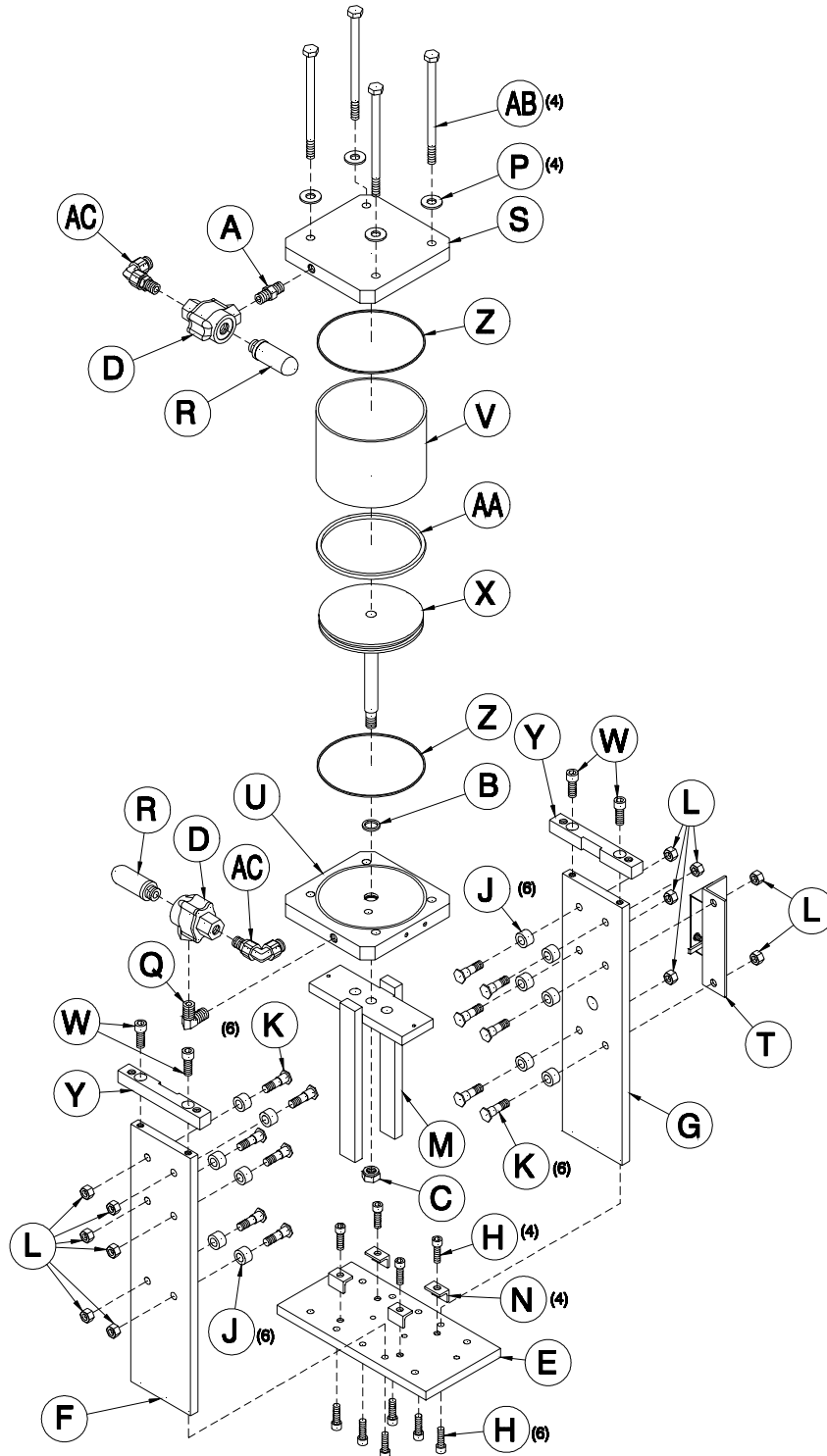
Figure 8. Electric Console, Digital Hose Heat (Part No. 17660B-220/380-DGT), Exploded View, Sheet 3 of 3

TABLE 8. ELECTRIC CONSOLE, DIGITAL HOSE HEAT (PART No. 17660B-220/380-DGT), PARTS, SHEET 3 OF 3

Reference Letter	Part Number	Description	Quantity
A	0670A-1-1	Socket	1
B	0681A	Cable Clamp	2
C	0689-1	Transformer	1
D	1701-16	Grommet	1
E	5653B	Fuse Holder	1
F	5703D-10	Bushing	2
G	6690-13-2-11-41	4 Ckt FE Pin Housing	1
H	6690-20-1-3	Terminal Block	1
J	6690-20-5-2	Main Terminal Block (220V)	1
	6690-20-5-4	Main Terminal Block (380V)	1
K	6690-21-1	Quencharc	3
L	17650-1	Strain Relief (220V)	1
	11651-4	Strain Relief (380V)	1
M	17650-2	Terminal Lug	1
N	17660-8	TSU Plug Assembly	1
P	OP482-17-2	Locknut (220V)	1
	11651-5	Locknut (380V)	1
Q	OP5193-3-3	1 Amp Fuse	1
R	6690-20-1-12	Terminal Block	1

**AIR MOTOR ASSEMBLIES**

**16:1 Ratio**



**Figure 9. 16:1 Ratio Air Motor (Part No. 17755), Exploded View**

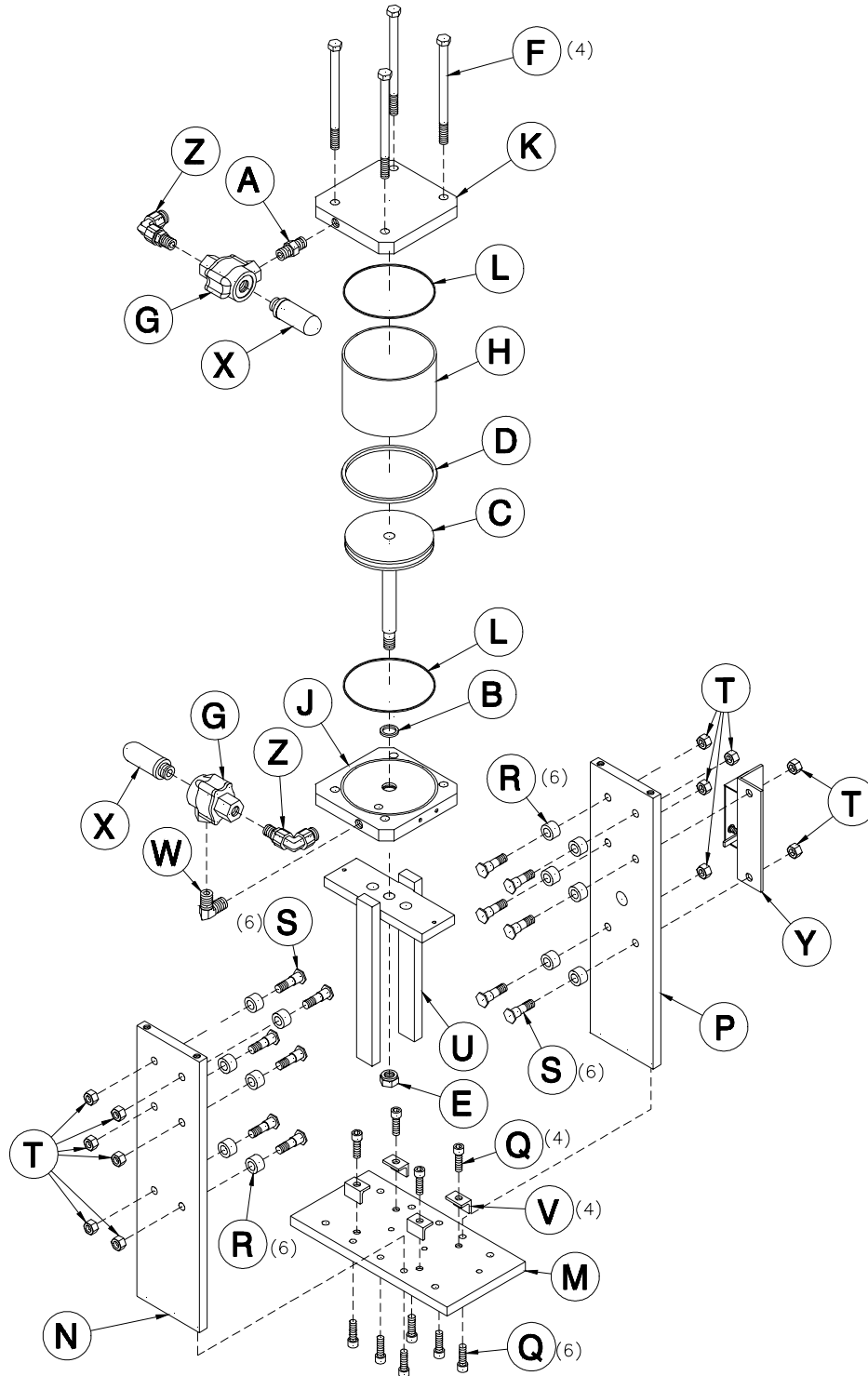
TABLE 9. 16:1 RATIO AIR MOTOR (PART NO. 17755), PARTS

Reference Letter	Part Number	Description	Quantity
A	0466A	Hex Nipple	1
B	0551	O-Ring	1
C	0557	Piston Rod Nut	1
D	0562-12	Exhaust Valve	2
E	0751	Base	1
F	0752	Air Cylinder Upright	1
G	0753	Air Cylinder Upright-SW Side	1
H	0754	Socket Head Cap Screw	10
J	0755-1	Bearings	12
K	0755-2	Cam Roller Stud	12
L	0756	Hex Nut	12
M	0757A	Pump Yoke	1
N	0765	Pump Mounting Bracket	4
P	1516A-3	Washer	4
Q	14501-20	Elbow	1
R	17002	Muffler	2
S	17745-1	Air Cylinder Top Plate	1
T	17745-10	Reversing Switch Assembly	1
U	17745-2	Air Cylinder Bottom Plate	1
V	17745-3	Air Cylinder	1
W	17745-4	Socket Head Cap Screw	4
X	17745-5	Air Piston W/Rod	1
Y	17745-6	Air Cylinder Adapter	2
Z	17745-7	O-Ring	2
AA	17745-8	O-Ring	1
AB	17745-9	Hex Head Cap Screw	4
AC	20042	Tube Fitting	2

**Air Cylinder Rebuild Kit** (Part # 17745-3-1)- Includes B, Z, AA, & Air Cylinder Lubricant (Part #553-2). Order as required from your local distributor.

