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1. DESCRIPTON OF PACKAGE STYLES

1A. STANDARD PACKAGE

The Spartan I standard package consists of either a 115V or 230V control supplied in a small metal enclosure. The speed potentiometer, fuse (s) and On/Off switch are supplied as an integral part of the cover of the box enclosure. External wiring to the motor and AC lines is accomplished by using wire nuts, which are supplied with the control.

Table I below gives the various horsepower sizes and corresponding control model numbers. AC input currents and proper control fusing is also given.

TABLE -I

MODEL	HP	INPUT VOLT AC	NORMAL RMS LINE CURRENT	RATED MOTOR CURRENT	FUSE TYPE ENCLOSED CONTROL	FUSE TYPE OPEN CHASSIS
S12	1/8	115	2.5	1.35	B	B
S16	1/6	115	3.0	1.75	B	B
S25	1/4	115	5.0	3.00	B	B
S33	1/3	115	8.0	3.50	B	B
S34	1/3	230	3.0	1.75	C	E
S50	1/2	115	9.0	6.00	B	B
S51	1/2	230	5.0	3.00	C	E
S75	3/4	115	14.0	7.50	B	B
S76	3/4	230	6.0	3.50	C	E
S101	1	230	9.0	5.50	C	E
S150	1.5	230	14.0	8.00	C	E

Fuse Type B - Shawmut A13 X 20 or IR SF 13 X 20
Fuse Type C - Bussmann ABC20 or Littelfuse 314020
Fuse Type E - Shawmut A25 X 20 or IR SF 25 X 20

1B. GASKETED UNIT

The model numbers in Table I will be prefixed by the letter “G”.

The gasketed Spartan I is identical to the standard Spartan I described above except gaskets will be found in the following locations:

1. Between the faceplate (cover) and enclosure bottom.
2. Between fuse post (s) and the faceplate.
3. Between removable portion of fuse holder (s) and fixed part of the fuse holder (s).
4. Under cover mounting screws.

In addition to the above gaskets a pot nut with an “O” ring seal and a rubber boot over the “On/Off” switch are provided.

1C. OPEN CHASSIS VERSION

The model numbers in Table I will be prefixed by the letter “O”.

In the open chassis version the heatsink with PC board, which is mounted to the box cover on enclosed Spartan I controls, is mounted on a flat aluminum baseplate. The speed potentiometer, “On/Off “ switch , and fuse (s) are provided for customer mounting remote from the control .External connections are made to the control by wiring to the terminal strips mounted on the baseplate.

2. GENERAL CIRCUIT DESCRIPTION

A Polyspede Spartan I drive system consists of a shunt field or permanent magnet DC motor, and an adjustable SCR controller. A motor speed reducer may be supplied as an option .Two separate Spartan I control circuits have been designed for operation on either 115V or 230V AC.

The Spartan I controller provides variable armature voltage and constant field voltage. Variable armature voltage is provided by a phase controlled full wave bridge consisting of two SCR’s and two power diodes. Field voltage is provided by a full wave diode bridge which utilizes the power diodes as one half of the bridge. Therefore, the power diodes are common to both armature and field supplies.

There are two control loops, speed and torque, that operate simultaneously and independently of each other. In most cases the speed loop is in control. Armature voltage feedback is used by the speed loop, when it is in control, to provide speed regulation. The torque loop takes command when the load requires more than approximately 150% of the rated motor current. Armature current is continuously monitored by a very low wattage dissipation current shunt. The signal from this shunt is also used in the speed loop to provide IR compensation. IR compensation makes it possible to have good speed regulation with fluctuating load demand. The transition between the speed and torque loops is smooth. This is accomplished by using the latest in integrated circuitry in both loops. Because of this advanced design, the speed and torque loops are the utmost in accuracy, stability, and reliability. Therefore the motor can be controlled over a wide speed range, even creep speeds, without cogging .Figure 1 is block diagram of the Spartan I control system.

On enclosed controls pre-stripped loose leads are provided for AC line and motor connections. In addition, wire nuts are provided for making these required connections. Each lead is color coded for easy identification .An identification label that is located on the PC board protective cover indicates proper external connections. Figure 4 of this manual also depicts the proper external connections.

Open chassis models provide terminal strips to make necessary external connections. An external connections label is provided on the protective PC board cover. In addition, Figure 9 of this manual supplies more detailed information on external connections.

Refer to the sections on “Installation” and “Initial Turn On Procedures” given below that specifically pertain to the type of control, either enclosed (standard package or gasketed version) or open chassis control that is being installed.

2A. CONTROL SPECIFICATIONS

TABLE II

Input Voltage (single phase) ……..	115 VAC ± 10 (115V Models) 230 VAC ± 20 (230V Models)
Input Frequency ……...	50 /60 Hz
Output Voltage to Armature (Rectified and Unfiltered) … ……...	0-90 VDC (0 -180 VDC on 230V. controls)
Output Voltage to Field (Rectified and Unfiltered) ……	100 VDC (200 VDC on 230V controls)
Speed Range …….	0 – 100%
Regulation……..	Better than ± 3% of Base Speed
Speed Range for Specified Regulation…….	20:1
Speed Dial Characteristic. ……	Linear
Soft Start Acceleration Time (Fixed)……	.75 sec
Torque Limit, % of Rated Motor Current (Fixed)……	Approx. 150%
Maximum Ambient Temperature …….…….	40° C

3. INSTALLATION (ENCLOSED VERSION)

On enclosed versions of the Spartan I two holes in the back of the box allow it to be fastened to any support. Two conduit holes in the bottom allow entry of the AC lines and exit of motor wiring.

Remove the six faceplate screws. Use two screws (not supplied) to mount the box on a suitable vertical surface in an area where the ambient temperature does not exceed 40°C (104° F). On gasketed controls two circular gaskets will be mounted over the mounting holes. Use a flat metal washer underneath the mounting screw head in order to avoid tearing the gasketing. Figures 2 and 3 show the mounting hole locations and overall dimensions of the 115 and 230 volt enclosed Spartan I controls, respectively.

Install two conduit runs; one from the AC disconnect panel to the left hand conduit hole in the box, and another from the right hand conduit hole to the motor. Refer to the table in Figure 4 which gives input and armature current requirements of the various horsepower sizes in order to size external wiring properly.

Pull wires of the required size into the Spartan I box and tag the wire ends to avoid mixing of the wires.

If the Spartan I unit is a gasketed model ("G" prefix in front of the model number) watertight conduit fittings must be used. With the motor wiring connected to the motor but not to the control; check each of the motor leads for continuity to ground. (Use a Simpson model 260 meter set to R x 10,000 OHMS scale.) No continuity should exist. If a short to ground is indicated, locate and correct the short before connecting wiring to the control unit. Also check resistance between A1 and A2 wires using the Simpson 260 on the R x 1 OHMS scale. Resistance should be in the order of 1 to 5 OHMS. If a reading lower than 1 OHM is observed, check for possible wiring shorts in the motor conduit box. Check resistance between motor field wires. Resistance is typically 100 to 300 OHMS for motors used on 115 VAC service, and 200 to 600 OHMS for motors used in 230 VAC service.

