USER GUIDE

TC100D2C LUBRICATION CONTROLLER

AUSTRALIA WIDE

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Contents

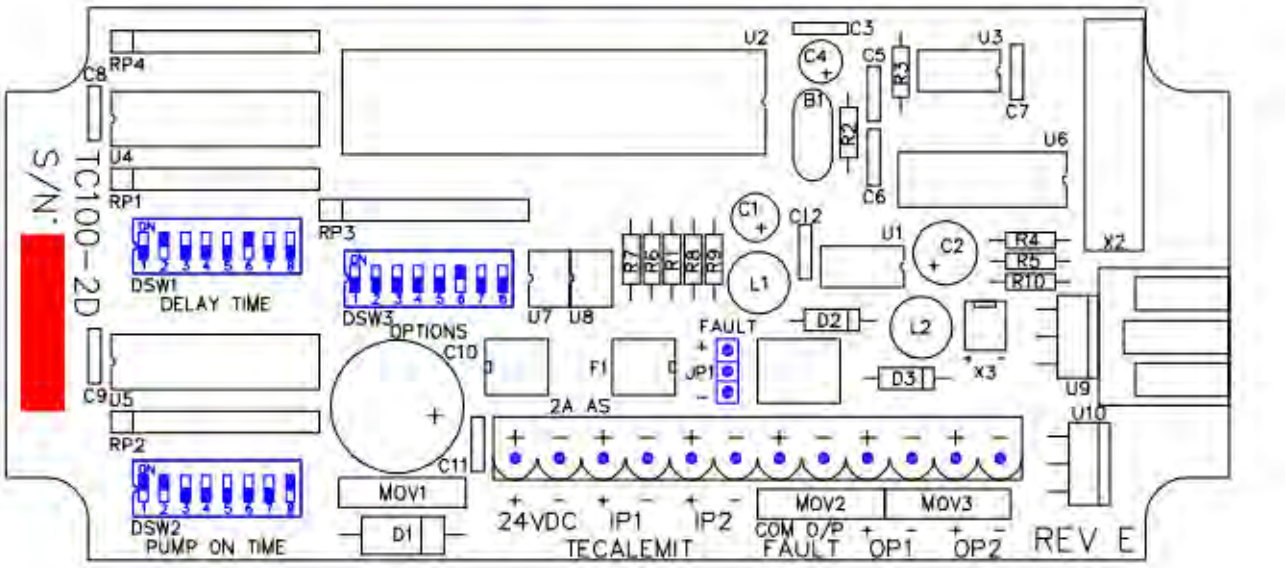
Product Information

The TC100D2C Lubrication System Controller is suitable for use on:

- Single Line (Injector) based lubrication systems, controlled by a N.O. pressure switch.
- Progressive (divider block) lubrication systems, controlled by:
  - Cycle Count Switch or 2-WIRE Proximity Sensor - or;
  - Time OFF / Time ON (unmonitored) Progressive Systems.

MAKE	MODEL	TYPE	VARIANT	Voltage
CooperBuilt	TC100D2C	Lubrication Controller	V6.1	24V DC

TC100D2C PRINTED CIRCUIT BOARD - REV E



24VDC	Power Supply input (Internal fuse: 20 x 5mm 2Amp anti-surge)
IP1	Pressure switch, Cycle switch or Proximity Sensor input (N/O volts-free)
IP2	Low Level or Remote Test switch input (N/O volts-free)
FAULT	Fault Alarm Relay output (jumper selectable: N/O volts-free contact, configurable switched 24VDC+ or 0VDC-. Resettable fuse rating: 0.5Amp)
OP1	Pump **SSR** output (switched 24VDC, 30Watts, 1.25A)
OP2	Valve Solenoid **SSR** output (switched 24VDC, 20Watts, 1.00A)
	SSR = Solid State Relay (short circuit protected)

NOTE: Maximum current draw on OP1 and OP2 must not be exceeded.

For high current devices, such as DC grease pumps - connect an external power relay.

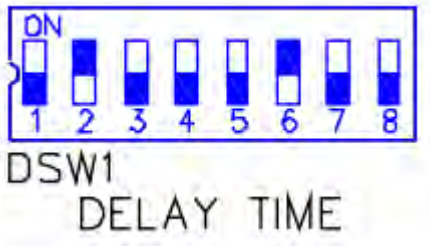
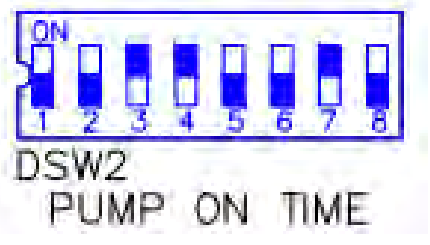
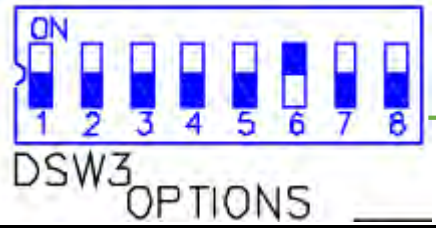
Controller Setup