**Exhaust Valve Repair Kit** (Part # 0562-12-1-H)- Order as required from your local distributor

**10:1 Ratio (Optional)**



**Figure 10. 10:1 Ratio Air Motor (Part No. 17796), Exploded View**



TABLE 10. 10:1 RATIO AIR MOTOR (PART NO. 17796), PARTS

Reference Letter	Part Number	Description	Quantity
A	0466A	Hex Nipple	1
B	0551	O-Ring	1
C	0555	Air Piston w/Rod	1
D	0556	O-Ring	1
E	0557	Piston Rod Nut	1
F	0558	Hex Head Cap Screw	4
G	0562-12	Exhaust Valve	2
H	0746-1	Air Cylinder	1
J	0746-2	Air Cylinder bottom Plate	1
K	0746-3	Air Cylinder Top Plate	1
L	0746-4	O-Ring	2
M	0751	Base	1
N	0752	Air Cylinder Upright	1
P	0753	Air Cylinder Upright-SW Side	1
Q	0754	Socket Head Cap Screw	10
R	0755-1	Bearings	12
S	0755-2	Cam Roller Stud	12
T	0756	Hex Nut	12
U	0757A	Pump Yoke	1
V	0765	Pump Mounting Bracket	4
W	14501-20	Elbow	1
X	17002	Muffler	2
Y	17745-10	Reversing Switch Assembly	1
Z	20042	Tube Fitting	2

**Air Cylinder Rebuild Kit** (Part # 746-1-1)- Includes B, D, L, & Air Cylinder Lubricant (Part #553-2). Order as required from your local distributor.

**Exhaust Valve Repair Kit** (Part # 0562-12-1-H)- Order as required from your local distributor.

### REVERSING SWITCH ASSEMBLY

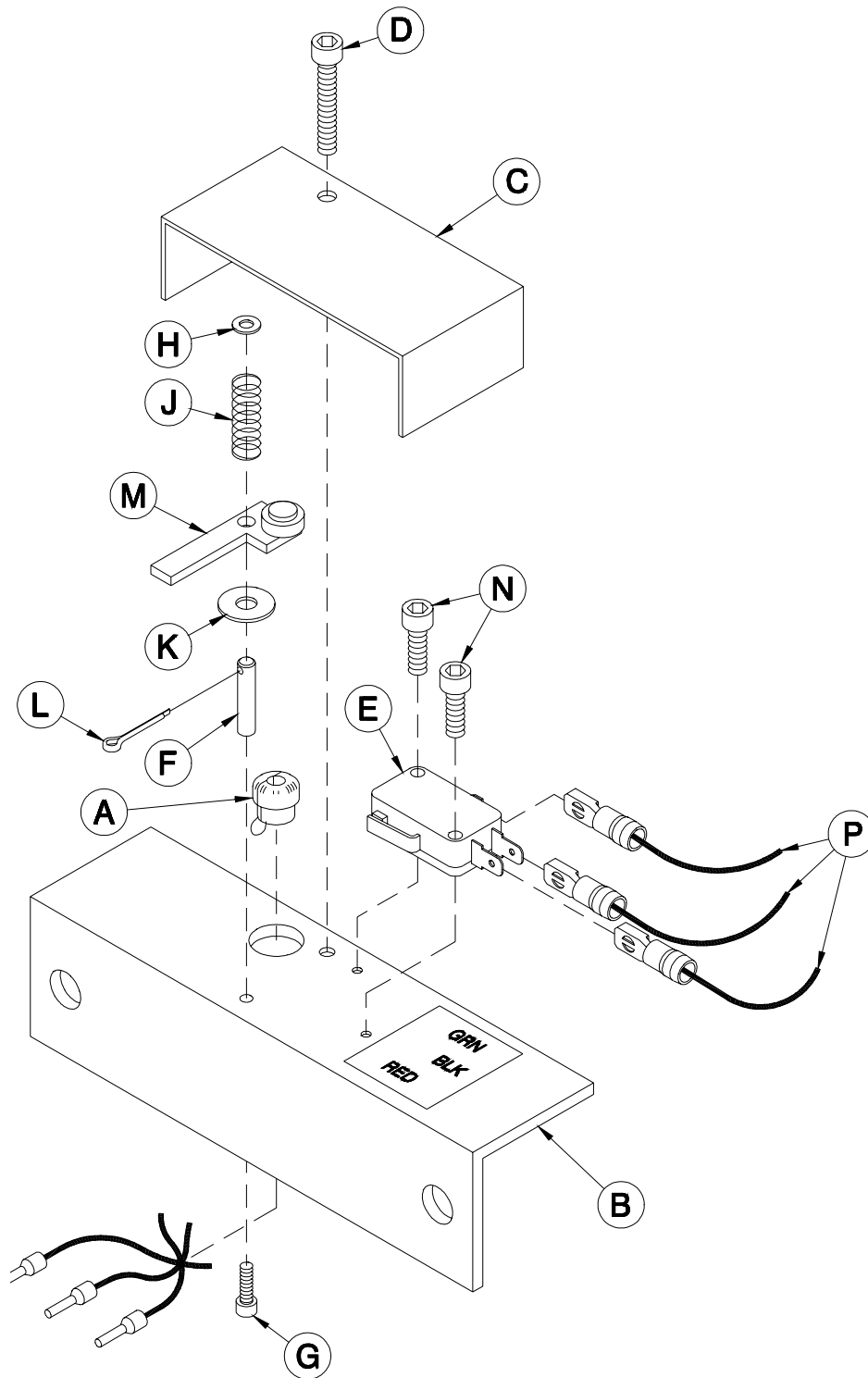
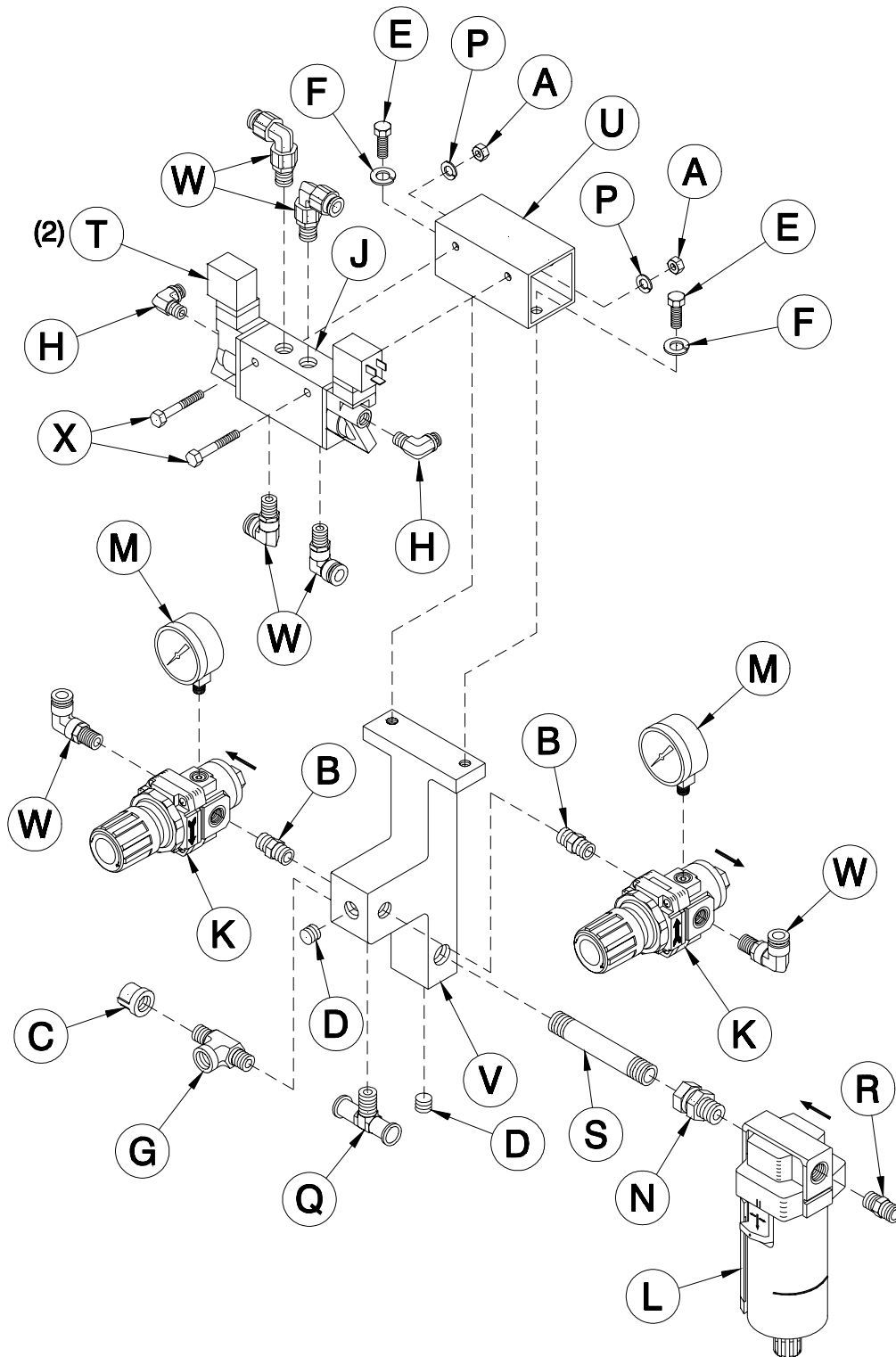


Figure 11. Reversing Switch (Part No17745-10), Exploded View

TABLE 11. REVERSING SWITCH (PART NO. 17745-10), PARTS

Reference Letter	Part Number	Description	Quantity
A	0364	Bushing	1
B	0577B-1	Reversing Switch Bracket (Includes N, F, & G)	1
C	0577-2	Reversing Switch Cover Box	1
D	0577-3	Socket Head Cap Screw	1
E	0578A	Reversing Switch	1
F	0579-2	Pivot Arm	1
G	0579-3	Socket Head Cap Screw	1
H	0579-4	Flat Washer	1
J	0579-5	Spring	1
K	0579-6	Fiber Washer	1
L	0579-7	Cotter Pin	1
M	0579A-1	Reversing Switch Lever	1
N	9577-10	Socket Head Cap Screw	2
P	17745-10-1	Reversing Switch Harness	1

**AIR CONTROL SYSTEM ASSEMBLY**



**Figure 12. Air Control System (Part No. 17756), Exploded View**

TABLE 12. AIR CONTROL SYSTEM (PART NO. 17756), PARTS

Reference Letter	Part Number	Description	Quantity
A	0385-4	Hex Nut	2
B	0561	Hex Nipple	2
C	0575	Pipe Cap	1
D	0576	Pipe Plug	2
E	1701-4	Hex Head Cap Screw	2
F	5504-3	Helical Lock Washer	2
G	6304-21	Branch Tee	1
H	6306-3	Tube Fitting	2
J	6311-109	Valve (Includes 17756-2-24)	1
K	6311-124	Regulator	2
L	6312-26	Air Filter	1
M	6314-31	Gauge	2
N	9457	Swivel Union	1
P	9758	Lockwasher	2
Q	17746-5	Pipe Tee	1
R	17746-7	Hex Nipple	1
S	17746-12	Pipe Nipple	1
T	17756-2-24	Coil	2
U	17756-4	Mounting Bracket	1
V	17756-7	Air Manifold	1
W	20042	Tube Fitting	6
X	IP1119	Hex Head Cap Screw	2
Not Shown	8680-3-2	Din Connector	2

**Spool Replacement Kit** (Part #17756-2-1)- Order as required from your local distributor.

**Seal Kit** (Part #17756-2-3)- Order as required from your local distributor.

**Valve Modification/Rebuild Kit** (Part #6311-109-1)- Two required per valve assembly. Spool Assembly not included. Order as required from your local distributor.

