



Installation, Operation, and Maintenance Manual



Welker[®] Oil Injection Pump

Model OIP-1,-2, & K-001.02

The information in this manual has been carefully checked for accuracy and is intended to be used as a guide to operations. Correct operating and/or installation techniques, however, are the responsibility of the end user. Welker reserves the right to make changes to this and all products to improve performance and reliability.

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Section 1 - General Information

1.1 Introduction

The Welker OIP series of Injection Pumps are engineered to inject a small volume of oil into the bearings of turbine style meters, reducing the maintenance required to keep bearings properly lubricated, while improving overall meter performance. The oil is gravity fed into the pump, utilizing a check-valve to isolate the pipeline pressure from the oil reservoir. The system may be electronically controlled by a timer assembly or a voltage signal from a meter source.

1.2 Model Numbers

OIP-1AK Oil Injection Pump with 250 cc oil reservoir in 10" x 8" x 6" NEMA 4X enclosure, Internal check valve, .25 cc/stroke, 6 VDC solenoid, 20 to 100 psi operating range.

OIP-1BK Welker 6Tc, 6VDC battery powered timer (UL listed) with 15 sec.- 255 hr. range.

OIP-2AK Oil Injection Pump with 250 cc oil reservoir in 10" x 8" x 6" NEMA 4X enclosure, Internal check valve, .25 cc/stroke, 6 VDC solenoid, 20 to 1,440 psi operating range with instrument supply regulation package.

OIP-2BK Welker 6Tc, 6VDC battery powered timer (UL listed) with 15 sec.- 255 hr. range.

OIP-()X SS fittings & tubing

1.3 System Specifications

Injection Pump

Operating pressure:.....1,440 psi
Actuation Pressure:.....15-100 psi
Injection Volume:..... 0.25 cc (nonadjustable)
Material:..... Anodized Aluminum
Connection:..... Female, ¼" npt

Instrument Regulator

Max. Inlet:.....3,000 psi
Max. Output:.....120 psi.
Material:.....Anodized Aluminum
Relief Valve:.....Set at 85 psi
Gauge:.....0-100 psi,
Connection:.....Female, ¼" npt

System Weight:

10 lbs 4.54 kilograms

Oil reservoir

Material:.....Anodized Aluminum
.....Polycarbonate
Capacity:.....250 cc w/ 50 cc
graduations

Enclosure

Material:.....Polycarbonate
Rating:.....Nema 4X
Dimensions...10" x 8" x 6"

Standard enclosures come with snap tight latches and a sealed door.

Section 2 - Installation

2.1 Mounting

The system should be installed in a vertical position as close as possible to the meter. Mounting bracket, Welker Part # ME46900, may be used to simplify the installation. The bracket mounts to the back of the enclosure and clamps onto a 2" pipe pole.

NOTE *It is recommended that a needle valve be installed on the meter oiler port, so that the pump may be isolated from the meter for maintenance.*

2.2 Connections

The outlet of the pump is a female, ¼" npt connection. Connect the pump outlet to the inlet of the lubrication port of the meter (**1/8" tubing is recommended**). The smaller diameter tubing will allow the oil to be pumped into the meter faster. Connect the air supply to the female ¼" npt bulk-head fitting on the outside of the enclosure (**1/4" tubing is recommended**). The larger tubing will allow a faster response when the pump solenoid is energized. Once this has been completed, engage the air supply and set the regulator to 70 psi. Check all connections carefully to verify that there are no air leaks in the supply system.

After connections are completed, proper power may be applied to the solenoid to actuate the pump for purposes of injection verification.

NOTE: *When sealing fittings with PTFE tape, refer to the proper sealing instructions for the tape used.*

2.3 Filling Reservoir

Remove the oil fill cap on the reservoir and fill with the meter manufacturer's recommended oil. When the system has been filled, re-install the oil fill cap and hand tighten. The oil fill cap is equipped with a seal that protects the oil from environmental contamination.

NOTE *Do not fill reservoir past the 250 cc mark. The top cap is equipped with a vacuum vent and any excess fill amount will be spilled from this port.*

2.4 Start-Up

Many meters are sent out without any lubrication. Refer to meter manufacturer's Instructions for recommended oil, oiling frequency and start-up procedures.

When the injection system is equipped with the Welker 6Tc timer assembly, please refer to the 6Tc instructions for startup, testing and operational procedures. The injection pump must be manually actuated several times to verify lubrication to the meter.