WARNING NOTES ON MOTOR FIELD CONNECTIONS

1. If the motor has four field leads, connect them as shown in the external connections diagram, Figure 4. If only two leads are supplied as field leads on the motor, connect F2 of the motor to the F-(yellow-white) control lead. Make sure that the motor, if not supplied by Polyspede, is compatible with the control. Control voltage between F+ and F- should read approximately:

    a) 100 VDC – 115 VAC Input
    b) 200 VDC – 230 VAC Input

2. If the motor is a permanent magnet type, it will not have field leads. Therefore, insulate the two field leads on the Spartan I unit using the provided wire nuts and electrical tape to avoid shorts between the leads or to the box.

Double check to be sure that the AC Input voltage which you are providing agrees with the voltage warning tag attached to the control unit.

If the preceding wiring checks are all correct, connect wiring from the conduit runs to the correct wires on the control faceplate assembly, using the wire nuts provided. Refer to figure 4 in making the proper connections or the external connections label located on the protective PC board cover.

After making all connections, the wiring should be properly positioned in the Spartan I box. Figure 5 gives an illustration of how the wiring should be placed behind the printed circuit board. After the wiring is neatly placed in the Spartan I box, the faceplate should be attached by reusing the six screws previously removed.

4. INITIAL TURN ON PROCEDURE (ENCLOSED VERSIONS)

Make sure the AC switch on the faceplate is in the "Off" position. Set the speed pot fully counterclockwise. Apply power by closing the AC disconnect switch supplying power to the control.

Switch the AC switch on the control cover to the "On" position. The motor should not rotate. By advancing the speed pot the motor should accelerate in speed. If the motor rotates in the opposite direction to that desired, it will be necessary to remove the faceplate and reverse the A1 and A2 motor leads. Be sure to turn off power at the AC disconnect before removing the faceplate.

Proceed to the section entitled "Control Operation".

5. INSTALLATION (OPEN CHASSIS VERSION)

Four holes are provided in the base plate for mounting purposes. Vertical mounting is preferable with the heatsink toward the top. Figure 8 shows the preferred mounting position and also the open chassis mounting dimensions. The control should be mounted in an area where the ambient temperature does not exceed 40 ^{o} C.

Connections are made to open chassis control by means of terminal strips 1TB and 2TB. Use spade or ring lugs to make these connections. Figure 9 shows the proper external connections. In addition, in Figure 9 a table is given indicating AC line input and armature currents for the various horsepower sizes.

Dress the leads from the speed pot away from the power leads, preferably in a separate conduit run. Do not use a speed pot of value less than 10,000 OHMS impedance in the installation or control malfunction will occur. (A 10K speed pot is provided with the control.) Most reliable control operation will occur if the speed pots leads are kept as short as possible.

Terminals 1 and 2 on 2TB are the reset terminals. These terminals must be connected to run. Normally, these two terminals are jumpered at the factory by means of a metal jumper. In systems that will not wire the motor armature directly to terminals 3 and 4 on the control because of use of a DC loop contactor, the wire jumper should be removed. In its place an auxiliary contact on the DC loop contactor or relay contact that works in conjunction with the DC contactor should be connected terminals 1 and 2 on 2TB. This contact must close when the DC contactor energizes to permit the motor to run, and must open to reset the electronic circuitry when the contactor de- energizes.

Since this auxiliary contact will be used in low level signal circuitry, it should have a gold contact surface preferably with good wiping action. Failure to follow these instructions on contactor operated systems could cause fuse blowing and possible drive damage.

WARNING NOTES ON MOTOR FIELD CONNECITONS

1) If the motor has four field leads, connect them as shown in the open chassis external connections diagram, Figure 9. If only 2 leads are supplied as field leads on the motor, connect F2 of the motor to 1TB terminal 6. Make sure that the motor, if not supplied by Polyspede, is compatible with the control. Voltage between the terminals 5 and 6 should read approximately:

   a) 100 VDC - 115 VAC Input
   b) 200 VDC - 230 VAC Input

2) If the motor is a permanent magnet type, it will not have field leads .In this case no connections should be made to terminals 5 and 6 on 1TB.

6. INITIAL TURN ON PROCEDURE (OPEN CHASSIS VERSION)

Make sure the AC disconnect switch is in the "Off" position. Double check to be sure the AC input voltage which is being provided agrees with the voltage warning tag attached to the control unit. Set the speed pot fully counterclockwise. Activate the control by closing the AC disconnect. (In contactor operated systems also energize the DC contactor). The motor should not be running at this time. If the motor does run rotate the speed pot in the clockwise direction. If the motor now slows down, the speed pot has been wired into the circuit backwards. Reverse the outer leads of the speed pot. If the motor rotates in a direction opposite to that desired, turn off power and interchange the motor armature leads A1 and A2 connected to terminals 3 and 4 and 1TB.

7. CONTROL OPERATION

Prior to shipment all controls are tested and completely adjusted at the Polyspede factory. Therefore, after properly wiring and furnishing AC power as explained in previous sections, the control should be capable of running the motor at the desired speed as set by the speed potentiometer. If the motor speed cannot be controlled, fuses blow, or other problems are experienced with the control, refer to the Trouble Shooting Chart, the Trouble Shooting Fuse Blowing, and/or the Motor Test Sections.

8. TROUBLE SHOOTING CHART

MALFUNCTION	POSSIBLE CAUSE	ACTION
a) Motor does not run or will not run to top speed.	a) AC input to control missing.	Check AC line voltage
	b) Fuse blown	Remove check and if necessary replace the fuse.
	c) Motor jammed mechanically.	Check by rotating the shaft manually.
	d) Field voltage low or missing causing insufficient torque under heavy loads. (Does not apply to PM motors) .	Check field voltage, field voltage should be: a) 100 VDC of 115V input controls. b) 200 VDC on 230V input controls
	e) Motor field open or disconnected and operating under heavy loads. (Does not apply for PM motors) .	Check motor field wiring .Check resistance of the field as given in motor tests with the power off.
	f) Terminals 1 and 2 on 2TB not connected (Open Chassis control only)	Either a permanent jumper or contact closure must be used to permit control operation. See A1103-000-EW for further details (Figure 9).
	g) External speed pot not properly connected (Open Chassis control only)	With speed pot disconnected resistance should measure 10K or greater. With pot wired up the voltage between terminals 7 to 8 should vary between 0 to 6 VDC
	h) Problems in control circuitry	Return to Polyspede factory for repair
b)Motor runs only at full speed or overspeed.	a) Motor field open or disconnected and operating under light load. (Does not apply to PM motors).	Check motor field wiring .Check resistance of the field as given in motor tests with the power off.
	b) Motor field voltage low or missing and operating under light load	Check field voltage, field voltage should be: a) 100 VDC on 115V input controls b) 200 VDC on 230V input controls
	c) External speed pot not properly connected. (Open chassis control only)	Voltage should vary between 0 to 6 VDC between terminals 7 to 8 on 2TB as the speed pot is rotated.