**Regulator Rebuild Kit** (Part #MK6311-124-1)- Order as required from your local distributor.

**Filter Rebuild Kit** (Part #MK6312-26-1)- Order as required from your local distributor.

**PRIMARY HEATER ASSEMBLY**

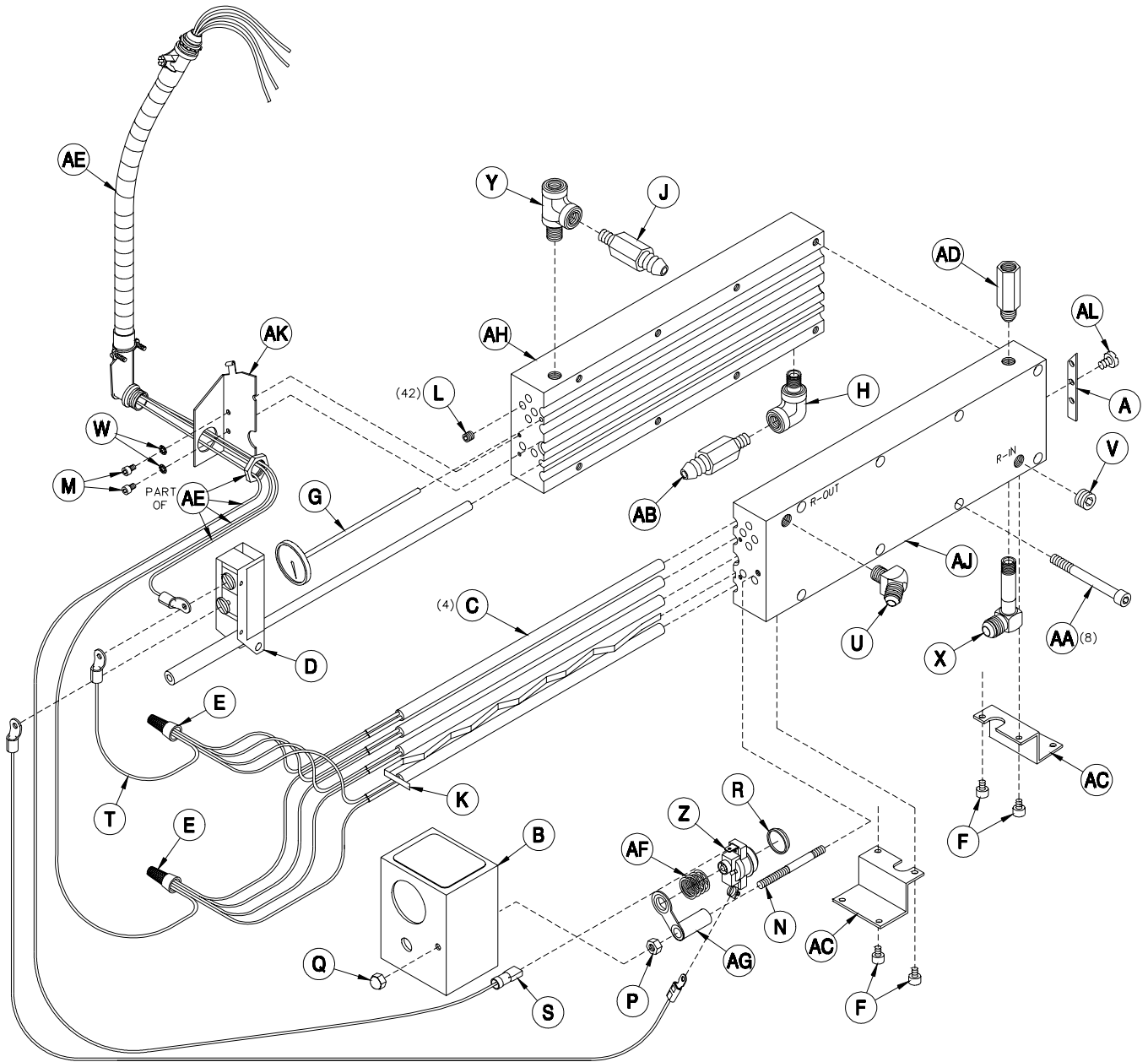


Figure 13. Primary Heater (Part No. 18300), Exploded View

TABLE 13. PRIMARY HEATERS (PART NO. 18300), PARTS

Reference Letter	Part Number	Description	Quantity
A	0351B-1	Stop	1
B	0355B	Thermostat Cover Box	1
C	0361-1250	Heating Element	4
D	0362C	Thermostat	1
E	0363A	Insulating Wire Nut	2
F	0371	Socket Head Cap Screw	4
G	0374	Dial Thermometer	1
H	0375B-2	Street Elbow	1
J	0375C-3	Hose Nipple	1
K	0376	Leaf Spring	1
L	0377	Pipe Plug	42
M	0379-2	Socket Head Cap Screw	2
N	0385-3	Threaded Stud	1
P	0385-4	Hex Nut	1
Q	0385-5	Acorn Nut	1
R	0385-6	Heat Transfer Plate	1
S	0385-7A	Wire Harness	1
T	0386	Firerod Harness	1
U	0465	Hose Elbow	1
V	0576	Pipe Plug	1
W	0651A-10	Lockwasher	2
X	1323	Long Male Elbow	1
Y	6465	Pipe Tee	1
Z	6690-7-29	Thermal Limit Switch	1
AA*	9463	Socket Head Cap Screw	8
AB	10350-1	Extended Hose Nipple	1
AC	10356	Bracket	2
AD	17357	Bushing	1
AE	17365	Heater Wire Harness	1
AF	17385-1	Wave Spring	1
AG	17385-2	Mounting Bracket	1
AH	56350-1-1	A-Primary Heater Half ( <i>Includes L</i> )	1
AJ	56300-1-1	R-Primary Heater Half ( <i>Includes L &amp; V</i> )	1
AK	56379-1	Thermostat Mounting Bracket	1
AL	OP168B-1-2	Pan Head Machine Screw	1

\* Torque Specifications: 87 Inch Pounds

**PROPORTIONING PUMP ASSEMBLY**

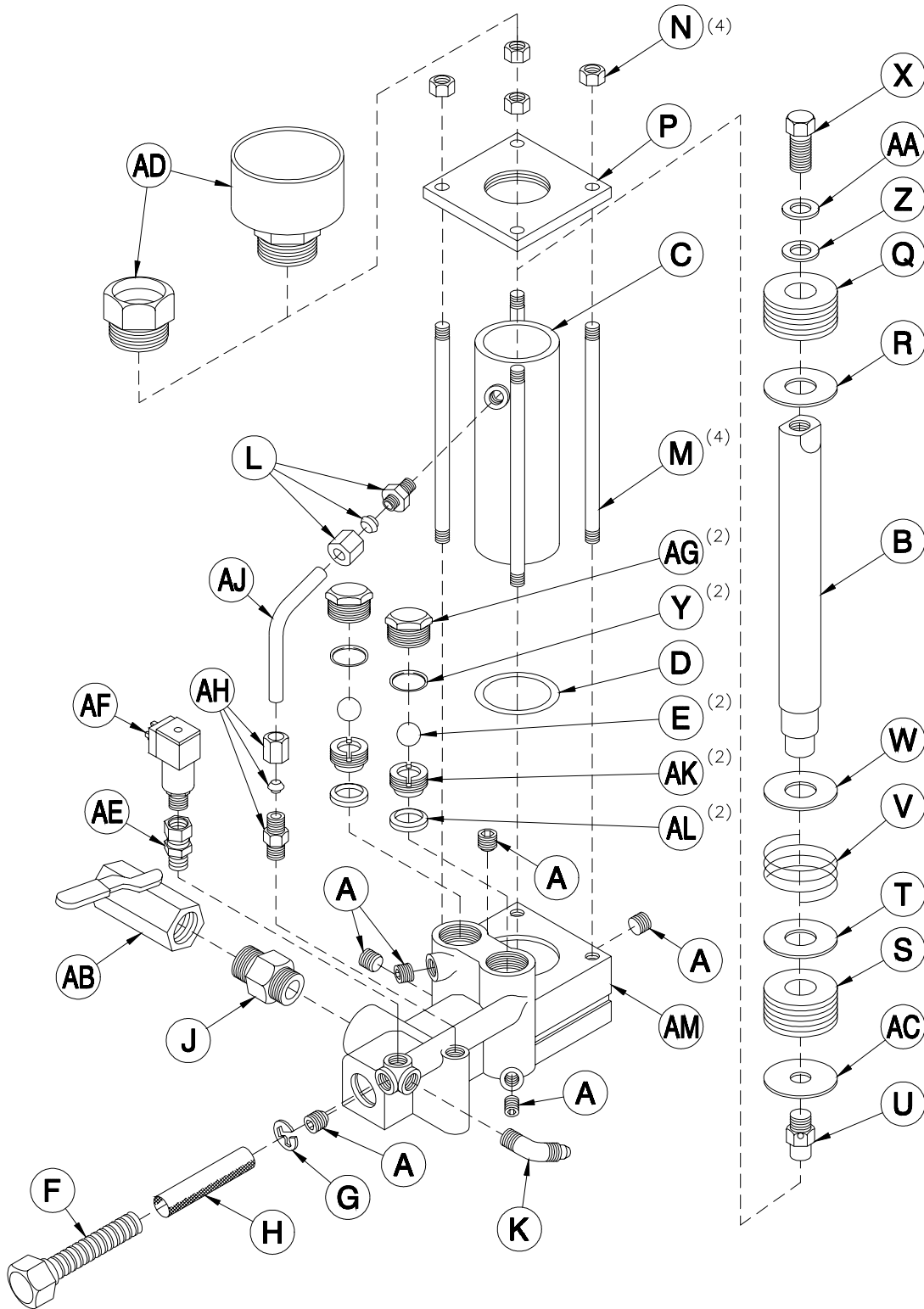


Figure 14. Proportioning Pump (Part No. 17400/17450-SIZE), Exploded View



TABLE 14. PROPORTIONING PUMP (PART NO. 17400/17450-SIZE), PARTS

Reference Letter	Part Number	Description	Quantity
A	0377	Pipe Plug	6
B	See Schedule	Pump Piston Rod	1
C	See Schedule	Pump Cylinder	1
D	0453	O-Ring	1
E	0455	Valve Ball	2
F	0460	Screen Screw	1
G	0461	Snap Ring	1
H	0462	Pump Screen	1
J	0463	Hex Nipple	1
K	0465	Hose Elbow	1
L	0470	Tube Nipple	1
M	56427	Tie Rod	4
N	0213-1	Hex Nut	4
P	0474	Cylinder Top	1
Q	See Schedule	Packing Set	1
R	See Schedule	Packing Support Washer	1
S	See Schedule	Packing Set	1
T	See Schedule	Packing Support Washer	1
U	See Schedule	Packing Retainer Bolt	1
V	See Schedule	Conical Spring	1
W	See Schedule	Spring Retainer Washer	1
X	See Schedule	Hex Head Cap Screw	1
Y	0485	O-Ring	2
Z	See Schedule	Washer	1
AA	See Schedule	Washer	1
AB	0487A	Ball Valve	1
AC	See Schedule	Packing Retainer Washer	1
AD	See Schedule	R-Packing Nut	1
	See Schedule	A-Packing Nut w/Lube Cup	1
AE	0562-15	Swivel Union	1
AF	6690-16-161	Pressure Switch	1
AG	17402	Check Valve Retainer	2
AH	17404	Tube Fitting	1
AJ	17405	Crossover Tube w/Ferrule	1
AK	17406	Check Valve Seat	2
AL	17407	Check Valve Seal	2
AM	17428	Resin Pump Base (Includes A)	1
	17478	Iso Pump Base (Includes A)	1