NOTE* *The 6Tc timer is equipped with a manual override that strokes the pump to inject oil. Do this several times while observing the oil level in the reservoir to verify the pump is injecting oil. ***NOTE* *The fitting at the metering valve may be cracked open for verification.***

A quantity of lubrication oil commonly suggested by meter manufactures for meters, in normal use, i.e. areas of average temperature and pressure, is 3.0 cc per month. This would equate to the Welker Oil Injection pump making approximately 12 strokes per month with the stroke volume of .25 cc. In extreme service of higher flow rates, higher pressures and temperatures, or in dirty environments, more frequent lubrication may be necessary.

Section 3 - Electronics

3.1 Introduction

The Welker model 6Tc Timer / Controller is a programmable electronic device primarily used to control sample pumps and injection pumps. The 6Tc can operate a solenoid proportional to time or proportional to flow. Proportional-to-flow injection is accomplished by an open collector or dry contact input. A 12-position slide switch allows the user to turn power on, set sample frequency (time or flow), and dwell time of output. A simple push button allows the operator to manually actuate the pump.

When the system does not include a timer assembly, the wiring connections from the power source to the solenoid must be connected to meet industry standards. A dwell time of 2 to 5 seconds is necessary to pulse the solenoid.

For systems not equipped with a Welker supplied Instrument Regulator, it is recommended that a relief device be incorporated into the air supply. Over-pressuring the system will damage the solenoid and void the warranty.

3.2 Listing

The Welker model 6Tc Timer / Controller is C-UL listed for use in Class 1, Division 1, Group C & D hazardous locations when used with a self-contained Welker battery (part no. EBPL072125), and when installed in accordance with wiring diagram EL-530. The timer has a Temperature rating of T3C.

WARNING ***Substitution of components may impair intrinsic safety of the 6Tc Timer / Controller.***

3.3 Wiring information

All wiring to the 6Tc Timer is installed for Class 1, Division 1 hazardous locations, in accordance with Article 504 (Intrinsically Safe Systems) of the National Electric Code NFPA 70. When other methods are used to pulse the solenoid the National Electric Code NFPA 70 should be followed for hazardous locations.

3.4 Specifications

Duty

Continuous

Input

Open Collector or Dry Contact
Impedance-470K Ohm (pull up to 5V)
Max Frequency 1 kHz

Terminal Strip

4 Point
12 AWG Max. Wire Size

Battery Pack, EBPL072125

Voltage: 7.2 VDC @ 12.5AH
Composition: Lithium-Thionyl Chloride
Cycle Life: 150,000 (2 Second Dwell)
Shelf Life: 10 Years

Battery Pack, EBPL072125

6.7 oz.....190 grams

Power

Voltage.....6.0 - 7.3 VDC
Current.....standby - 60mA @ 7.2 VDC
.....operating - 120 mA @ 7.2 VDC

Output

Transistor @ 500 mA
Blocking Diode for Inductive Protection

Operating Temperature:
-40°F to +180°F

Area Classification

Hazardous Areas
Intrinsically safe for use in
Class 1, Div. 1, Groups C and D

U. L. APPROVED

File E122722

Section 4 - Electronics Installation

4.1 Electrical Connections

The wiring terminals for connecting external devices to the 6Tc Timer / Controller are located on the lower right corner of the circuit board.

NOTE All electrical connections made to the 6Tc Timer must be made in accordance with wiring diagram EL-530 located at the rear of this manual.

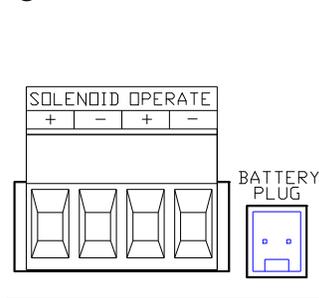


Figure 4.1

4.1.1 Open Collector / Dry Contact Input

The 6Tc Timer / Controller is capable of receiving one (1) open collector or dry contact input. This signal can represent flow rate or it can be permissive to operate.

When connecting an open collector to the 6Tc Timer / Controller, connect the positive lead of the signal to OPERATE (+) and the negative lead to OPERATE (-).

CAUTION If polarity is not correct, the pulse input will not be received.

When connecting a dry contact closure to the 6Tc Timer / Controller, connect the leads to OPERATE (+) and OPERATE (-). Polarity does not have to be observed.

NOTE Refer to Figure 4.1 for wiring terminal location.

4.2 Solenoid

The 6Tc Timer / Controller is capable of operating only one solenoid at a time. The Welker OIP system is currently designed to use only the Clippard solenoid valve. The red wire of the solenoid should be connected to the SOLENOID (+) and the black wire to SOLENOID (-) on the 6Tc Timer / Controller. Refer to Figure 4.1 for wiring terminal location.

NOTE *If a solenoid other than those listed in this documentation is used, the integrity of the intrinsically safe system will be violated and the C-UL listing voided.*

4.3 Solenoid Specifications

Inlet Connection

10-32 Male Thread

Air Flow

@ 100 psi. - 0.6 scfm

Exhaust Connection

10-32 Female Thread

Pressure Range

0 - 105 psi.