(Cont. Trouble Shooting Chart)

MALFUNCTION	POSSIBLE CAUSE	ACTION
	d) Control board problems.	Return to Polyspede factory for repair
c)Repeated control fuse blowing	a) Incorrect AC input voltage.	Check that voltage supplied agrees with voltage warning label.
	b) Incorrect connections between motor and control.	Recheck all motor connections as given in : A1101-000-EW-Enclosed controls A1103-000-EW-Open Chassis
	c) Shorts between internal control wiring and enclosure or mounting base.	Visual inspection and routine checks.
	d) Shorts in external wiring	Refer to Section on testing in case of fuse blowing.
	e)Faulty SCR's, power diodes and/or field diodes	Refer to Section on testing in case of fuse blowing.

9. TROUBLE SHOOTING PROCEDURE – IN CASE OF FUSE BLOWING 115 VOLT CONTROLS –ENCLOSED AND OPEN CHASSIS

If fuses blow, a light bulb checkout procedure may be used without danger of damaging the control and without excessive fuse blowing during checkout. Proceed as follows:

a. Turn power off at the service disconnect ahead of the control.
b. Connect a 120 volt 100 watt incandescent light bulb in series with the ungrounded AC input line (L1).
c. Replace any blown control fuse with a good fuse.
d. Disconnect A1, A2, and field wires at the motor. Insulate wire ends.
e. Turn power on at the service disconnect; turn the control "On/Off" switch to the "On" position on enclosed controls. On open chassis controls without a DC loop contactor make sure terminals 1 and 2 on 2TB are connected. On open chassis controls with a DC loop contactor make sure that an auxiliary contact working in conjunction with the contactor is closed when the DC contactor is energized. The bulb should not burn at any setting of the speed control pot. If the bulb does light, the Spartan I is probably defective in the case of the enclosed version. For the enclosed control go to step (f). In open chassis controls turn off power and remove any speed pot connections. If the bulb still burns, move on to step (f). If the bulb does not burn on the open chassis version after removing the speed pot connections, put back the wires one at a time until the wire causing the problem is located.

Replace any defective wires. If the bulb still burns after all external connections haven been removed, move on to step (f). If the problem has been corrected go to step (g).

This step is to be done if step (e) shows that the light bulb still lights with all external connections removed including A1, A2, F1 and F2. This probably indicates that the Spartan I's, SCRs, Field diodes, and/or power diodes are defective. The only semiconductor components that are recommended field replaceable are the power diodes located in the rectifier assembly mounted on the U shaped heatsink.

There are 4 terminals on the rectifier assembly. On three of the terminals only one lug is connected. One terminal has double lug connections. With power off, remove the connections on the three single lug terminals. Leave the double lug connections as is. Insulate the bare lugs before reapplying power. Reapply power. If light bulbs do not light, problem could be confined solely to the rectifier assembly. Turn off power. Using a Simpson 260 or equivalent check for proper diode action on the bridge assembly and power diodes. There are three diodes inside. Place the plus lead of the meter on the terminal next to the black dot. The other meter lead should be placed on one of the three other terminals. Diode action should be observed. That is, with the meter on the R X 1 scale, when the black dotted terminal is plus in respect to the other terminal a reading of between 10-15 OHMS will be read on the meter. With the opposite polarity, the meter will show an open. In the same manner check the other two terminals in respect to the black dot terminal. If the diode assembly is faulty, replace. After replacing the rectifier assembly reconnect the wires to the diode assembly. If the bulb still lights, the SCRs or field diodes are probably the cause of the problem. Since these components are not recommended field replaceable, the control should be returned to the Polyspede factory for repair.

If the bulb does not now light on enclosed controls, proceed to step (g). On open chassis controls turn off power and reconnect speed pot connections and any other external connections if they presently are not connected. Reapply power. If bulbs now burn go back to step (e). If bulb does not burn go to step (g).

g) If no faults are located in the preceding steps or if they have already been corrected, leave light bulb connected as in the preceding steps and reconnect A1 and A2 wires at the motor. Leave field wires disconnected and insulated. (Open chassis controls should also have all wires except field leads connected at this time.) Set speed control pot at zero and turn on all power. Light should not burn. Increase speed setting to 20%. Lamp brilliance should increase smoothly to nearly full brilliance. (Note- lamp flicker and erratic brilliance may be observed at settings above 15% - 20%-- this is normal).

h) Repeat step (g) with motor field wires connected. Results should be similar except that bulb will burn at about 1/2 brilliance with speed control set at zero (due to motor field current) and will increase to nearly full brilliance at a 15% or 20% setting of the speed pot. (If the control is used on PM motor, skip this step)

i) If operation is normal in all preceding steps, remove light bulb and reconnect all wiring for normal operation.

j) If occasional fuse blowing occurs, an intermittent short or ground is indicated. Inspect motor leads on motor brush pigtails for possible faults. Inspect Spartan I unit for loose foreign objects. (washers, nuts, wire clippings, etc) Test all external wiring. If the problem seems to be in the DC motor, refer to the Motor Tests Section.

10. TROUBLE SHOOTING PROCEDURE – IN CASE OF FUSE BLOWING, 230 VOLT CONTROLS- ENCLOSED AND OPEN CHASIS

If fuses blow, a light bulb checkout procedure may be used without the danger of damaging the control and without excessive fuse blowing during checkout. Proceed as follow:

Perform all of the steps used in the checkout of 115 Volt controls previously explained except with the following changes:

a) Use two 115 volt 100 watt light bulbs connected in series in each of the two AC input lines (a total of four bulbs). This is necessary since both lines may be "hot" in a 230 volt service and either line may be susceptible to faults to ground.

b) Results should be the same in the preceding section for 115 volt controls except that bulb brilliance may be less than that described for 115 volt controls because of the number of bulbs used.

11 MOTOR TESTS:

The following tests will be helpful in pinpointing possible motor problems. Before making any tests, remove the armature and field leads from the control.

a) Shorts To the Frame - Using a Megger set for 400 volt test potential, check leakage resistance between the A1, A2, motor field leads and the motor frame. Readings of less than 10,000 OHMS indicate possible problems. A dead short indicates need for immediate repair. Checks for dead shorts may be made with an ohmmeter of a continuity tester if a Megger is not available. Retest while rotating armature by hand.

b) Open or Shorted Field - A resistance check between F1 and F2 (also F3 and F4) should indicate a resistance between 100 to 600 ohms.

c) Open Armature - An ohmmeter between A1 and A2 should indicate a resistance of less than 10 ohms. Rotate the motor shaft very slowly, while observing the ohmmeter. Because of the residual magnetism on shunt field motors or the field on permanent magnet motors a CEMF will be produced in rotating.

This will cause the ohmmeter readings to change during rotation. Therefore, after moving the shaft a small amount stop and check the resistance reading. A high resistance reading at any position of the rotated motor shaft when it is stopped is a trouble indication. Armature opens are usually the result of bad brushes, burned commutator segments, or severed wires.

12. CONTROL MAINTENANCE

The control requires practically no maintenance once it has been installed. It is a rugged piece of equipment, but can be damaged if abused.