TABLE 15. SCHEDULE OF PARTS

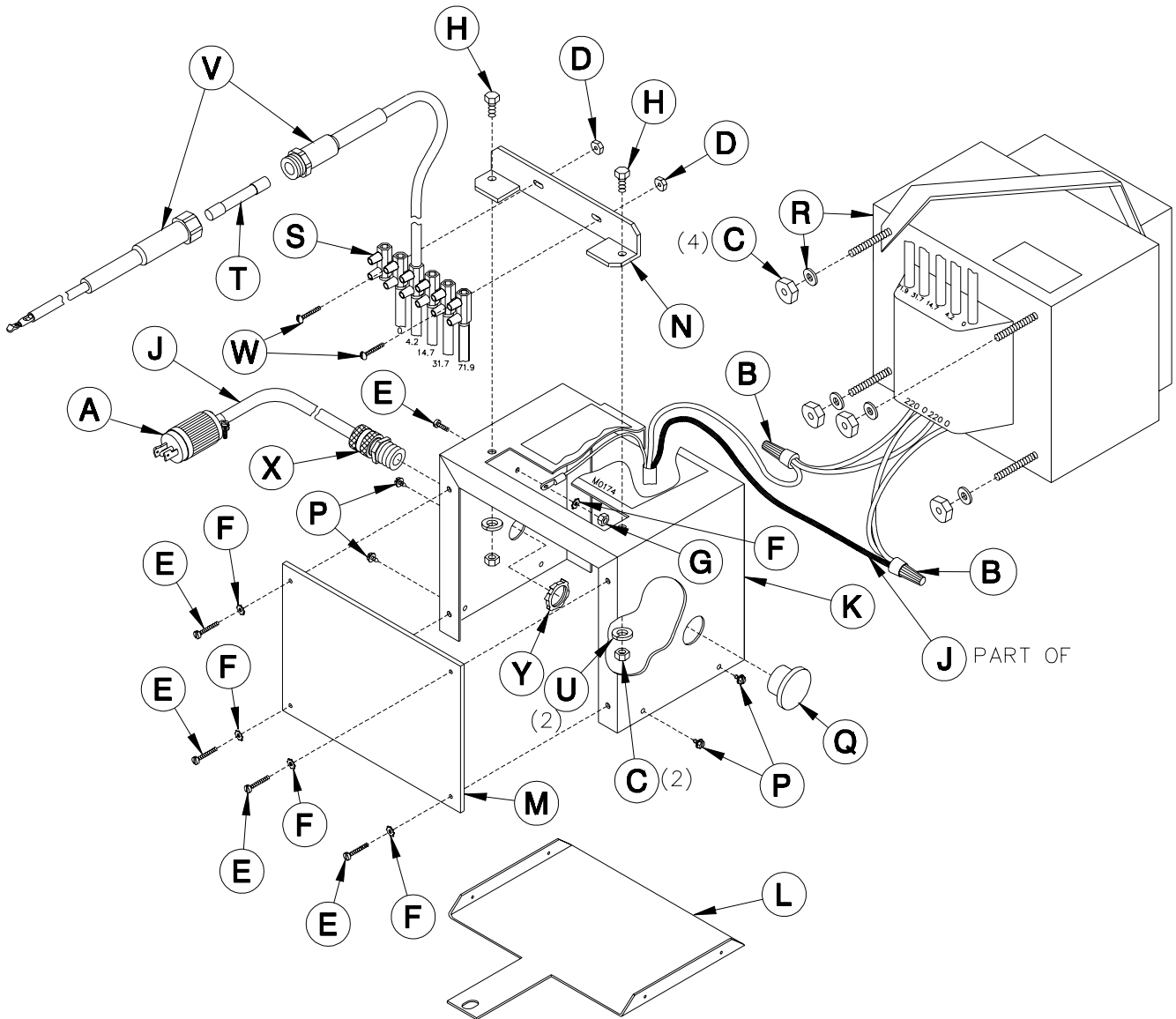
Reference Letter	Pump Size				
	15	19	22	24	30
<b>B</b>	0451A-15	0451A-19	0451A-22	0451A-24	0451A-30
<b>C</b>	0452B-15	0452B-19	0452B-22	0452B-24	0452B-30
<b>Q</b>	0476-15	0476-19	0476-22	0476-24	0476-30
<b>R</b>	0477-15	0477-19	0477-22	0477-24	0477-30
<b>S</b>	0478-15	0478-19	0478-22	0478-24	0476-19
<b>T</b>	0479-15	0479-19	0479-22	0479-24	0479-30
<b>U</b>	0480D-22/15	0480D-22/15	0480D-22/15	0480D-30/24	0480D-30/24
<b>V</b>	0481-15	0481-22/19	0481-22/19	0481-24	0481-30
<b>W</b>	0482-15	0482-19	0482-22	0482-24	0482-30
<b>X</b>	0483-5/16	0483-5/16	0483-5/16	0483-3/8	0483-3/8
<b>Z</b>	0486-5/16	0486-5/16	0486-5/16	0486-3/8	0486-3/8
<b>AA</b>	0486-5/16	0486-5/16	0486-5/16	0486-3/8	Not Used
<b>AC</b>	0488-15	0488-19	0488-22	0488-24	0488-30
<b>AD</b>	0475-15 0489-15	0475-19 0489-19	0475-22 0489-22	0475-24 0489-24	0475-30 0489-30

TABLE 16. SCHEDULE OF PARTS

Reference Letter	Pump Size					
	40	44	48	52	56	60
<b>B</b>	0451A-40	0451A-44	0451A-48	0451A-52	0451A-56	0451A-60
<b>C</b>	0452B-40	0452B-44	0452B-48	0452B-52	0452B-56	0452B-60
<b>Q</b>	0476-40	0476-44	0476-48	0476-52	0476-56	0476-60
<b>R</b>	0477-40	0477-44	0477-48	0477-52	0477-56	0477-60
<b>S</b>	0478-40	0478-44	0478-48	0478-52	0478-56	0478A-60
<b>T</b>	0479-40	0479-44	0479-48	0479-52	0479-56	0479-60
<b>U</b>	0480D-60/40	0480D-60/40	0480D-60/40	0480D-60/40	0480D-60/40	0480D-60/40
<b>V</b>	0481-44/40	0481-22/44	0481-60/48	0481-60/48	0481-60/48	0481-60/48
<b>W</b>	0482-40	0482-44	0482-48	0482-52	0482-56	0482-60
<b>X</b>	0483-7/16	0483-7/16	0483-7/16	0483-7/16	0483-7/16	0483-7/16
<b>Z</b>	0486-7/16	0486-7/16	0486-7/16	0486-7/16	0486-7/16	0486-7/16
<b>AA</b>	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
<b>AC</b>	0488-40	0488-44	0488-48	0488-52	0488-56	0488-60
<b>AD</b>	0475-40 0489-40	0475-44 0489-44	0475-48 0489-48	0475-52 0489-52	0475-56 0489-56	0475-60 0489-60