DIP Switch Banks

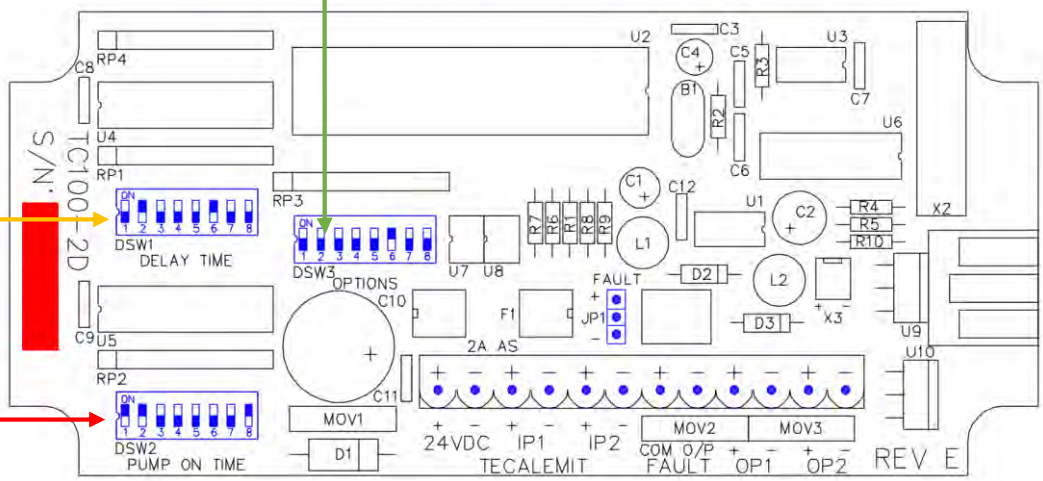
There are three 8-way DIP switches labelled **DSW1** *(DELAY TIME)*, **DSW2** *(PUMP ON TIME)* and **DSW3** *(OPTIONS)* that are required to be set by the user.

The controller is programmed by turning **ON** numbered DIP switches. **DSW** switches in the **DOWN** position are **OFF**. Switches in the **UP** position are **ON**. A reference table is included on the following pages, which lists the various ON / OFF combinations needed to set the controller.

Note - The DIP switches are read only during the power-up sequence, so changes made while the power is on will not be recognised until next time the unit is powered up. *We recommend that changes to the DIP switch settings should only be performed with the power off.*

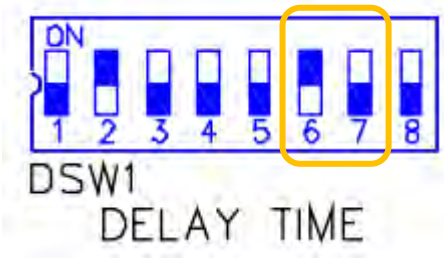
	**DSW1** is used to select the **DELAY** (pause) time between lube cycles. A Prelube function can also be selected (start a lube event immediately on power up)
	**DSW2** is used to select the pump **RUN** (on) time. This is the *maximum* amount of time the pump can run before a fault alarm is logged.
	**DSW3** is used to select the various options. *Options include*: Pressure Switch monitoring, Cycle Switch Monitoring, Remote Manual Lube Switch function, Pulsed Output.

TC100D2C PRINTED CIRCUIT BOARD - REV E



Setting DSW1 (Delay) Time

Select the UNIT of TIME: the first step is to select what unit-of-time you want to use for the DELAY setting. The TIME UNITS available to choose are: *2-seconds, Minutes, 10-minutes, Hours.*



Pins 6 – 7 are used to select the **UNIT** of time

The multiplier units available to choose are:
2-seconds, Minutes, 10-minutes, Hours

Select the UNIT of TIME (pins 6-7):

	Switch	6	7	8	TIME UNITS
	DSW1	0	0		2 seconds
	DSW1	0	1		1 minute
	DSW1	1	0		10 minutes
	DSW1	1	1		1 hour
Prelube Option	DSW1			1	Run lube cycle on power-up

0 = OFF **1= ON**

Example above:

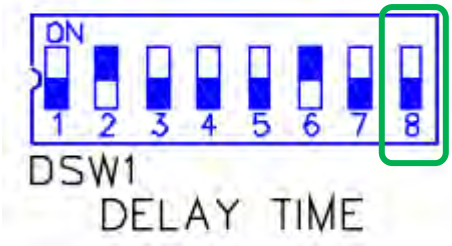
- **Pin 6 ON**, the controller will measure time in blocks of **10-minutes.**
- **Pin 2 ON:** Multiplier Value of 2 (2 x 10-minutes = 20 Minute **DELAY** time)

To measure time in **MINUTE**S, turn on **PIN 7** only.

To measure time in **HOURS**, turn on **PIN 6 & 7.**

Select the PRELUBE function:

The controller can be set to start a LUBE EVENT as soon as power is applied. This is not recommended on machines where the pump power source is not available at start up – e.g. Pneumatic Grease pumps, as the air tank may take time to fill at start up.

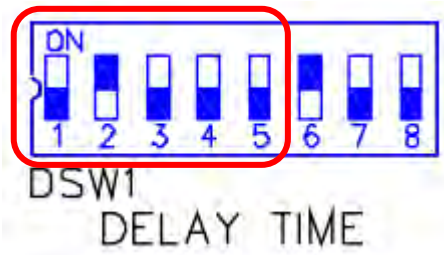


Pin 8 is used to enable the **Prelube Function.**

With this switch **ON** the controller will start a lube event immediately when the power supply is connected.

- **Pin 8 OFF:** the controller will NOT start with a Prelube at Power-up.
- **Pin 8 ON:** the controller WILL start with a Prelube at Power-up.

Select the DELAY TIME Interval:



Pins 1 – 5 are used to select the pump **DELAY** time value (or *multiplier*)

The number you enter here will be multiplied by the Time Units.

Example: Switch 2 ON = a TIME value of 2

Example settings below: 2 x 10-minutes = 20 Minute DELAY time.

1. In the TIME MULTIPLIER column, find the TIME value you want to enter into the controller.
   a. In this example, we want a value of 2.
2. Refer to the columns 1-5. These represent the switches that you need to turn ON at DSW1.
   a. 0 = OFF 1 = ON
   b. In this example, we would turn on switch 2 at DSW1.