> IF FUSE REPLACEMENT BECOMES NECESSARY, USE ONLY THE SPECIFIED FUSES. THE USE OF SUBSTITUTE FUSES MAY CAUSE CONTROL DAMAGE AND VOID THE CONTROL WARRANTY.

Correct fuses to be used are listed in page 1 of this manual and on the fuse warning tags located on control. On open chassis controls a fuse warning label is also supplied on the fuseholder.

13 MAINTENANCE MOTOR

Polyspede motors are rugged machines specifically designed for SCR controllers. There are no adjustments to make and maintenance is quite simple. All moving parts are subject to wear. Brushes are perhaps the only component requiring periodic maintenance.

Motor brush life is related to motor speed, loading, cycling rate, ambient temperature, and other variables not controlled by Polyspede. Therefore, only guide lines can be given for checking this item. Experience has shown that each application has its own wear rate. Removal of the brushes after each three months of operation during the first year will give an indication of your specific wear rate. After three sets of brushes have been used, remove the motor armature for checking by a competent motor repair shop for possible commutator refacing.

Armature bearings are sealed and require no additional lubricating. Replacement should be performed by a reputable service shop if the bearings become noisy.

Occasional cleaning of motor vent holes or removal of fan guard to remove dust accumulation from fans is the only additional maintenance required.

14. MAINTENANCE – SPEED REDUCER

1. Use type and grade of oil specified on the gear nameplate. Keep in mind proper viscosities for various temperatures. Note: Most reducers are shipped from the manufacturer without oil.

2. Keep oil at proper level.

3. Drain, flush, and refill reduction unit after initial run in period.

4. Replace shaft seals at first sign of leakage not only to avoid damage due to loss of lubricant but also to eliminate the possible entrance of contaminants into housing.

5. If detailed instructions for assembly and disassembly of a particular unit is required, write the factory for this information.

6. If your drive is coupling connected, and requires lubricating, the coupling should be checked on start-up and semi-annually.

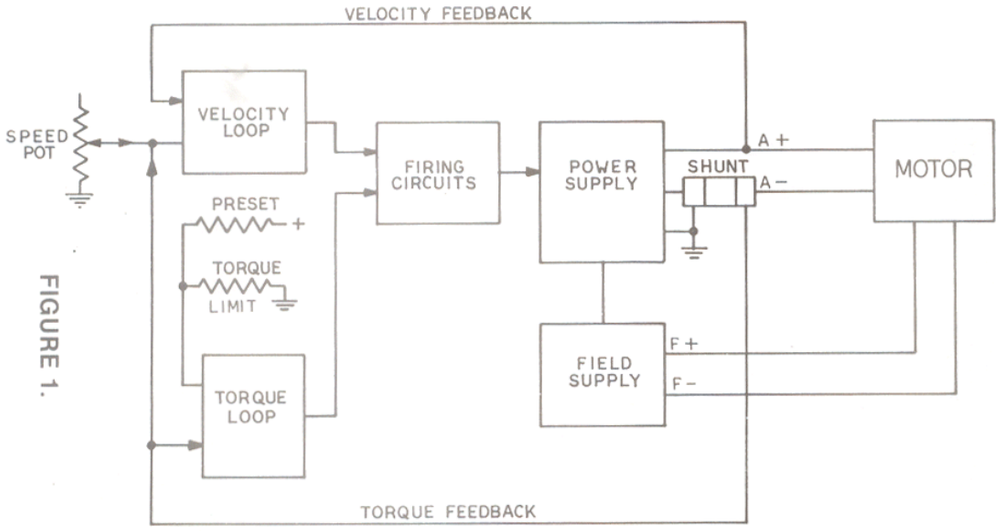

VELOCITY FEEDBACK
SPEED POT
VELOCITY LOOP
FIRING CIRCUITS
POWER SUPPLY
SHUNT
A +
A –
MOTOR
PRESET
+
TORQUE LIMIT
TORQUE LOOP
FIELD SUPPLY
F +
F –
TORQUE FEEDBACK

FIGURE 1.

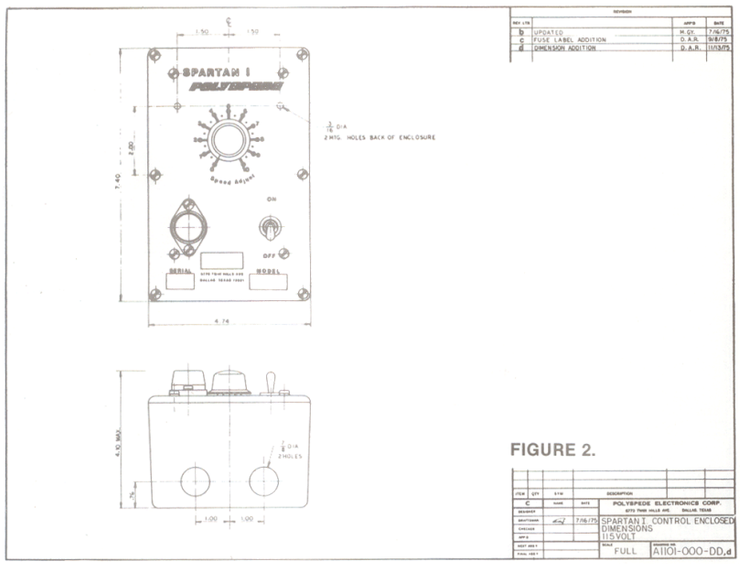
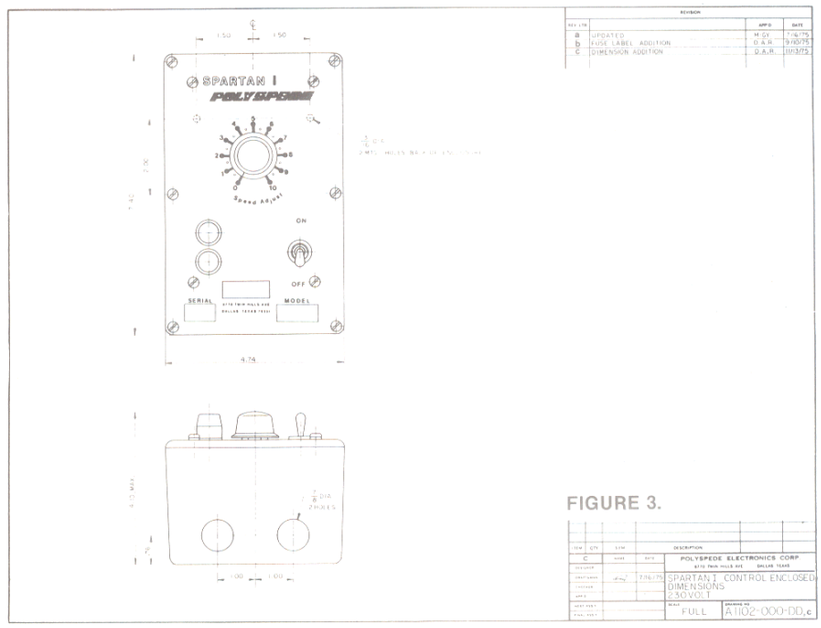

SPARTAN I
Speed Adjust
ON
OFF
SERIAL
MODEL
4.76
7.40
2.00
4.50 MAX.
3.00
1.00
2 HOLES BACK OF ENCLOSURE
2 HOLES
REVISION
REV. LTR
APP'D
DATE
b UPDATED M. EK 7/16/75
c FUSE LABEL ADDITION D. A.R. 9/8/75
d DIMENSION ADDITION D. A.R. 11/13/75
DESCRIPTION
POLYPEDE ELECTRONICS CORP.
DALLAS TEXAS
SPARTAN I CONTROL ENCLOSED
DIMENSIONS
115 VOLT
FULL
A1101-000-DD,d

FIGURE 2.