**HOSE HEAT POWER PACK ASSEMBLIES**

**Manual Hose Heat**

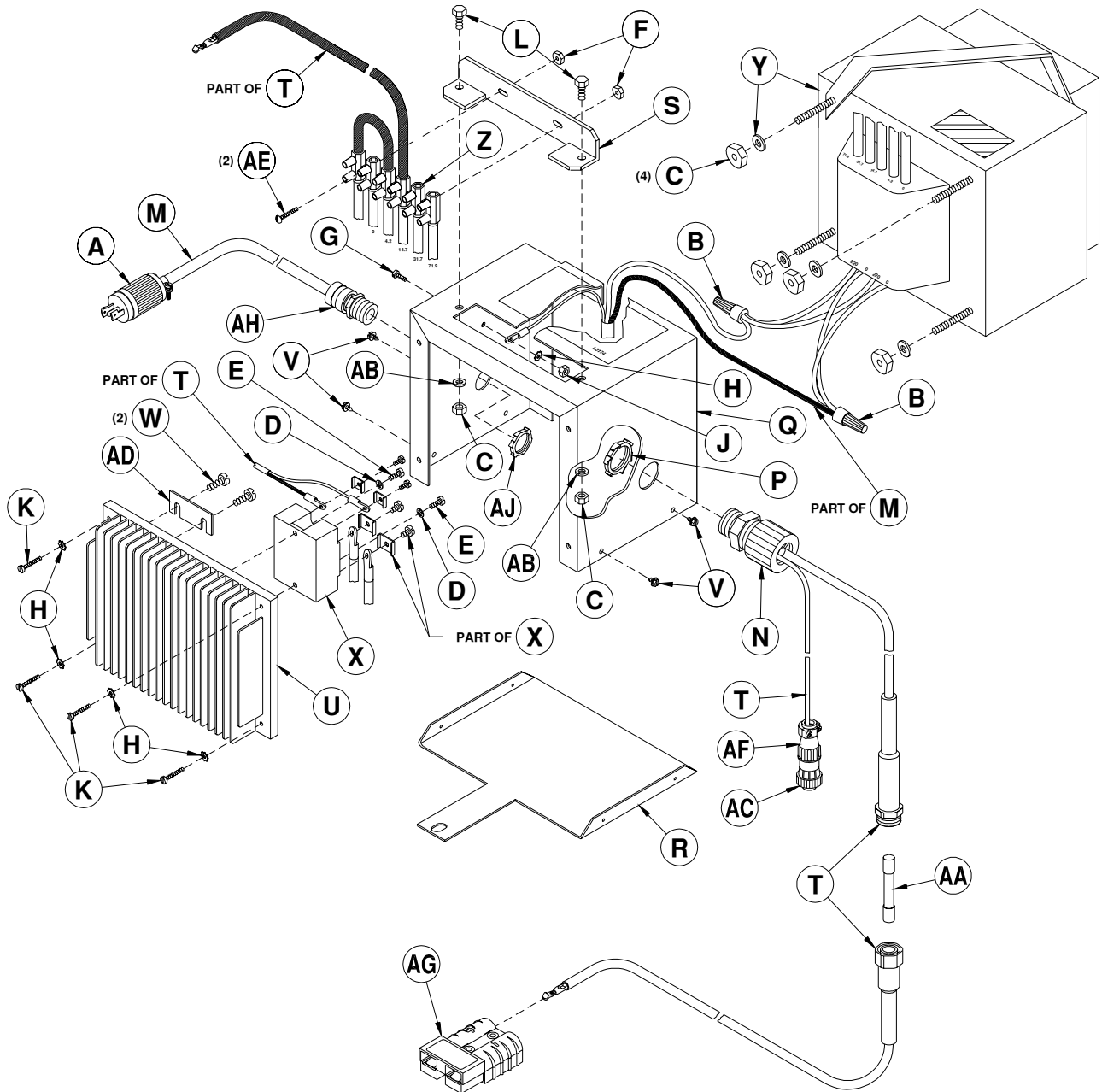


**Figure 15. Manual Hose Heat Power Pack (Part No. 17276), Exploded View**

TABLE 17. MANUAL HOSE HEAT POWER PACK (PART NO. 17276), PARTS

Reference Letter	Part Number	Description	Quantity
A	0251-1	Plug	1
B	0363A	Wire Nut	2
C	0385-4	Hex Nut	6
D	0651A-9	Hex Nut	2
E	0655-2	Pan Head Machine Screw	5
F	0655-4	Lockwasher	5
G	0668-3	Hex Nut	1
H	0760-3	Hex Head Cap Screw	2
J	1275B-2	Input (Power) Wire Harness (Includes A)	1
K	1277-1	Transformer Cover Box	1
L	1277-2	Bottom Cover	1
M	1277-3	Front Cover	1
N	1277-4	Terminal Block Mounting Bracket.	1
P	1615C-4	Sheet Metal Screw	4
Q	1704-5	Hole Plug	1
R	6690-15-5	Transformer	1
S	6690-20-5-6	Terminal Block	1
T	6690-24-14	50 AMP Fuse	2
U	9758	Helical Lockwasher	2
V	17276-1	Hose Conn. Lead	1
W	60302	Round Head Machine Screw	2
X	OP482-17-1	Bushing	1
Y	OP482-17-2	Locknut	1

**Digital Hose Heat**



**Figure 16. Digital Hose Heat Power Pack (Part No 17277), Exploded View**

TABLE 18. DIGITAL HOSE HEAT POWER PACK (PART NO. 17277), PARTS

Reference Letter	Part Number	Description	Quantity
A	0251-1	Plug	1
B	0363A	Insulating Wire Nut	2
C	0385-4	Hex Nut	6
D	0651A-10	Lockwasher	2
E	0651A-8	Pan Head Machine Screw	2
F	0651A-9	Hex Nut	2
G	0655-2	Pan Head Machine Screw	1
H	0655-4	Lockwasher	5
J	0668-3	Hex Nut	1
K	0698-3	Pan Head Machine Screw	4
L	0760-3	Hex Head Cap Screw	2
M	1275B-2	Input (Power) Wire Harness	1
N	1275C-1-2-1	Strain Relief	1
P	1275C-1-2-2	Locknut	1
Q	1277-1	Transformer Cover Box	1
R	1277-2	Bottom Cover	1
S	1277-4	Terminal Block Mounting Bracket	1
T	17277-1	Transformer Wire Harness (Includes AC, AF)	1
U	1278-2	Heat Sink	1
V	1615C-4	Sheet Metal Screw	4
W	4605-3	Pan Head Machine Screw	2
X	6690-1-46	Solid State Relay	1
Y	6690-15-5	Transformer	1
Z	6690-20-5-6	Terminal Block	1
AA	6690-24-14	50 AMP Fuse	2
AB	9758	Lockwasher	2
AC	6690-13-3-11-41	4 CKT Ma Pin Plug	1
AD	14667	Terminal Jumper	1
AE	60302	Round Head Machine Screw	2
AF	6690-13-4-11	Cable Housing	1
AG	0684-2	Power-Lock™ Connector Housing	1
AH	OP482-17-1	Bushing	1
AJ	OP482-17-2	Locknut	1