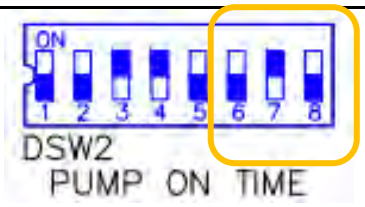
1 2

TIME	DSW1 Switches to Turn ON				
MULTIPLIER	1	2	3	4	5
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	0
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1
26	0	1	0	1	1
27	1	1	0	1	1
28	0	0	1	1	1
29	1	0	1	1	1
30	0	1	1	1	1

Setting DSW2 Pump RUN (On) Time

Select the UNIT of TIME: the next step is to select what unit-of-time you want to use for the pump RUN time setting. The TIME UNITS available to choose are: 1-*seconds, 10-seconds, Minutes.*

If the system uses a Pressure Switch or Proximity Cycle switch to end the lubrication cycle, this setting will determine the maximum amount of time that the pump can run before a fault is logged. (E.G: If no signal is received at IP1 during the pump ON time, an alarm FAULT will be displayed).



Pins 6 – 8 are used to select the **UNIT** of time and output type

The multiplier units available to choose are:
1-second, 10-seconds, 1-minute

Select the UNIT of TIME (pins 6-8): the unit selected here will be multiplied by the value that you select on pins 1-5.

	Switch	*6*	*7*	*8*	*TIME UNITS*
Standard Output	DSW2	1	0	0	1 second
Standard Output	DSW2	0	1	0	10-seconds
Standard Output	DSW2	0	0	1	1 minute
Pulsed Output at OP1	DSW2	0	1	1	Pulsed Output: Seconds ON / OFF

0 = OFF **1= ON**

STANDARD OUTPUT Example above:

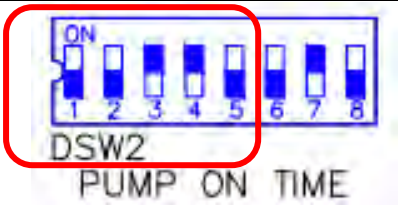
- **Pin 7 ON**, the controller will measure RUN TIME in blocks of **10-seconds.**

If you wanted to measure time in **SECONDS**, turn on **PIN 6** only.

If you wanted to measure time in **MINUTES**, turn on **PIN 8** only.

PULSED OUTPUT OPTION: The controller also has a pulse feature that can be used to drive *reciprocating hydraulic grease pumps*. Enabling this feature will send a pulsed signal output at OP1: cycling ON / OFF. The duration of these pulses is set on **DSW3** – see next page for info.

Select the RUN TIME Interval:



Pins 1 – 5 are used to select the pump **ON** time value (or *multiplier*)

The number you enter here will be multiplied by the Time Units below.

Example: Switch 3 & 4 ON = a TIME value of 12

Example settings below: 12 x 10-seconds = 120 seconds RUN time.

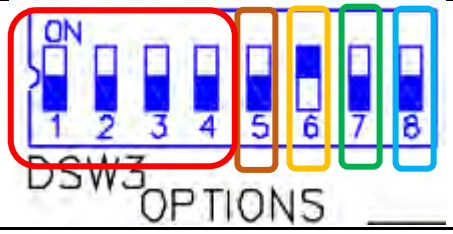
1. In the TIME MULTIPLIER column, find the TIME value you want to enter into the controller.
   a. In this example, we want a value of 12.
2. Refer to the columns 1-5. These represent the switches that you need to turn ON at DSW2.
   a. 0 = OFF 1 = ON
   b. In this example, we would turn on switches 3 & 4 at DSW2.

1 2

TIME MULTIPLIER	DSW2 Switches to Turn ON 1	2	3	4	5
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	0
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1
26	0	1	0	1	1
27	1	1	0	1	1
28	0	0	1	1	1
29	1	0	1	1	1
30	0	1	1	1	1

Setting DSW3 (Options)

DSW3 Pressure Switch, Remote Manual Lube, Pulsed Output options: **DSW3** is used to select the various options, such as Pressure Switch Monitoring, Cycle Switch Monitoring, Remote Manual Lube Input and Pulsed output timing.



DSW3 is used to select the various options.

Options include: Pressure Switch monitoring, Cycle Switch Monitoring, Remote Manual Lube Switch function, Pulsed Output.

Pressure Switch (DSW3 switch 6 ON): ***(with switches 1-4 OFF)*** Enables pressure switch function to end the lube cycle. The controller will monitor IP1+ and IP1- for a CLOSED input signal. When a closed circuit is detected from the pressure switch, the lube event will end. If the signal is not detected within the PUMP ON time, an alarm will be triggered.

Remote Manual Lube (DSW3 switch 7 ON): Enables IP2 to be used as a manual lube button input. Closing the circuit on IP2+ and IP2- will initiate a Manual Lube event. (Note: enabling this function will disable the ability to use IP2 as a low-level input.

Pulsed Output Feature (DSW3 switch 5 on): **OP1** pulse interval (seconds) set by switches 1 - 4 below. Pulsing option must also be selected via **DSW2** switch, pins 7 & 8 ON). Enabling this feature will disable the abilty to use the CYCLE count input option.

Ignore IP1 (DSW3 switch 8 ON): Disables pressure switch function to end the lube cycle. Used for unmonitored Progressive systems.

Example settings below: Pulse Interval 2 = 2-seconds ON, 2-seconds OFF.

OP1 pulse interval (seconds)	DSW3 Switches to turn ON			
	1	*2*	*3*	*4*
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

DSW3 Cycle Count Option:

Pressure Switch (DSW3 switch 6 ON): *(with switches 1-4 set ON as below)* Enables cycle count switch function to end the lube cycle. The controller will monitor IP1+ and IP1- for the required number of closed-input signals. E.G. if set for 5 pulses, when IP1 is triggered 5 times, the lube event will end. If the 5 signals are not detected within the PUMP ON time, an alarm will be triggered.