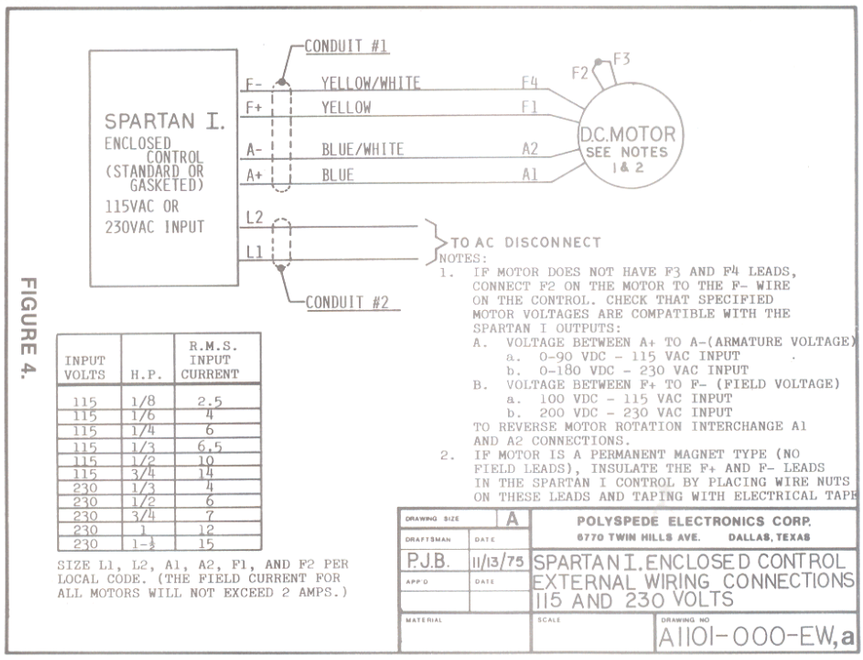


REVISION

REV. LTR		APP'D	DATE
a	UPDATED	M.G.K.	7/16/75
b	FUSE LABEL ADDITION	D.A.H.	9/10/75
c	DIMENSION ADDITION	D.A.H.	10/13/75

FIGURE 3.

ITEM	QTY.	SIZE	DESCRIPTION	
C			POLYSPEEDE ELECTRONICS CORP.	
DESIGNED			4215 TWIN HILLS AVE.	DALLAS, TEXAS
DRAFTSMAN			SPARTAN I CONTROL ENCLOSED DIMENSIONS 230VOLT	
TRACED				
APP'D				
NEXT ASSY			SCALE: FULL	DRAWING NO. A1102-000-DD,c
FINAL ASSY				



NOTES:

1. IF MOTOR DOES NOT HAVE F3 AND F4 LEADS, CONNECT F2 ON THE MOTOR TO THE F- WIRE ON THE CONTROL. CHECK THAT SPECIFIED MOTOR VOLTAGES ARE COMPATIBLE WITH THE SPARTAN I OUTPUTS:
   A. VOLTAGE BETWEEN A+ TO A-(ARMATURE VOLTAGE)
      a. 0-90 VDC - 115 VAC INPUT
      b. 0-180 VDC - 230 VAC INPUT
   B. VOLTAGE BETWEEN F+ TO F- (FIELD VOLTAGE)
      a. 100 VDC - 115 VAC INPUT
      b. 200 VDC - 230 VAC INPUT
   TO REVERSE MOTOR ROTATION INTERCHANGE A1 AND A2 CONNECTIONS.
2. IF MOTOR IS A PERMANENT MAGNET TYPE (NO FIELD LEADS), INSULATE THE F+ AND F- LEADS IN THE SPARTAN I CONTROL BY PLACING WIRE NUTS ON THESE LEADS AND TAPING WITH ELECTRICAL TAPE

INPUT VOLTS	H.P.	R.M.S. INPUT CURRENT
115	1/8	2.5
115	1/6	4
115	1/4	6
115	1/3	6.5
115	1/2	10
115	3/4	14
230	1/3	4
230	1/2	6
230	3/4	7
230	1	12
230	1-½	15

SIZE L1, L2, A1, A2, F1, AND F2 PER LOCAL CODE. (THE FIELD CURRENT FOR ALL MOTORS WILL NOT EXCEED 2 AMPS.)

DRAWING SIZE: A		POLYSPEDE ELECTRONICS CORP. 6770 TWIN HILLS AVE. DALLAS, TEXAS
DRAFTSMAN: P.J.B.	DATE: 11/13/75	SPARTAN I. ENCLOSED CONTROL EXTERNAL WIRING CONNECTIONS 115 AND 230 VOLTS
APP'D	DATE	
MATERIAL	SCALE	DRAWING NO: A1101-000-EW,a

FIGURE 4.

INSTALLATION, ENCLOSED AND GASKETED CONTROLS 115V AND 230V

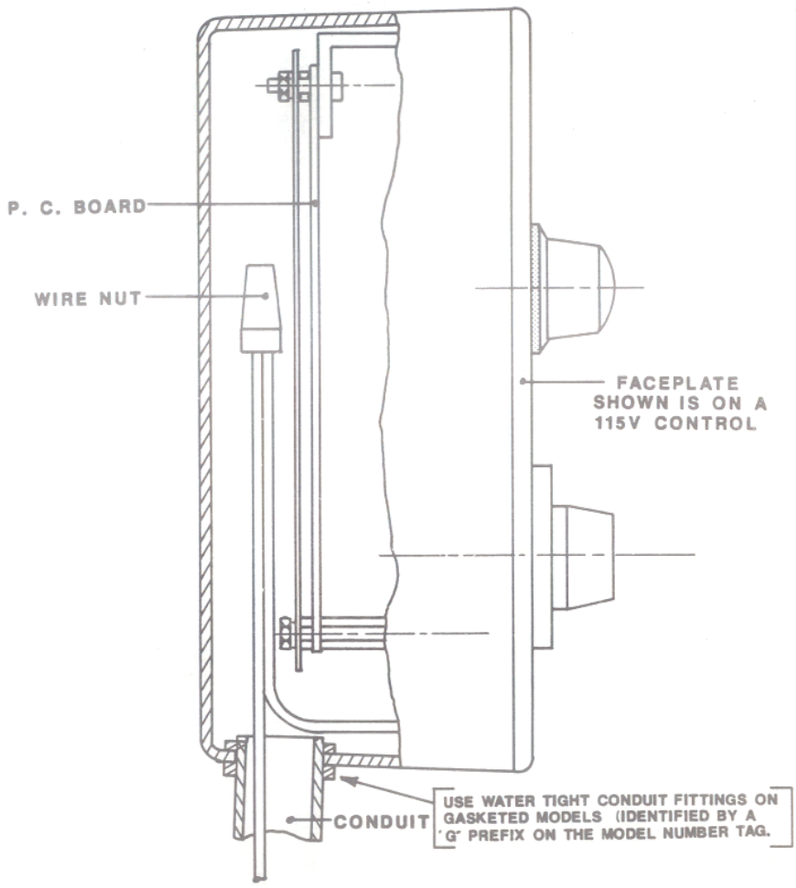


FIGURE 5.

