

Port-A-Pike II Controller

by Charles Long

Listed below is a circuit diagram and parts list for the 2nd generation power supply and control unit used on Ed Torpey's Port a Pike II layout. It is a momentum transistor throttle connected to a full-scale controller and brake valve.

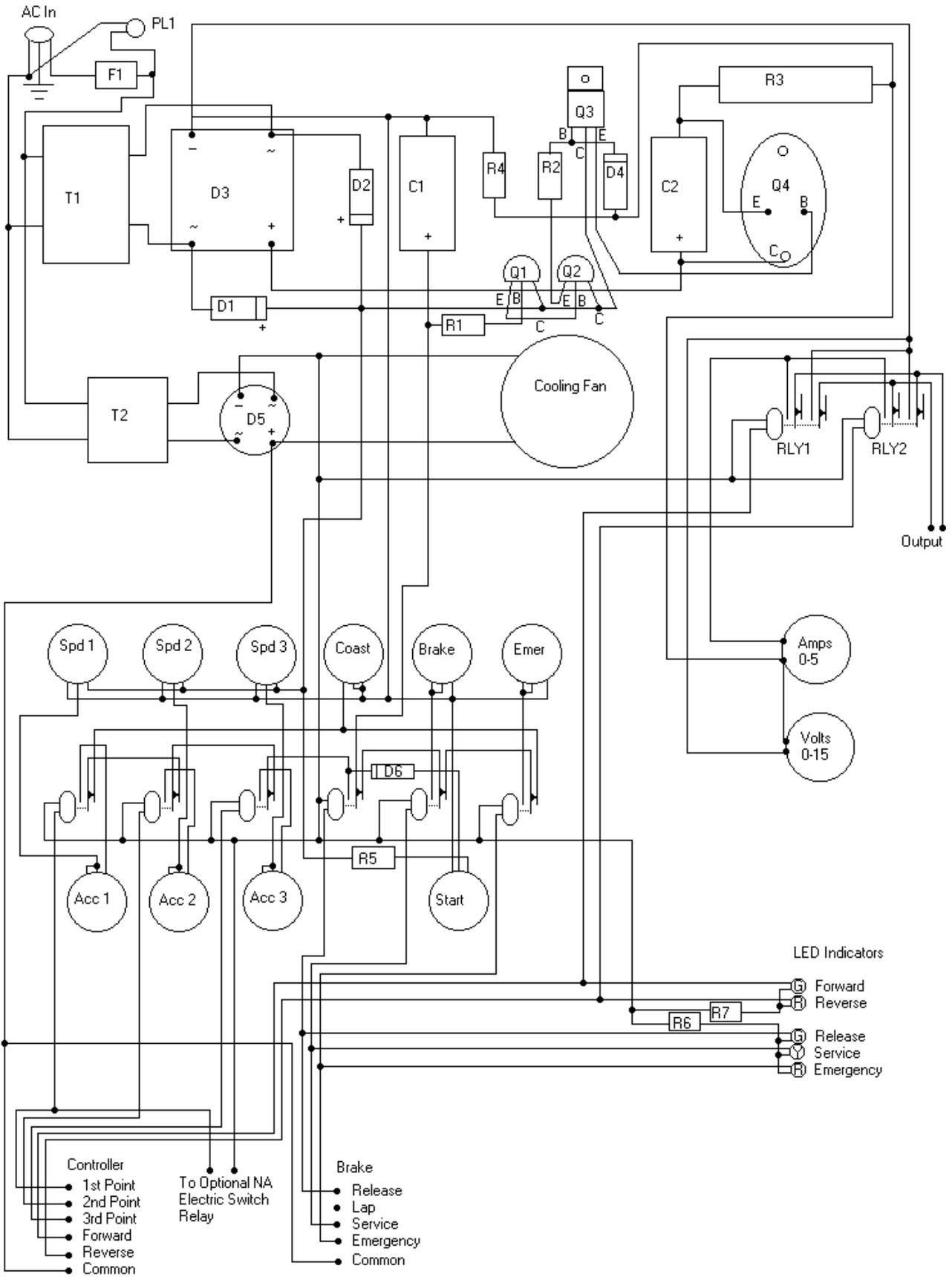
It is based on a "Cooler Crawler" circuit that I found on at www.enteract.com/~weyand, and uses contemporary silicon solid state devices. It replaces an earlier unit based on an old generation 1960's Linn Westcott True Action Throttle circuit.

Ed modified the brake valve to incorporate a wafer switch to provide the electrical contacts. I hard wired the circuits using one small piece of the perf board to hold the six SPDT relays and ten trimmer pots of the control unit and a second larger piece of perf board for most of the components for the main power supply. It is recommended to use heat sink paste between Q4 and the heat sink. I used a small computer-type cooling fan to ventilate the case. Two separate relays were used for the reversing function. This cuts off power when the reverse handle is centered.