IP1 activations	DSW3 Switches to turn ON			
	1	*2*	*3*	*4*
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

NOTE: The Cycle-count input and Pulsed Output features cannot be selected at the same time.

Fault Output Terminal Strip Configurations.

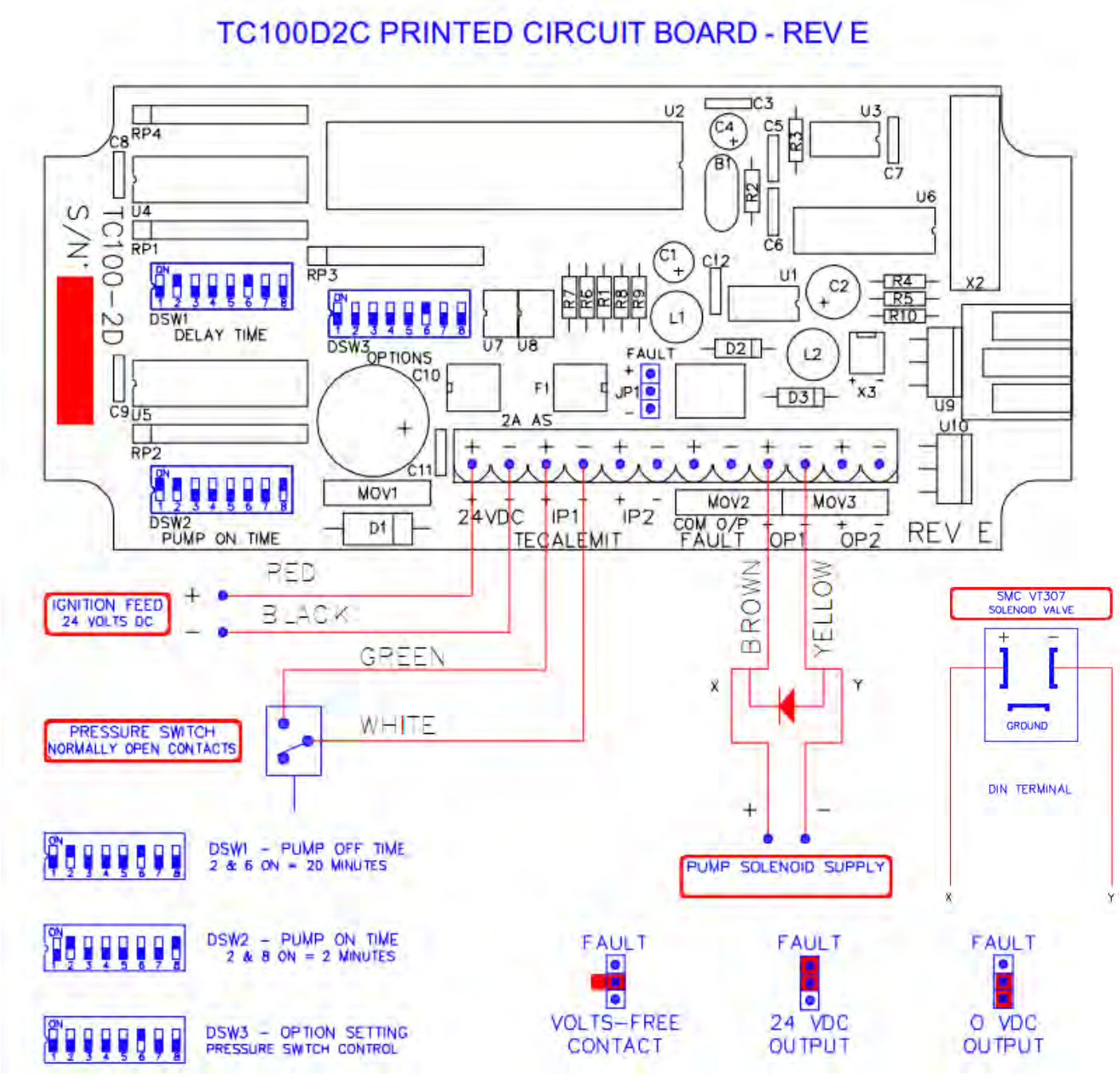
Optional: The FAULT output terminal strip can be connected to an external device of the users choice, to trigger a warning device such as a beacon, lamp, buzzer or send an alarm output signal to other on-board vehicle systems (such autonomous vehicle monitoring systems).

The polarity of the FAULT O/P terminal can be configured so that when controller is in FAULT mode (Fault Lamp Illuminated) the signal is either a Volts-Free Contact, 24V DC+ Output or 24V DC- Output.

	**JP1 jumper connected to Centre and + Pins.** FAULT O/P will output a 24V DC (pos) signal. (COM not used).
	**JP1 jumper connected to Centre and - Pins.** FAULT O/P will output a 24V DC (neg) signal. (COM not used).
	**JP1 jumper connected Centre Pin ONLY.** COM and O/P circuit will close on FAULT