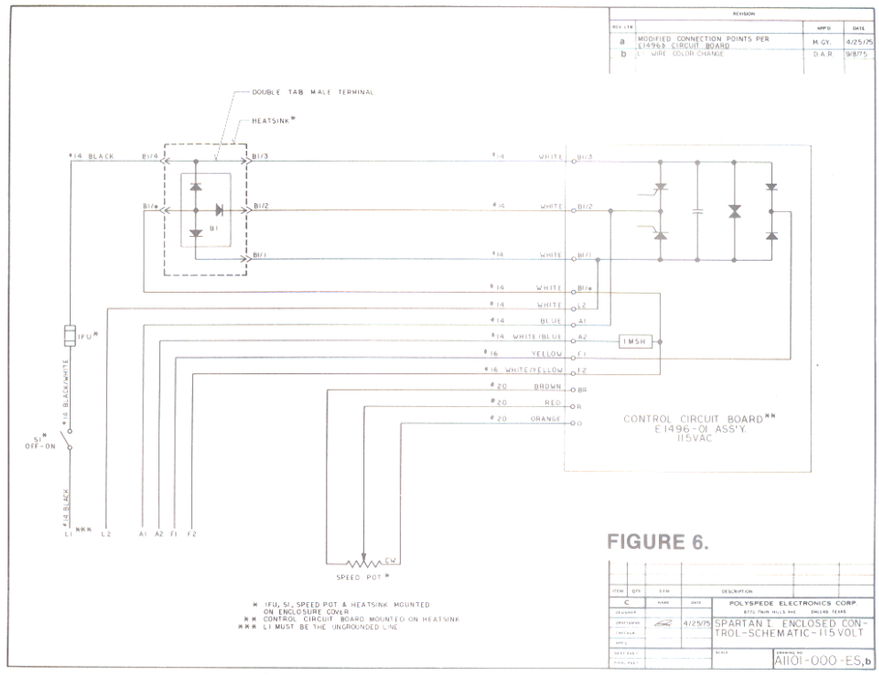

REVISION
REV LTR
APPD
DATE
a MODIFIED CONNECTION POINTS PER E1496 CIRCUIT BOARD
M.GY. 4/25/75
b WIRE COLOR CHANGE
D.A.R. 9/8/75
DOUBLE TAB MALE TERMINAL
HEATSINK*
#14 BLACK
BI/4
BI/3
BI/2
BI/1
BI
#14 WHITE
#16 WHITE
#14 WHITE
#14 WHITE
#14 WHITE
#14 BLUE
#14 WHITE/BLUE
#16 YELLOW
#16 WHITE/YELLOW
#20 BROWN
#20 RED
#20 ORANGE
BI/3
BI/2
BI/1
BI/4
L2
A1
A2
F1
F2
BR
R
O
1MSH
CONTROL CIRCUIT BOARD** E1496-01 ASS'Y. 115VAC
1FU*
S1* OFF-ON
#16 BLACK/WHITE
#16 BLACK
L1 *** L2 A1 A2 F1 F2
CW
SPEED POT*
* 1FU, S1, SPEED POT & HEATSINK MOUNTED ON ENCLOSURE COVER
** CONTROL CIRCUIT BOARD MOUNTED ON HEATSINK
*** L1 MUST BE THE UNGROUNDED LINE
ITEM QTY SYM DESCRIPTION
C
POLYSPEDE ELECTRONICS CORP.
ROWLETT TEXAS
4/25/75
SPARTAN I ENCLOSED CONTROL-SCHEMATIC-115 VOLT
SIZE
DRAWING NO.
A1101-000-ES,b

FIGURE 6.

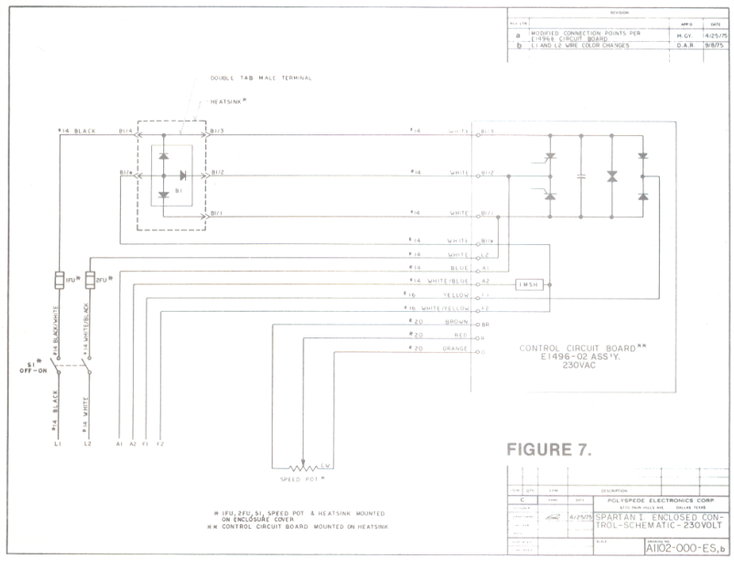
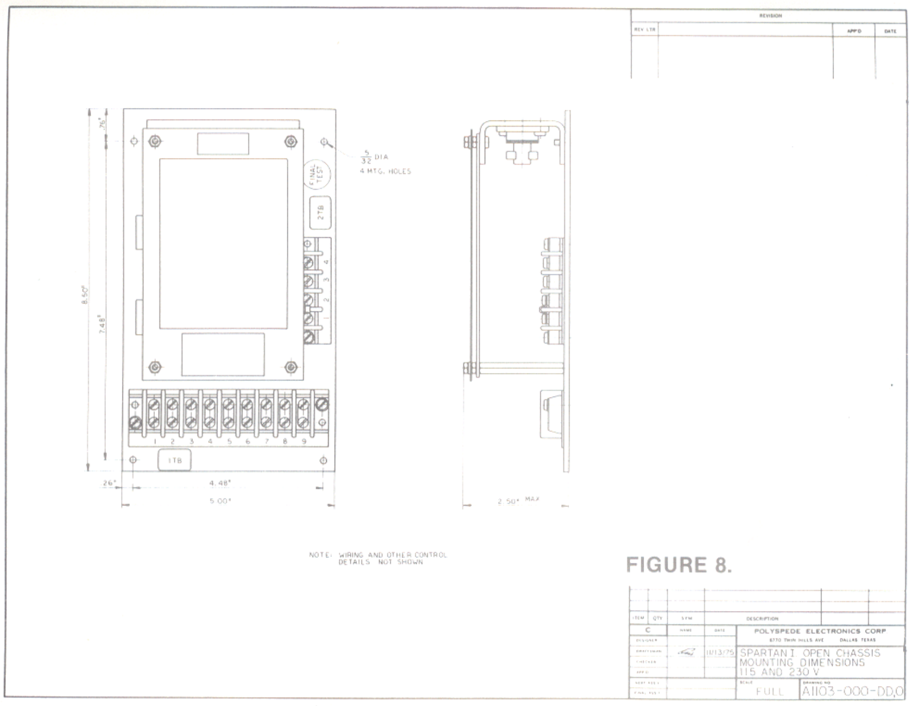