I obtained most of the parts from the web sites of the various suppliers, including:

Newark Electronics	www.newark.com
Digi-Key	www.digikey.com
All Electronics	www.allelectronics.com
RadioShack®	www.radioshack.com

Note: The items listed as RadioShack in the parts list are available at both the stores and on line; the items listed as RadioShack.com are only available on line.



Power Unit					
Item	Supplier	Part No.	Quantity	Unit Cost	Total Cost
T1 - 16V 3A Transformer	RadioShack.com	90-5823	1	\$19.65	\$19.65
T2 - 12.6V 300MA Transformer	Radio Shack	273-1385	1	\$3.99	\$3.99
D1, D2 - 1N4001	Newark	09F3574	2	\$0.20	\$0.40
D3 - 6A 400V Bridge Rectifier	Digi-Key	GBPC604-ND	1	\$2.17	\$2.17
D4 - 1N4733A Zener 5.1V	Digi-Key	1N4733ADICT-ND	1	\$0.36	\$0.36
D5 - 1.5A 400V Bridge Rectifier	Digi-Key	W04GGI-ND	1	\$0.46	\$0.46
C1, C2 - 1000 uF 40V	Digi-Key	4145PHBK-ND	2	\$1.84	\$3.68
R1 - 56K Ohm	Digi-Key	56KH-ND	1	\$0.05	\$0.05
R2 - 220 Ohm	Digi-Key	220H-ND	1	\$0.05	\$0.05
R3 - 1 Ohm 10W	Digi-Key	1.0W-10-ND	1	\$0.60	\$0.60
R4 - 1K Ohm	Digi-Key	1.0KH-ND	1	\$0.05	\$0.05
Q1, Q2 - 2N3904	Digi-Key	2N3904-ND	2	\$0.21	\$0.42
Q3 - TIP120	Newark	08F8783	1	\$0.90	\$0.90
Q4 - 2N3055	Newark	09F5475	1	\$1.72	\$1.72
TO3 Heat Sink for Q4	Digi-Key	HS110-3-ND	1	\$1.38	\$1.38
PL1 - 120VAC Green Pilot Lamp	Radio Shack	272-708	1	\$1.35	\$1.35
F1 - Fuse Holder	Radio Shack	270-364	1	\$1.59	\$1.59
RLY1, RLY2 - 12V DPDT	RadioShack.com	90-2351	2	\$5.50	\$11.00
AC Power Cord - 18/3 SJT	All Electronics	LCAC-85	1	\$2.75	\$2.75
Cooling Fan - 12VDC 50MM	All Electronics	CF-97	1	\$3.00	\$3.00
Perf Board	Radio Shack	276-1396	1	\$3.49	\$3.49
Metal Mounting Box	Radio Shack	270-274	1	\$12.99	\$12.99
Total					\$72.06
Control Unit					
Item		Part No.	Quantity	Unit Cost	Total Cost
Speed Potentiometer - 5K	Digi-Key	CT2264-ND	3	\$1.51	\$4.53
Accel Potentiometer - 50K	Digi-Key	CT2267-ND	3	\$1.51	\$4.53
Coast Potentiometer - 50K	Digi-Key	CT2267-ND	1	\$1.51	\$1.51
Brake Potentiometer - 10K	Digi-Key	CT2265-ND	1	\$1.51	\$1.51
Emer Potentiometer - 2.5K	Digi-Key	CT2263-ND	1	\$1.51	\$1.51
Start Potentiometer - 5K	Digi-Key	CT2264-ND	1	\$1.51	\$1.51
Green LED with Holder	RadioShack.com	90-1458	2	\$0.94	\$1.88
Red LED with Holder	RadioShack.com	90-1459	2	\$0.94	\$1.88
Yellow LED with Holder	RadioShack.com	90-1460	1	\$0.94	\$0.94
SPDT Relays	Newark	83F5384	6	\$1.56	\$9.36
D6 - 1N4001	Newark	09F3574	1	\$0.20	\$0.20
R5 - 4.7K Ohm	Digi-Key	4.7KH-ND	1	\$0.05	\$0.05
R6, R7 - 1K Ohm	Digi-Key	1.0KH-ND	2	\$0.05	\$0.11
5A DC Panel Meter	All Electronics	PMD-5A	1	\$12.00	\$12.00
15V DC Panel Meter	All Electronics	PMD-15V	1	\$12.00	\$12.00
Plastic Mounting Box	Radio Shack	270-1807	1	\$5.89	\$5.89
Total					\$59.41