Wiring Diagrams

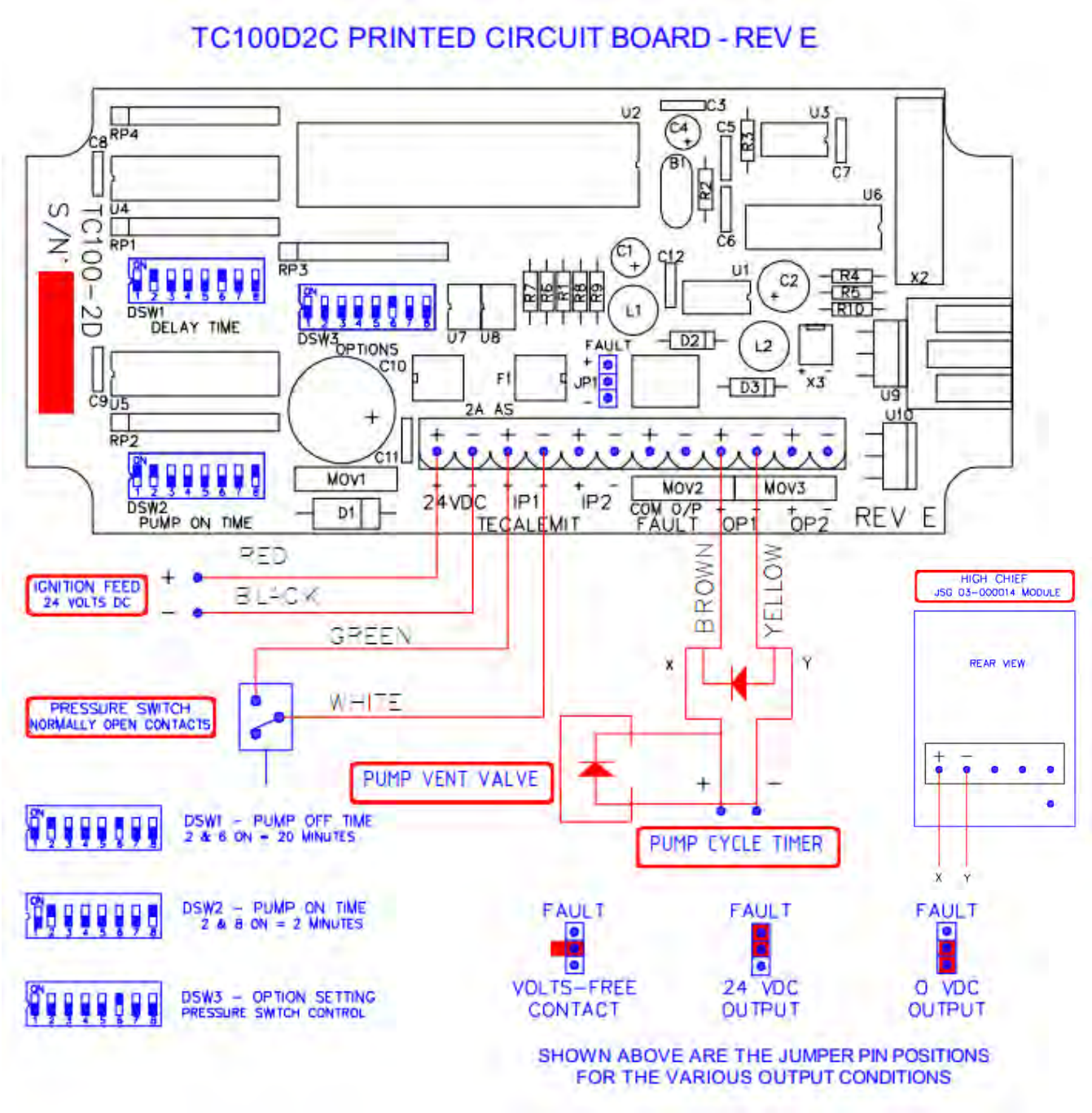
Single Line: Pneumatic Pumps.



Standard Settings for 20-minute Delay, 2-minute pump-on with pressure switch deactivation.

	Switch DSW1							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON				ON		
	Switch DSW2							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON						ON
	Switch DSW3							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position						ON		

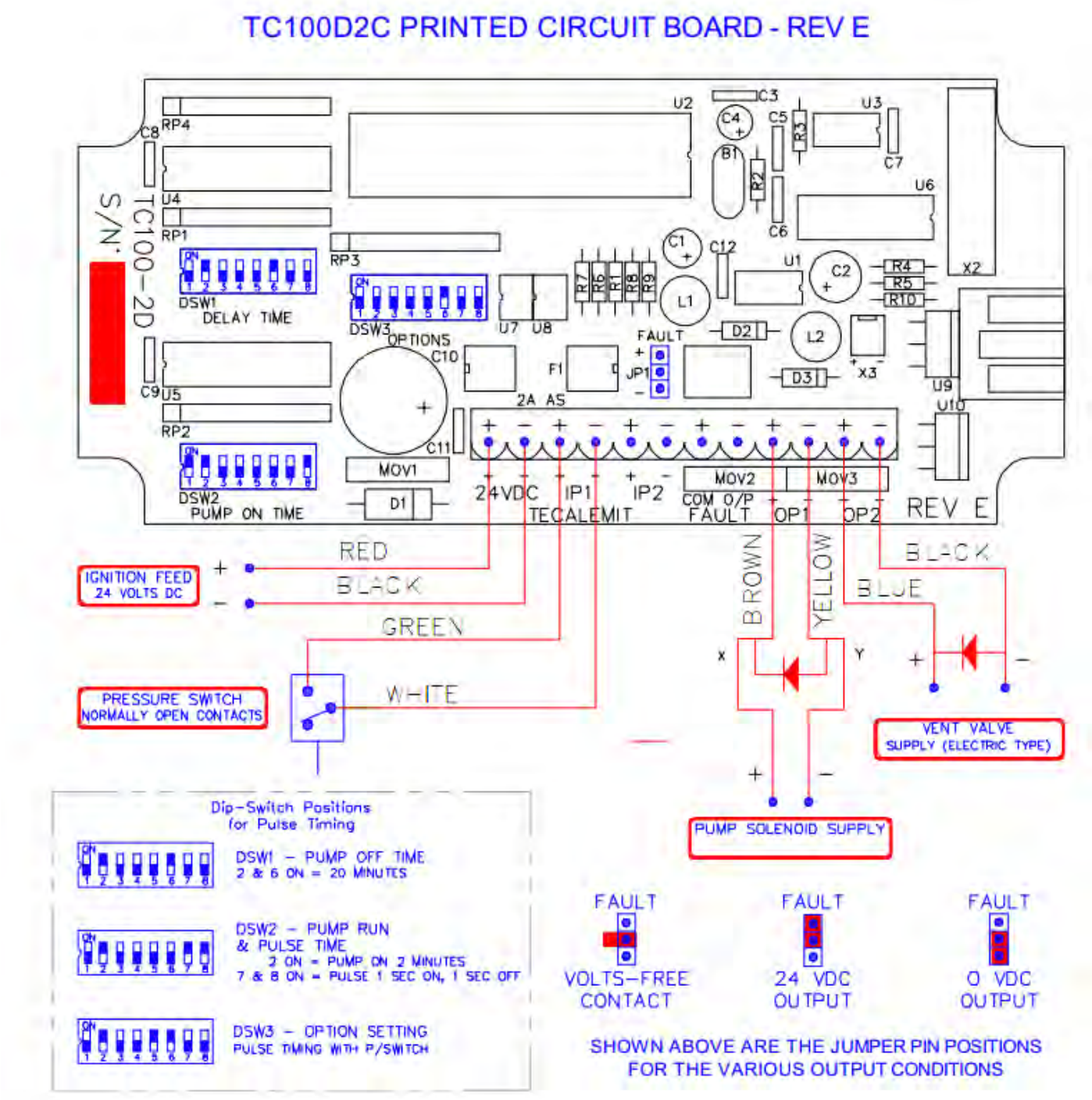
Single Line: Hi-Chief Hydraulic Pumps (with onboard Cycle Timer):