REVISION
a MODIFIED CONNECTION POINTS PER L-11968 CIRCUIT BOARD
b L1 AND L2 WIRE COLOR CHANGES
M.G.F. 4/25/75
D.A.R. 9/8/75
DOUBLE TAB MALE TERMINAL
HEATSINK*
#14 BLACK
#14 WHITE
#14 WHITE/BLUE
#16 WHITE/YELLOW
#20 BROWN
#20 RED
#20 ORANGE
#14 BLACK/WHITE
#14 WHITE/BLACK
#14 BLACK
#14 WHITE
1FU*
2FU*
S1* OFF-ON
L1
L2
A1 A2 F1 F2
B1
1MSH
CONTROL CIRCUIT BOARD** E1496-02 ASS'Y. 230VAC
SPEED POT*
1K
* 1FU, 2FU, S1, SPEED POT & HEATSINK MOUNTED ON ENCLOSURE COVER.
** CONTROL CIRCUIT BOARD MOUNTED ON HEATSINK
POLYSPEDE ELECTRONICS CORP
SPARTAN I ENCLOSED CONTROL-SCHEMATIC-230VOLT
A1102-000-ES,b

FIGURE 7.



REVISION
REV LTR
APP'D
DATE
.76"
8.50"
7.48"
5/32 DIA
4 MTG. HOLES
FINAL TEST
2TB
1 2 3 4
1 2 3 4 5 6 7 8 9
1TB
.26"
4.48"
5.00"
2.50" MAX
NOTE: WIRING AND OTHER CONTROL DETAILS NOT SHOWN
ITEM
QTY
SYM
DESCRIPTION
C
NAME
DATE
DESIGNER
DRAFTSMAN
CHECKER
APP'D
11/13/75
POLYSPEDE ELECTRONICS CORP
6770 TWIN HILLS AVE DALLAS TEXAS
SPARTAN I OPEN CHASSIS
MOUNTING DIMENSIONS
115 AND 230 V
SCALE
FULL
DRAWING NO
A1103-000-DD,0

FIGURE 8.

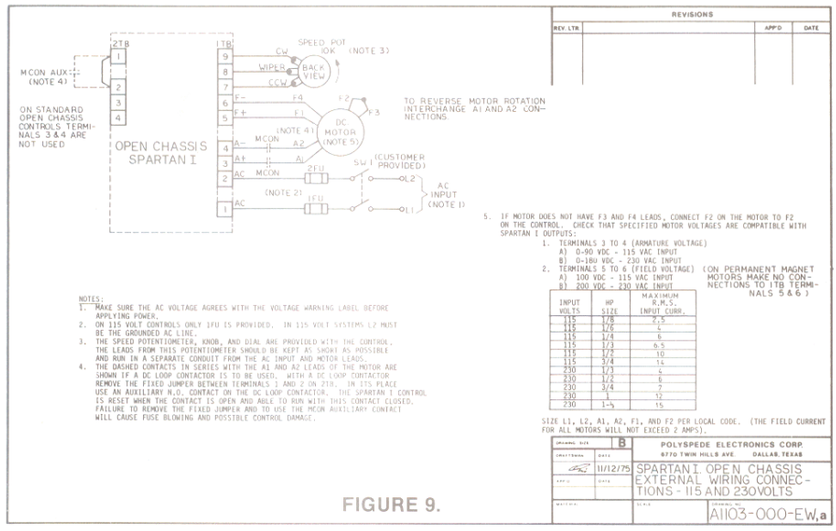

REVISIONS
REV. LTR
APP'D
DATE
MCON AUX
(NOTE 4)
ON STANDARD OPEN CHASSIS CONTROLS TERMINALS 3 & 4 ARE NOT USED
2TB
1TB
OPEN CHASSIS SPARTAN I
SPEED POT 10K (NOTE 3)
CW
WIPER
CCW
BACK VIEW
F-
F+
F4
F1
F2
F3
DC MOTOR (NOTE 5)
(NOTE 4)
A-
A+
AC
MCON
A2
A1
2FU
1FU
(NOTE 2)
SW1 (CUSTOMER PROVIDED)
L2
L1
AC INPUT (NOTE 1)
TO REVERSE MOTOR ROTATION INTERCHANGE A1 AND A2 CONNECTIONS.
5. IF MOTOR DOES NOT HAVE F3 AND F4 LEADS, CONNECT F2 ON THE MOTOR TO F2 ON THE CONTROL. CHECK THAT SPECIFIED MOTOR VOLTAGES ARE COMPATIBLE WITH SPARTAN I OUTPUTS:
1. TERMINALS 3 TO 4 (ARMATURE VOLTAGE)
A) 0-90 VDC - 115 VAC INPUT
B) 0-180 VDC - 230 VAC INPUT
2. TERMINALS 5 TO 6 (FIELD VOLTAGE)
A) 100 VDC - 115 VAC INPUT
B) 200 VDC - 230 VAC INPUT
(ON PERMANENT MAGNET MOTORS MAKE NO CONNECTIONS TO 1TB TERMINALS 5&6)
INPUT VOLTS
HP SIZE
MAXIMUM R.M.S. INPUT CURR.
115 1/8 2.5
115 1/6 4
115 1/4 6
115 1/3 6.5
115 1/2 10
115 3/4 14
230 1/3 5
230 1/2 8
230 3/4 7
230 1 12
230 1-1/2 15
SIZE L1, L2, A1, A2, F1, AND F2 PER LOCAL CODE. (THE FIELD CURRENT FOR ALL MOTORS WILL NOT EXCEED 2 AMPS).
NOTES:
1. MAKE SURE THE AC VOLTAGE AGREES WITH THE VOLTAGE WARNING LABEL BEFORE APPLYING POWER.
2. ON 115 VOLT CONTROLS ONLY 1FU IS PROVIDED. IN 115 VOLT SYSTEMS L2 MUST BE THE GROUNDED AC LINE.
3. THE SPEED POTENTIOMETER, KNOB, AND DIAL ARE PROVIDED WITH THE CONTROL. THE LEADS FROM THIS POTENTIOMETER SHOULD BE KEPT AS SHORT AS POSSIBLE AND RUN IN A SEPARATE CONDUIT FROM THE AC INPUT AND MOTOR LEADS.
4. THE DASHED CONTACTS IN SERIES WITH THE A1 AND A2 LEADS OF THE MOTOR ARE SHOWN IF A DC LOOP CONTACTOR IS TO BE USED. WITH A DC LOOP CONTACTOR REMOVE THE FIXED JUMPER BETWEEN TERMINALS 1 AND 2 ON 2TB. IN ITS PLACE USE AN AUXILIARY N.O. CONTACT ON THE DC LOOP CONTACTOR. THE SPARTAN I CONTROL IS RESET WHEN THE CONTACT IS OPEN AND ABLE TO RUN WITH THIS CONTACT CLOSED. FAILURE TO REMOVE THE FIXED JUMPER AND TO USE THE MCON AUXILIARY CONTACT WILL CAUSE FUSE BLOWING AND POSSIBLE CONTROL DAMAGE.
DRAWING SIZE B
POLYSPEDE ELECTRONICS CORP.
8770 TWIN HILLS AVE. DALLAS, TEXAS
11/12/75
SPARTAN I OPEN CHASSIS EXTERNAL WIRING CONNECTIONS - 115 AND 230 VOLTS
SCALE
DRAWING NO.
A1103-000-EW,a