# ELECTRICAL SCHEMATIC DIAGRAMS

## MANUAL HOSE HEAT SCHEMATIC DIAGRAMS

220V Single Phase 50/60Hz

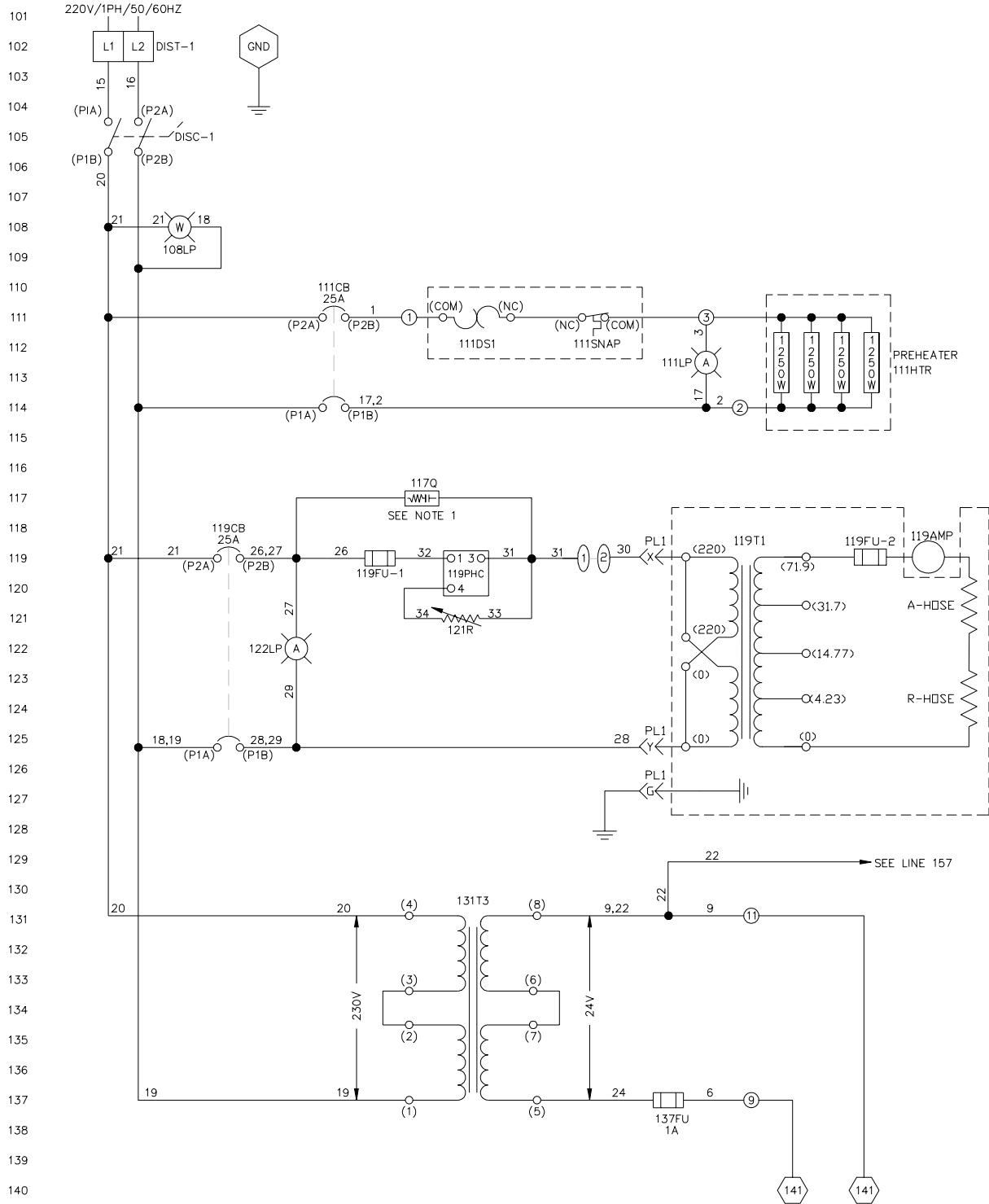


Figure 17. FF-1600 Electrical Schematic (SD17000A-220), Sheet 1 of 2



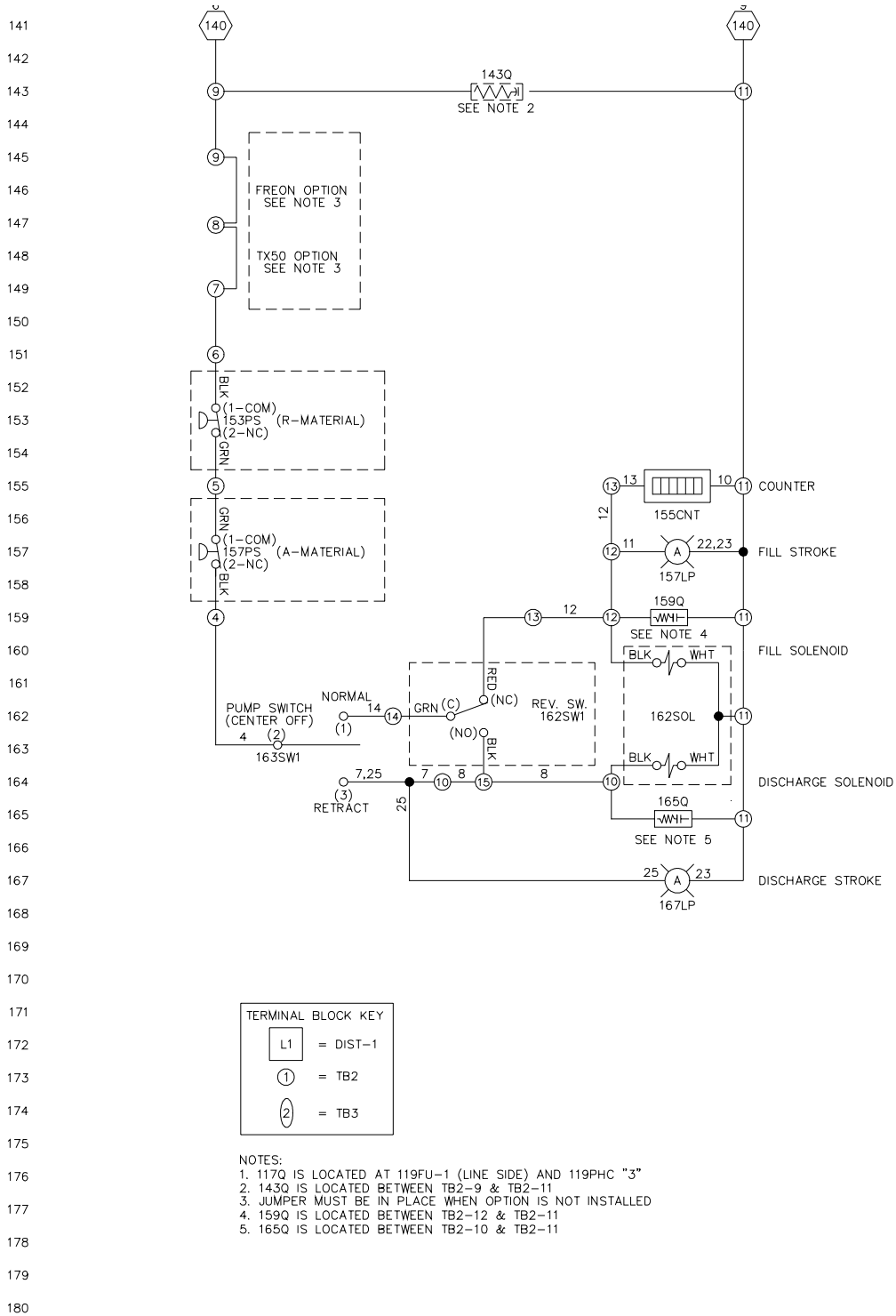
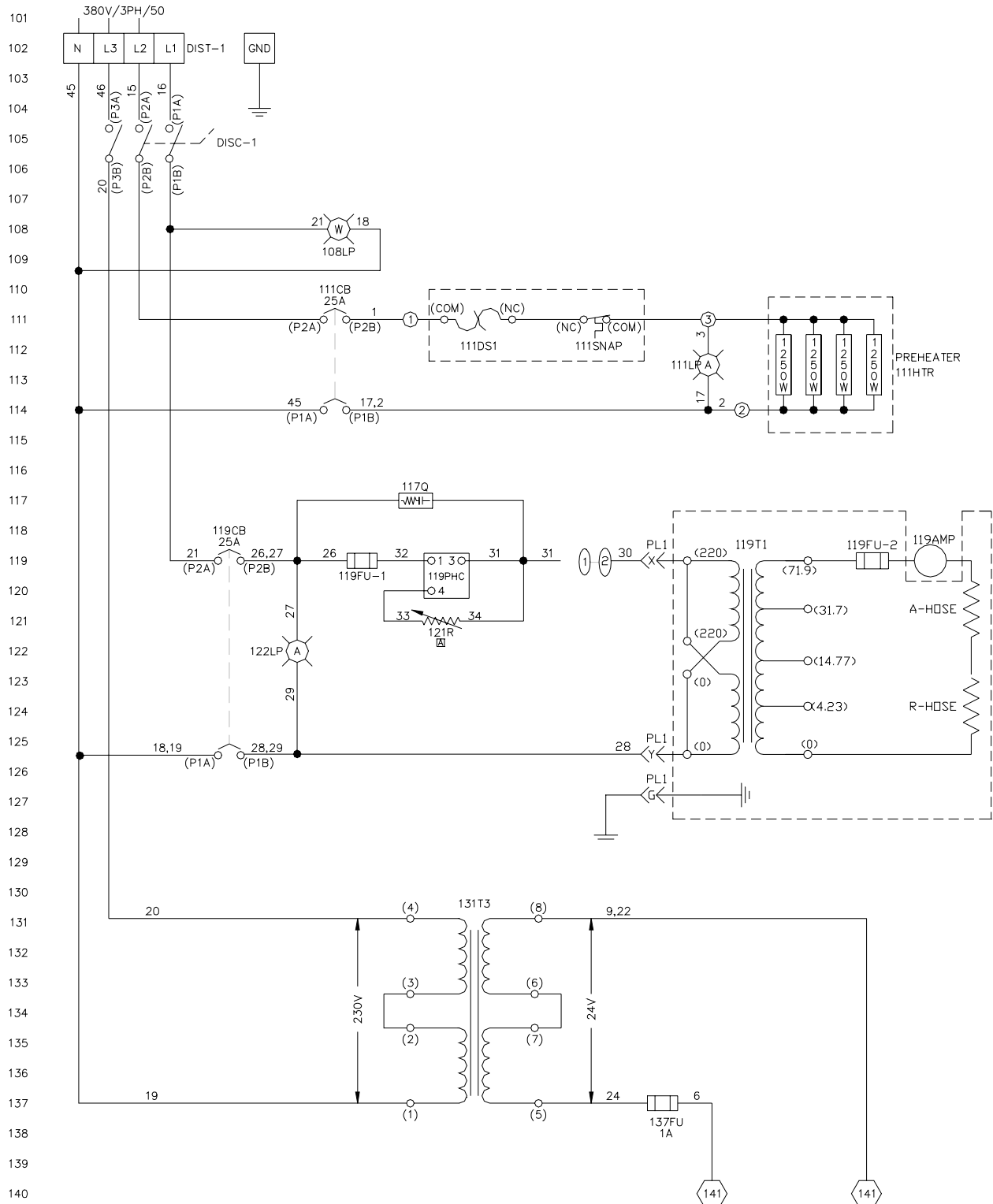


Figure 18. FF-1600 Electrical Schematic (SD17000A-220), Sheet 2 of 2

**380V Three Phase 50Hz**



**Figure 19. FF-1600 Electrical Schematic (SD17000A-380), Sheet 1 of 2**

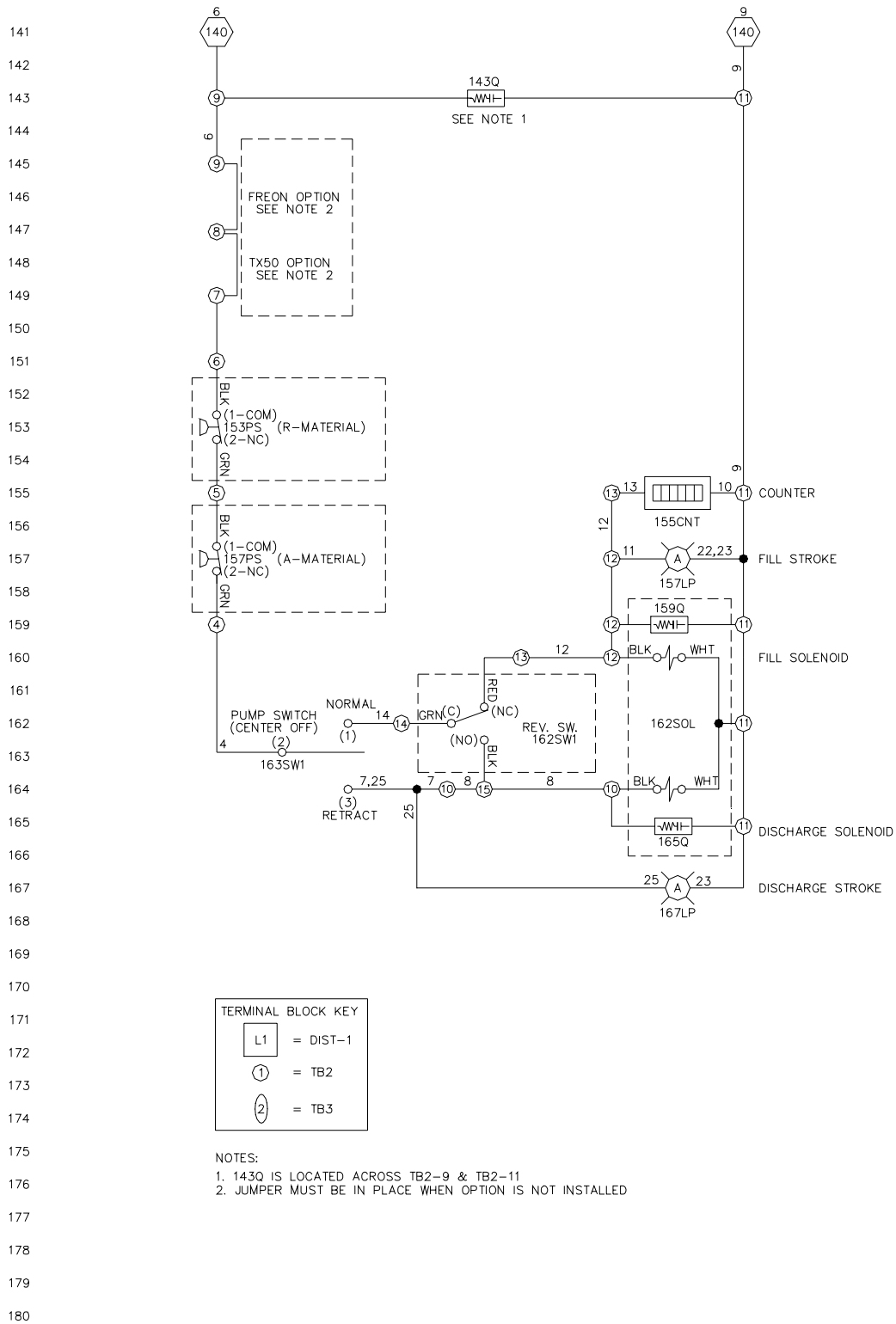


Figure 20. FF-1600 Electrical Schematic (SD17000A-380), Sheet 2 of 2

TABLE 19. FF-1600 ELECTRICAL SCHEMATIC (SD17000A-220/380), PARTS

Reference Number	Part No.	Description	Qty
<b>DIST-1</b>	6690-20-5-2	Main Power Distribution Block (220V Unit)	1
	6690-20-5-4	Main Power Distribution Block (380V Unit)	1
	17650-2	Wire Terminal Lug	1
<b>DISC-1</b>	6690-16-10	Switch	1
<b>108LP</b>	0656	Indicator Cap - White	1
	6690-19-25	Light Base	1
	6690-19-24	Bulb	1
<b>111CB</b>	0692-1-25	25Amp Circuit Breaker	1
<b>111DS1</b>	0362C	Thermostat	REF (1)
<b>111SNAP</b>	6690-7-29	Thermal Limit Switch	REF (1)
<b>111LP</b>	6690-19-25	Light Base	1
	0660	Indicator Cap - Amber	1
	6690-19-24	Bulb	1
<b>111HTR</b>	0361-1250	Heating Element - 1250 WATT	REF (4)
<b>115AMP</b>	9651-6-8	Ammeter 0-15A	1
<b>117Q</b>	6690-21-4	Quencharc	1
<b>119CB</b>	0692-1-25	25Amp Circuit Breaker	1
<b>119FU-1</b>	6690-24-1	Fuse 25 Amp	1
	6690-24-2	Fuse Block 30A	1
<b>119PHC</b>	6690-26-18	Phase Control 20A	1
<b>P1</b>	0670A-1-1	Hose Socket / Wired	1
<b>119T1</b>	6690-15-5	Transformer	REF (1)
<b>119AMP</b>	5616-KIT	Ammeter Replacement Kit	1
<b>119FU-2</b>	6690-24-13	Fuse Holder	REF (1)
	6690-24-14	Fuse 50 Amp	REF (1)
<b>A-HOSE</b>		ISO-HOSE Assembly	REF
<b>B-HOSE</b>		POLY-HOSE Assembly	REF
<b>121R1</b>	6690-5-17	Potentiometer	1
	17650-4	Knob	1
<b>121Q</b>	6690-21-2	Quencharc with Lugs	1
<b>122LP</b>	6690-19-25	Light Base	1
	0660	Indicator Cap - Amber	1
	6690-19-24	Bulb	1
<b>131T3</b>	0689-1	Transformer	1
<b>137FU</b>	OP5193-3-3	1 Amp Fuse	1
	5653B	Fuse Holder	1
<b>143Q</b>	6690-21-1	Quencharc	1
<b>153PS</b>	6690-16-161	Pressure Switch	REF (1)
	6690-16-76-2	Din Connector (Pressure Switch)	REF (1)
<b>155CNT</b>	9651-6-2	Counter	1
<b>157PS</b>	6690-16-161	Pressure Switch	REF (1)
	6690-16-76-2	Din Connector (Pressure Switch)	REF (1)
<b>157LP</b>	6690-19-25	Incandescent Light Base	1
	0660	Indicator Cap - Amber	1
	0662A	Incandescent Bulb	1
<b>159Q</b>	6690-21-1	Quencharc	1
<b>162SW1</b>	0578A	Reversing Switch	REF (1)