Type

Normally Closed 3-way
Bubble Tight

Voltage

6, 12 or 24 VDC

Temperature Range

30°F to 180°F

Power Consumption

0.67 watts @ rated voltage

4.4 Power System

The battery pack that powers the 6Tc Timer / Controller is located behind the cover plate attached to the inside of the NEMA 4X enclosure. To remove the battery, turn timer off and disconnect wire lead from battery plug on the 6Tc timer board. Loosen thumb screws and remove cover plate. Remove the battery back from the clasp that holds the battery in position and discard it. Replace with new battery, replace cover plate and thumb screws. Reconnect wiring leads and turn the 6Tc Timer / Controller on for operation.

CAUTION

DISPOSAL OF LITHIUM BATTERY CELLS IS REGULATED BY THE E. P. A. CONTACT YOUR LOCAL E. P. A. REPRESENTATIVE FOR PROPER DISPOSAL INSTRUCTIONS.

Section 5 - 6Tc Operation Instructions

5.1 Overview

This section describes the basic programming specifications for the 6Tc Timer / Controller. Programming is accomplished by setting the switch bank located in the upper right side of the 6Tc board.

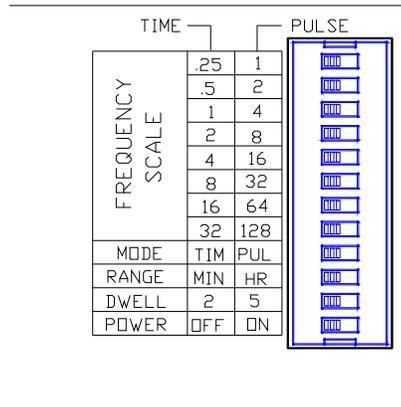


Figure 5.1

5.2 Dwell Time

Adjusting the dwell time, or the time required to actuate the pump until completion of injection, is accomplished by the switch labeled, DWELL. The dwell time options available are 2 and 5 seconds. Typically, a 2-second dwell time will be sufficient to complete the cycle of actuation.

5.3 Mode of Operation

The 6Tc has two modes of operation, TIMED and PULSE. Setting the MODE switch for (TIM) allows for frequency of actuation from 15 seconds to 60 hours.

Setting the MODE switch to (PUL) allows a maximum pulse count range of 1 to 255. This mode requires an input from a proportional to flow signal-producing device, such as a turbine meter or flow computer.

5.4 Frequency for Timed Mode

When setting the 6Tc Timer / Controller for Timed Mode, set the MODE switch to (TIM) and the range to either (MIN) or (HR). Then set the frequency scale for the amount of time desired between strokes. This may be done by sliding the switches to the right for on, or to the left for off. To calculate the time between strokes, add up all the values that are in the on position.

5.5 Frequency for Pulsed Mode

When setting the 6Tc Timer / Controller for a pulsed input, set the MODE switch to (PUL). The FREQUENCY SCALE setting is determined by the scale of pulses being sent to the 6Tc from the Flow Computer or Turbine Meter.

Example: If the input signal is one pulse per 10,000 scf of gas and you need to inject .25 cc of oil every 200,000 scf, the FREQUENCY SCALE would be set for 20.

$$\begin{array}{r} \text{Switch \# 3} = 4 \\ \text{Switch \# 5} = \underline{16} \\ \text{Total} \qquad \qquad 20 \end{array}$$

Section 6 - OIP Maintenance Instructions

6.1 Stopping Operation

When the unit is ready for maintenance, turn the 6Tc timer power off. Disconnect the battery from the terminal and remove the cable connection from the solenoid. Remove the air supply from the system and bleed the pressure off. If the system includes an instrument pressure regulator, check the gauge to verify that all pressure has been exhausted. The tubing from the air supply to the actuator of the pump must be removed by pushing down on fitting while pulling tubing from fitting.

6.2 Removal of Pump and Reservoir

Reservoir

Remove the oil fill cap. The oil fill cap adapter can now be removed by unscrewing it from the reservoir top. Flats have been provided for ease of removal.

Pump

Close needle valve at meter and purge pressure in the tubing from the pump. Remove tubing connection at pump and pull away. Remove jam nut from bottom of the pump. When pump and reservoir are loose, spin reservoir toward the front of the box and lift up and out. Pour all oil from the reservoir by turning it upside down over a collection container. The reservoir may stay connected to the pump while the pump is being disassembled.