Standard Settings for 20-minute Delay, 2-minute pump-on with pressure switch deactivation.

	Switch DSW1							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON				ON		
	Switch DSW2							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON						ON
	Switch DSW3							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position						ON		

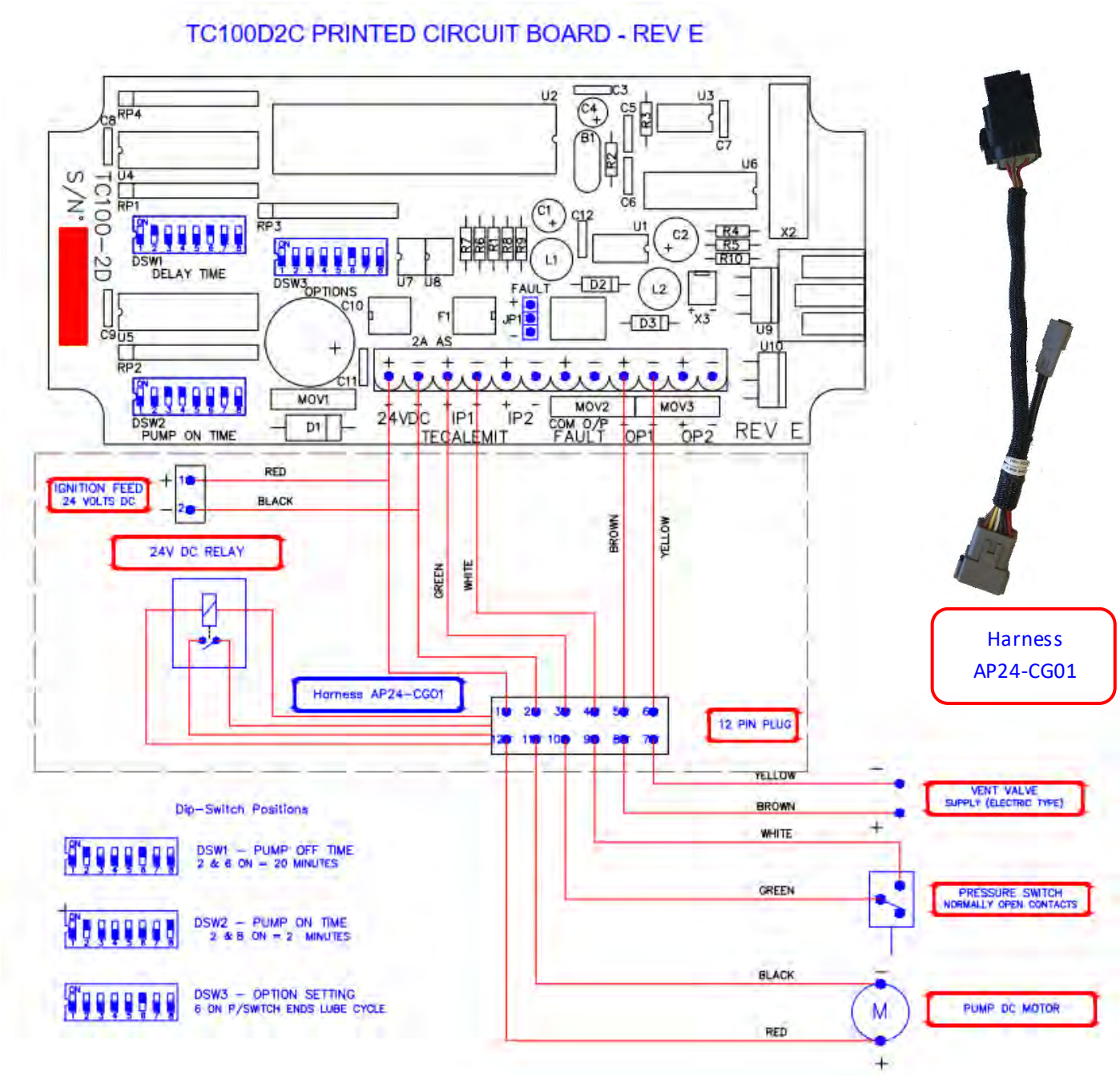
Single Line: Hi-Chief Hydraulic Pumps (with external Pulse Signal).