Reference Number	Part No.	Description	Qty
<b>162SOL</b>	6311-109	Valve	REF (1)
<b>163SW1</b>	6690-16-6	Toggle Switch	1
<b>165Q</b>	6690-21-1	Quencharc	1
<b>167LP</b>	6690-19-25	Incandescent Light Base	1
	0660	Indicator Cap - Amber	1
	0662A	Incandescent Bulb	1

## DIGITAL HOSE HEAT SCHEMATIC DIAGRAMS

220V Single Phase 50/60Hz

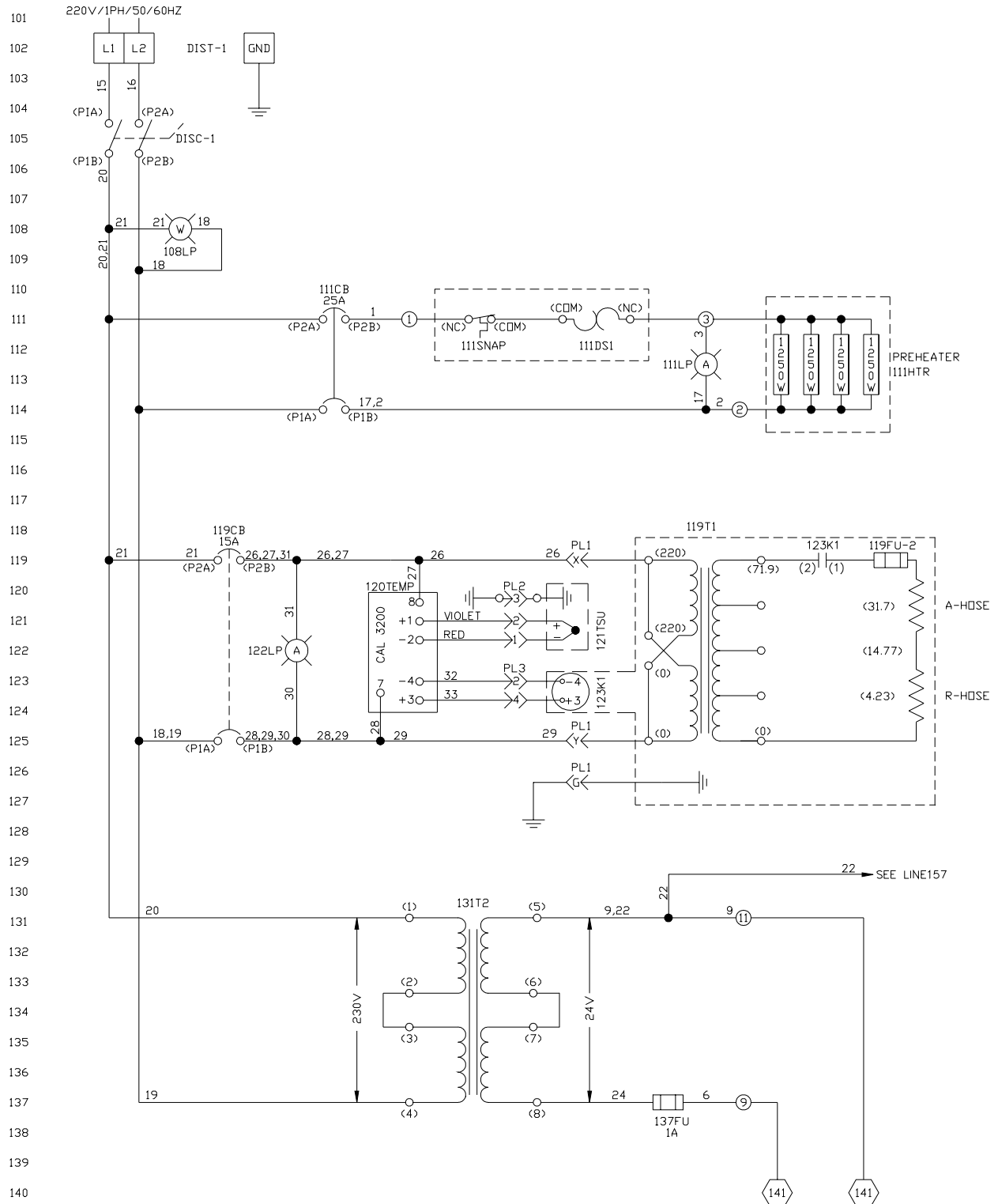
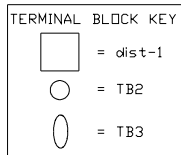
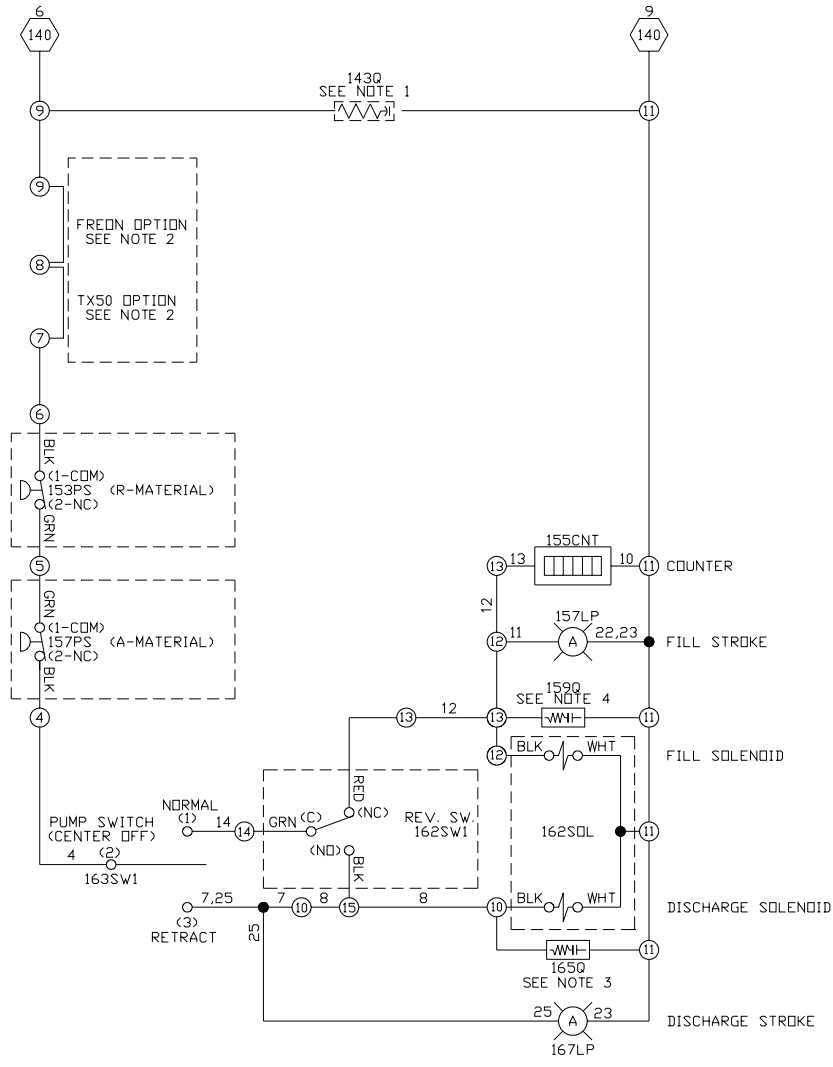


Figure 21. FF-1600 Electrical Schematic (SD1700B-220), Sheet 1 of 2

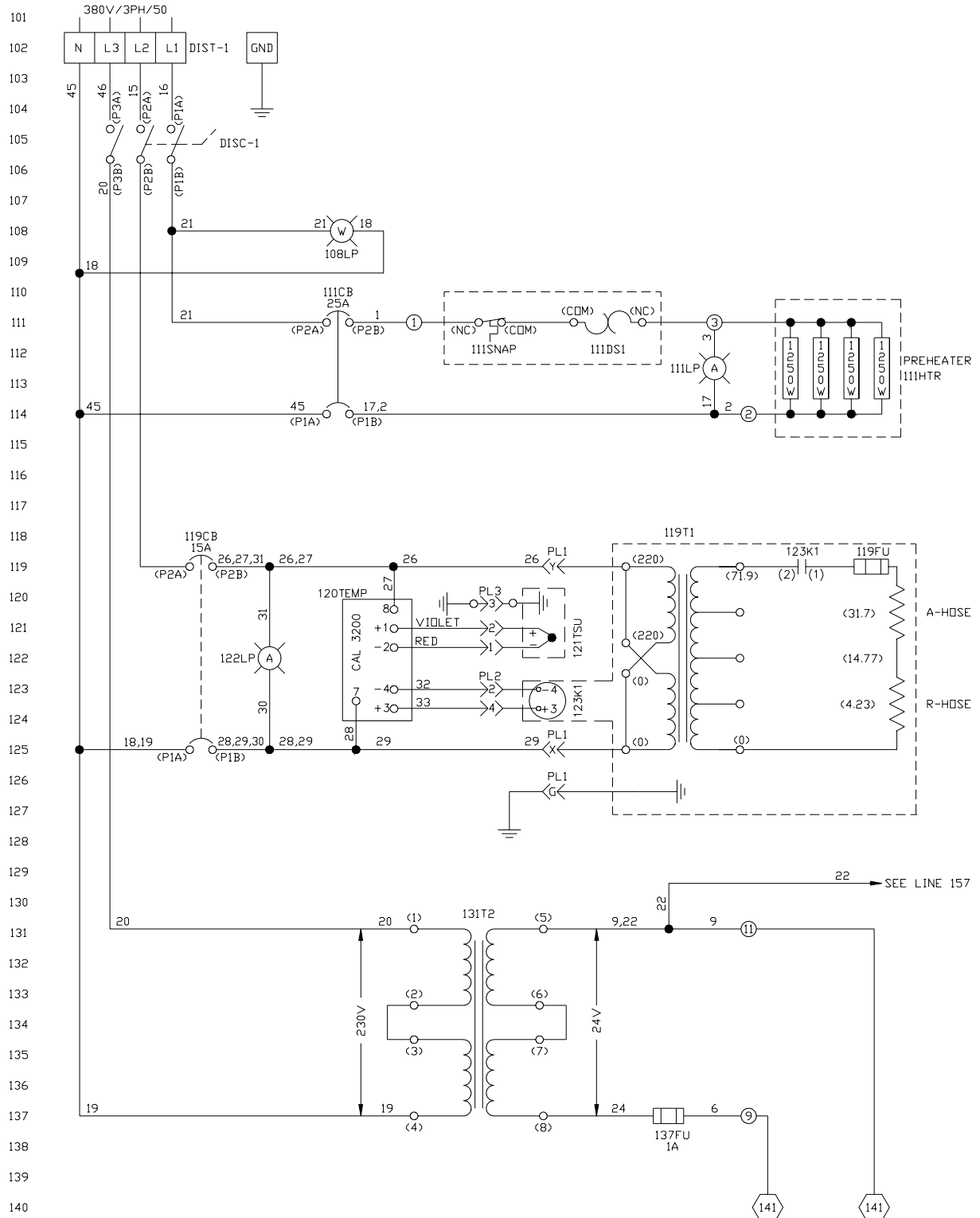
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151  
152  
153  
154  
155  
156  
157  
158  
159  
160  
161  
162  
163  
164  
165  
166  
167  
168  
169  
170  
171  
172  
173  
174  
175  
176  
177  
178  
179  
180