FIGURE 9.

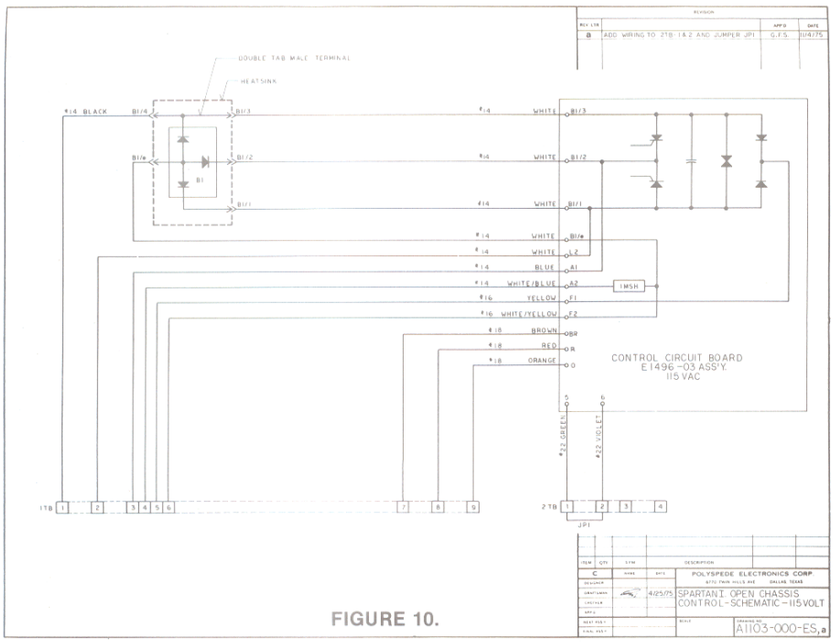

REVISION
REV LTR
DESCRIPTION
APP'D
DATE
a
ADD WIRING TO 2TB-1 & 2 AND JUMPER JP1
G.F.S.
10/4/75
DOUBLE TAB MALE TERMINAL
HEATSINK
#14 BLACK
BI/4
BI/3
BI/6
BI/2
BI/1
BI
#14 WHITE
#14 WHITE
#14 WHITE
#14 WHITE
#14 WHITE
#14 BLUE
#14 WHITE/BLUE
#16 YELLOW
#16 WHITE/YELLOW
#18 BROWN
#18 RED
#18 ORANGE
BI/3
BI/2
BI/1
BI/6
L2
A1
A2
F1
F2
BR
R
O
1MSH
CONTROL CIRCUIT BOARD
E1496-03 ASS'Y.
115 VAC
#22 GREEN
#22 VIOLET
5
6
1TB
1
2
3
4
5
6
7
8
9
2TB
1
2
3
4
JP1
QTY
SYM
DESCRIPTION
C
NAME
DATE
POLYSPEDE ELECTRONICS CORP.
MTG. TWIN MILLS AVE.
DALLAS, TEXAS
4/25/75
SPARTAN I OPEN CHASSIS
CONTROL-SCHEMATIC-115 VOLT
SCALE
DRAWING
A1103-000-ES,a

FIGURE 10.

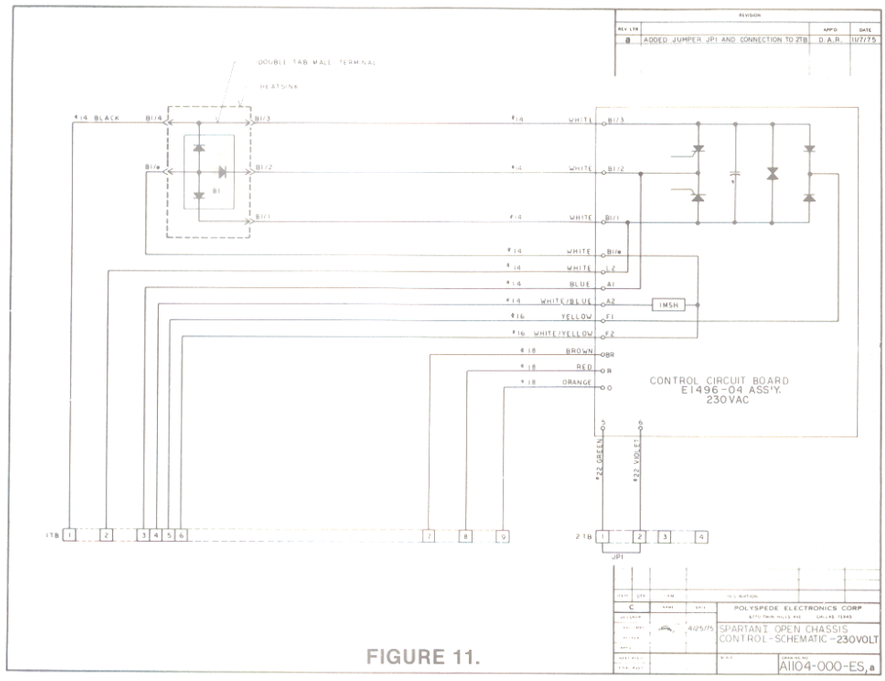

REVISION
REV LTR
DESCRIPTION
APPD
DATE
A
ADDED JUMPER JP1 AND CONNECTION TO 2TB
D.A.R.
11/7/75
DOUBLE TAB MALE TERMINAL
HEATSINK
#14 BLACK
#14 WHITE
#14 BLUE
#14 WHITE/BLUE
#16 YELLOW
#16 WHITE/YELLOW
#18 BROWN
#18 RED
#18 ORANGE
#22 GREEN
#22 VIOLET
IMSN
CONTROL CIRCUIT BOARD
E1496-04 ASS'Y.
230VAC
1TB
2TB
JP1
POLYSPEDE ELECTRONICS CORP
GALAXIE TEXAS
4/25/75
SPARTAN I OPEN CHASSIS
CONTROL-SCHEMATIC-230VOLT
A1104-000-ES,a

FIGURE 11.