Pulsed Output Settings for 20-minute Delay, 2-minute pump-on with pressure switch deactivation.

	Switch DSW1							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON				ON		
	Switch DSW2							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON					ON	ON
	Switch DSW3							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON			ON	ON		

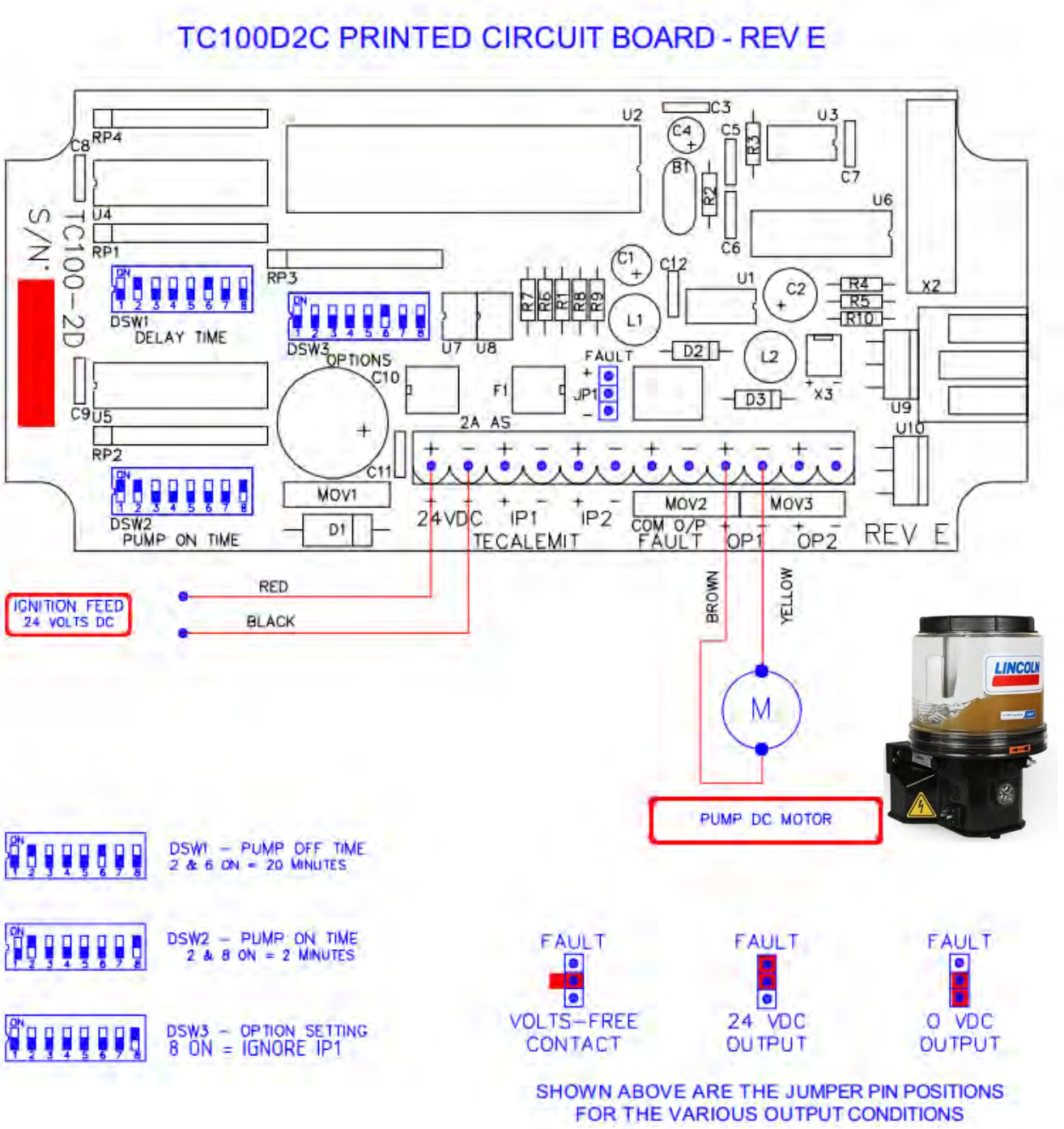
Single Line: Flowmaster DC Motor Pumps (with external Power Relay).



Standard Settings for 20-minute Delay, 2-minute pump-on with pressure switch deactivation.

	Switch DSW1							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON				ON		
	Switch DSW2							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON						ON
	Switch DSW3							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position						ON		