- NOTES:
1. 143Q IS LOCATED ACROSS TB2-9 & TB2-11
  2. JUMPER MUST BE IN PLACE WHEN OPTION IS NOT INSTALLED
  3. 165Q LOCATED BETWEEN TB2-10 & TB2-11
  4. 159Q LOCATED BETWEEN TB2-12 & TB2-11

Figure 22. FF-1600 Electrical Schematic (SD17000B-220), Sheet 2 of 2

**380V Three Phase 50Hz**



**Figure 23. FF-1600 Electrical Schematic (SD1700B-380), Sheet 1 of 2**



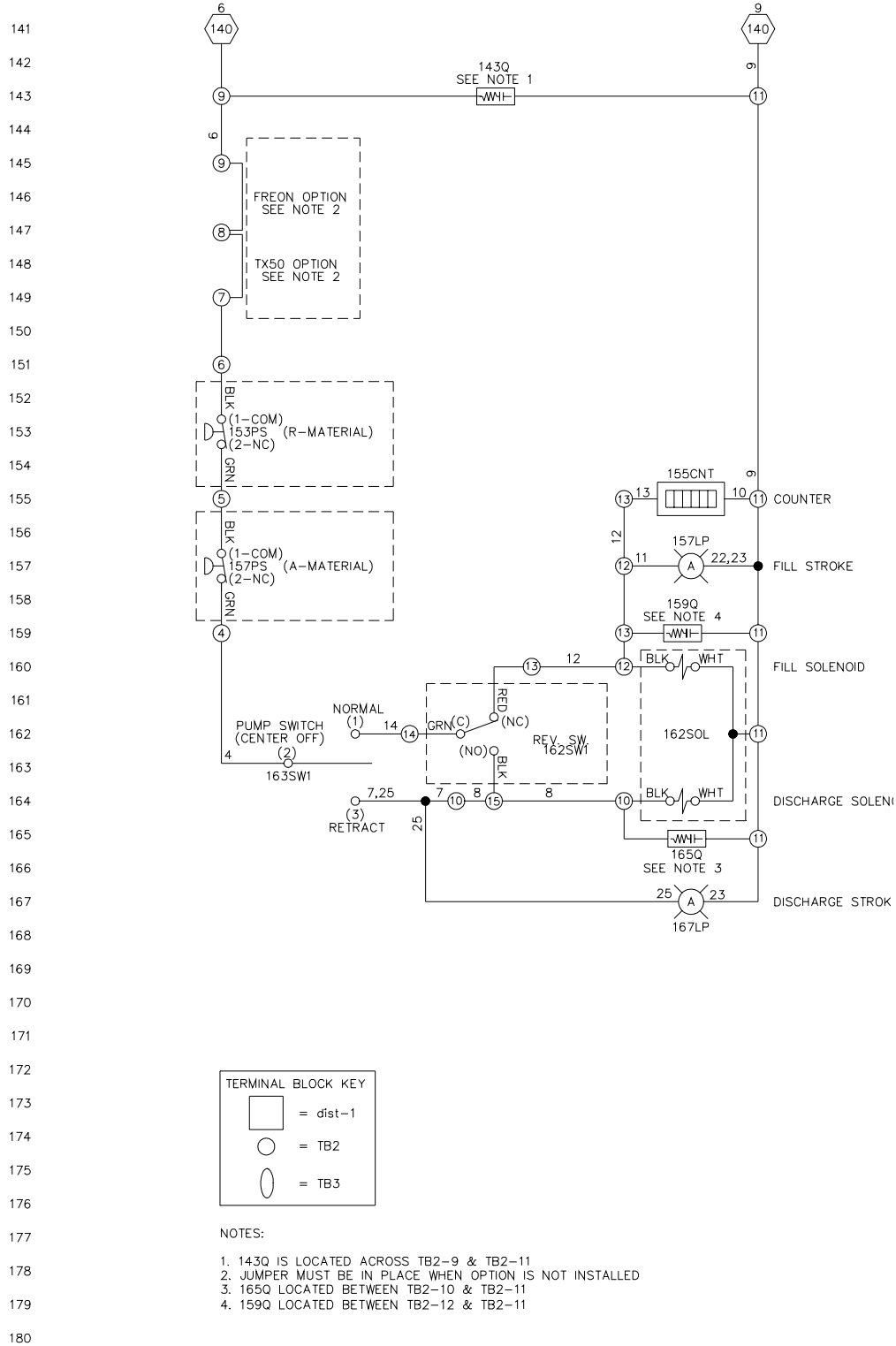


Figure 24. FF-1600 Electrical Schematic (SD17000B-380), Sheet 2 of 2

TABLE 20. FF-1600 ELECTRICAL SCHEMATIC (SD17000B-220/380), PARTS

Reference Number	Part No.	Description	Qty
<b>DIST-1</b>	6690-20-5-2	Main Power Distribution Block (220V Unit)	1
	6690-20-5-4	Main Power Distribution Block (380V Unit)	1
	17650-2	Wire Terminal Lug	1
<b>DISC-1</b>	6690-16-10	Switch	1
<b>108LP</b>	0656	Indicator Cap - White	1
	6690-19-25	Light Base	1
	6690-19-24	Bulb	1
<b>111CB</b>	0692-1-25	25Amp Circuit Breaker	1
<b>111DS1</b>	0362C	Thermostat with Terminal Screw	REF (1)
<b>111SNAP</b>	6690-7-29	Thermal Limit Switch	REF (1)
<b>111LP</b>	6690-19-25	Light Base	1
	0660	Indicator Cap - Amber	1
	6690-19-24	Bulb	1
<b>111HTR</b>	17350	5000W LV Primary Heater	REF (1)
	0361-1250	Heating Element - 1250 WATT	REF (4)
<b>119CB</b>	6690-25-6	1Amp Circuit Breaker	1
<b>117Q</b>	6690-21-1	Quencharc	1
<b>117T1</b>	9651-6-9	Transformer	1
<b>119CB</b>	0692-1-25	25Amp Circuit Breaker	1
<b>P1</b>	0670A-1-1	Hose Socket / Wired	1
<b>119T1</b>	6690-15-5	Transformer	REF (1)
<b>119FU</b>	6690-24-13	Fuse Holder	REF (1)
	6690-24-14	Fuse 50 Amp	1
<b>119T2</b>	6690-15-5	Transformer	REF (1)
<b>119FU-2</b>	6690-24-13	Fuse Holder	REF (1)
	6690-24-14	Fuse 50 Amp	REF (1)
<b>A-HOSE</b>		ISO-HOSE Assembly	REF
<b>B-HOSE</b>		POLY-HOSE Assembly	REF
<b>120TEMP</b>	6690-26-17	CAL 3200	1
<b>PL2</b>	17660-8	TSU Plug Assembly	1
	20207-3	TSU Extension Adapter	REF (1)
<b>121TSU</b>		TSU	REF
<b>122LP</b>	6690-19-25	Light Base	1
	0660	Indicator Cap - Amber	1
	6690-19-24	Bulb	1
<b>PL3</b>	6690-13-2-11-4	4CKT FE Pin Housing	1
<b>123K1</b>	6690-1-46	Solid State Relay	REF (1)
<b>131T2</b>	0689-1	Transformer	1
<b>137FU</b>	OP5193-3-3	1 Amp Fuse	1
	5653B	Fuse Holder	REF (1)
<b>143Q</b>	6690-21-1	Quencharc	1
<b>153PS</b>	6690-16-161	Pressure Switch	REF (1)
	6690-16-76-2	Din Connector (Pressure Switch)	REF (1)
<b>155CNT</b>	9651-6-2	Counter	1
<b>157PS</b>	6690-16-161	Pressure Switch	REF (1)
	6690-16-76-2	Din Connector (Pressure Switch)	REF (1)
<b>157LP</b>	6690-19-25	Incandescent Light Base	1

Reference Number	Part No.	Description	Qty
	0660	Indicator Cap - Amber	1
	0662A	Incandescent Bulb	1
<b>159Q</b>	6690-21-1	Quencharc	1
<b>162SW1</b>	0578A	Reversing Switch	REF (1)
<b>162SOL</b>	6311-109	Valve	REF (1)
<b>163SW1</b>	6690-16-6	Toggle Switch	1
<b>165Q</b>	6690-21-1	Quencharc	1
<b>167LP</b>	6690-19-25	Incandescent Light Base	1
	0660	Indicator Cap - Amber	1
	0662A	Incandescent Bulb	1





Field Number	Field Title	Description
1	Date	Enter date report is submitted.
2	Name	Enter name of person making report.
3	IM Number	Enter the Part Number of the Instruction Manual from the title page.
4	Issue Number	Enter the Issue number of the Instruction Manual from the title page. If there is no issue number, enter <b>NONE</b> .
5	Date of Issue	Enter the date of Issue of the Instruction Manual from the title page. If there is no issue date, enter <b>NONE</b> .
6	Page Number	Enter the page number containing the discrepancy.
7	Discrepancy	Provide a brief description of discrepancy.

**NOTE:** You may send a marked copy of the page as an attachment to your submittal.