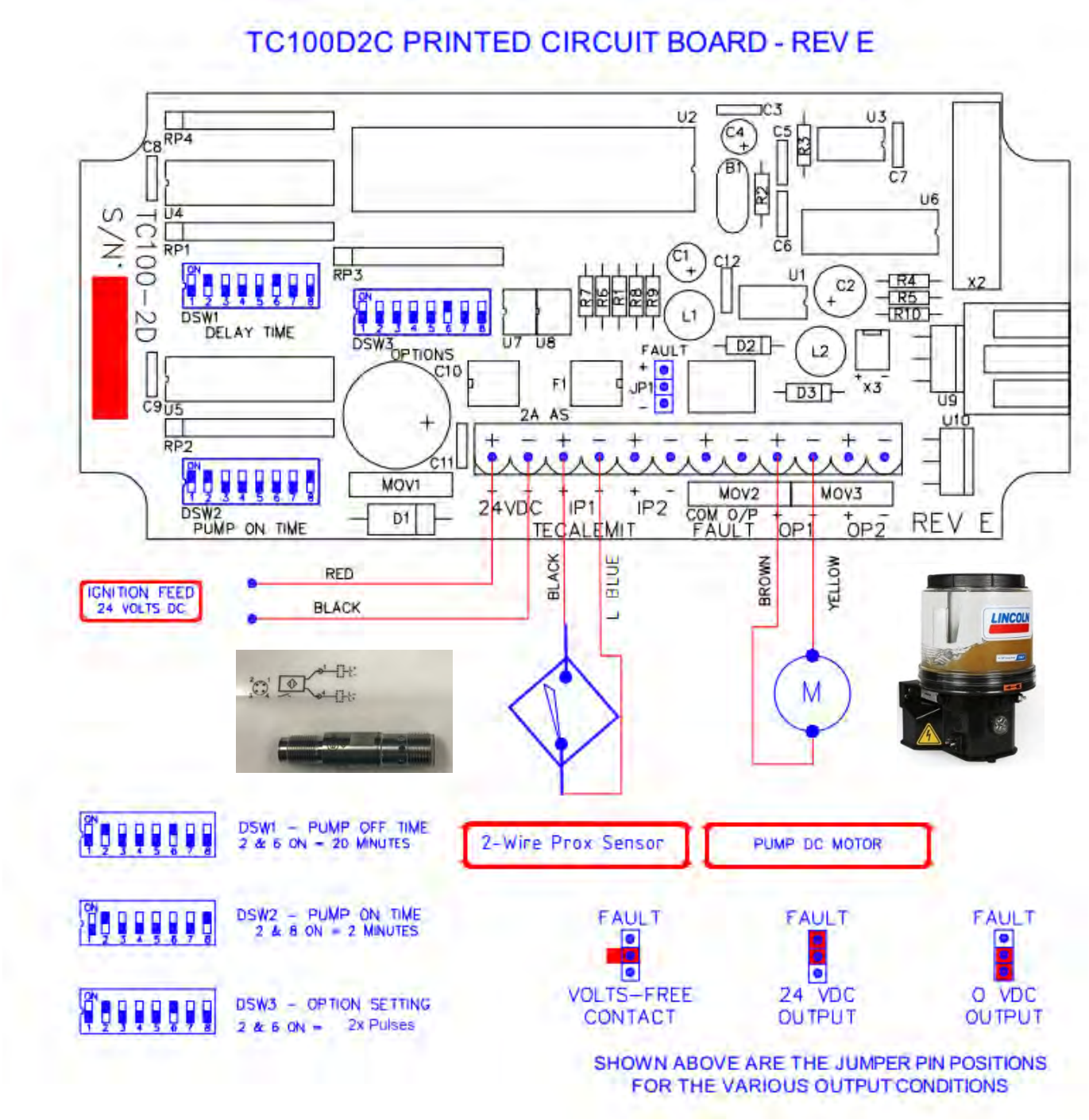
Progressive: DC Motor Pumps (no monitoring):



Standard Settings for 20-minute Delay, 2-minute pump-on (No monitoring).

	Switch DSW1							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON				ON		
	Switch DSW2							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON						ON
	Switch DSW3							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position								ON

Progressive: DC Motor Pumps (cycle switch monitoring):



Standard Settings for 20-minute Delay, 2-minute pump-on (2x Pulse Count).

	Switch DSW1							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON				ON		
	Switch DSW2							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON						ON
	Switch DSW3							
Pin No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Position		ON				ON		

LCD Screen: RUN and ERROR Messages

	**AT POWER-UP:** When power is first connected to the controller, all the lamps will briefly flash once (lamp test). The software version is also briefly displayed (e.g. 59 = V5.9, 60 = V6.0)
	**ZERO's Flashing at POWER-UP: ERROR** Flashing 00's indicates that an incorrect DIP switch setting has been selected. Refer to the programming steps and reset the DIP switches.
	**PUMP ON (Lamp - solid): Controller is in STANDARD mode** Pump is running. Output at OP1 is energised (constant while lamp is on) **PUMP ON (Lamp flashing): Controller is in PULSE output mode** Pump is running. Output at OP1 is energised (pulsing while lamp is on)
	**FAULT Lamp Illuminated: Single Line Injector Systems** The controller did not detect an INPUT from the pressure switch during the PUMP-ON time at IP1. **FAULT Lamp Illuminated: Progressive Systems** The controller did not detect the required number of INPUT's from the cycle switch during the PUMP-ON time at IP1
	**Number displayed during NORMAL Operation:** Shown is the number of successful lubrication events since the controller was powered up. This will count up by 1 with each successful lubrication event.
	**Number displayed and FAULT lamp is illuminated:** Shown is the number of lubrication events just prior to when the controller went into alarm mode. This number will remain static until the fault is cleared and a successful lubrication event is completed. **To acknowledge / clear the FAULT: Press TEST once.** The controller will attempt another lubrication cycle immediately.
	**LOW LEVEL Lamp Illuminated: (where optional level sensor is fitted)** Low Level Input triggered (IP2 Closed Circuit)

During the Pump On Time period, Input IP1 must close otherwise FAULT will be indicated. If IP1 is closed at the beginning of the Pump On cycle, it must open and then close again to avoid FAULT indication.

When a FAULT is indicated, all outputs are deactivated until the controller is reset. by either interrupting power or by pressing the TEST switch on the front panel. Pressing TEST resets the Delay Time period to zero and energises output OP1 immediately.

Document History

Rev.	Date	Nature of Changes	Process Owner	Approved By
1.0	31/05/2022	Draft	J. Gibson	
1.1	20/06/2022	1ST Release	J. Gibson	