6.3 Disassembly of Pump

Remove the actuator housing from the injection body by unscrewing it counterclockwise. These parts should be hand tightened only. Remove cap seal from ring seal. Remove ring seal from injection body. Both the cap seal and ring seal are threaded and may be removed by unscrewing in a counterclockwise direction. Remove piston from actuator housing and inspect for scratches in and on both parts. If parts are damaged and the scratches cannot be removed by sanding them with a 600-grit cloth or paper, parts should be replaced. Remove relief cap from injection body and remove the check valve. Remove all used seals, clean parts with a solvent and wipe clean.

6.4 Assembly of Pump

See Drawing # AD761BE

Lightly lubricate seals with a silicone-based grease and replace. Screw the ring seal into the injection body until it is tight. Screw the cap seal into the ring seal until it is tight. Install stroke limiter around ring seal. Lightly put a thin film of silicone grease in actuator housing and place piston into it. Place return spring around cap seal and screw the actuator housing onto the injection body. Remember to hand tighten these two parts. Put check valve back into relief cap with a new O-ring and screw back into injection body.

6.5 Reassembly of System

See Drawing # AD761BE

Holding the reservoir, drop the pump into its hole in the box. Screw the jam nut onto the injection body, do not tighten. Spin the reservoir into the box and align the reservoir top with the hole in the top of the box. Screw oil fill adapter cap into reservoir top and tighten with wrench. There is an O-ring seal in the adapter cap, so do not overtighten cap or box could be damaged. Tighten jam nut on injection body.

6.6 Start-up of System after Maintenance

Fill the reservoir to the 250-cc mark with oil, screw down oil fill cap and hand tighten. Connect the tubing from the needle valve at the meter to the relief cap and tighten. Connect the tubing to the actuator fitting by pushing tubing down into fitting until it stops. Apply air to the system and check for leaks. Plug solenoid cable back into solenoid and connect battery to the 6Tc. Turn on timer and 'test fire' the 6Tc several times until oil reaches the needle valve. Observe oil level in reservoir and crack fitting at valve to verify oil is being injected. Once verification has been satisfied, tighten fitting and open needle valve to lubricate meter.

Section 7 - Troubleshooting Guide

PROBLEM	SOLUTION
Welker 6Tc will not operate.	<ol style="list-style-type: none">1. Be sure the battery connection is secure. If the test fire button works but the timer portion does not, disconnect the battery and ground the battery prongs together on the timer board.2. Verify voltage of battery. If battery drops below 6 VDC, it will not power the timer.3. There must be a 'jumper wire' in the Operate Terminals on the board if it is operating in the Timed mode.4. If timer is in the Counter Mode, verify there is an incoming signal from the meter source.5. Check the solenoid cable connections on the terminal strip.
Pump will not inject oil	<ol style="list-style-type: none">1. Verify oil level in reservoir. If level is sufficient, check for blocked porting from the reservoir to the pump.2. Verify the air supply to the pump is set at 70 psi.3. If system was not equipped with a timer assembly, verify the voltage signal to the solenoid is sufficient.4. Internal damage has occurred and maintenance is needed.
Bubbles of gas pressure leaking from bottom of reservoir.	<ol style="list-style-type: none">1. Internal check valve is damaged and needs to be replaced.

Section 8 - Spare O-ring Kit

PART #	DESCRIPTION	QTY.	SPARES	1 YEAR SPARES
VO90009	O-Ring	1	2	4
VO90014	O-Ring	1	2	4
BU108OS	Back-up	3	6	12
VO90108	O-Ring	1	2	4
VO70018	O-Ring	2	4	8
MS112OO	U-Cup	1	2	4
VO70222	O-Ring	2	4	8
VO70224	O-Ring	2	4	8

Complete O-Ring Kit Part #OKOIP(1&2)K
Per Drawing #AD761(BD&BE)

Section 9 - Drawings

Drawings

Title

EL-530	Welker 6Tc Interface
AD761BO Rev. C	OIP-2BK Oil Injection System
AD761BA Rev. A	OIP-1AK Oil Injection System
AD761BB Rev. A	OIP-1BK Oil Injection System
AD761BC Rev. A	OIP-2AK Oil Injection System
AD761BD	Oil Reservoir - OIP3R
AD761BE Rev. A	Oil Injection Pump - OIP3

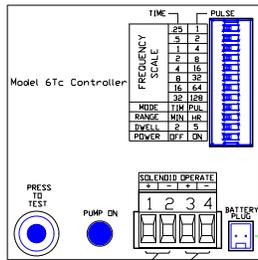
MATERIAL:

FINISH:

ROUTING:

DRAWING NUMBER
EL-530

REVISION:



REFER TO TABLE Δ

REFER TO TABLE Δ

INTERNAL BATTERY PACK EBPL072125

TABLE Δ
SOLENOID INTERFACE TO WELKER 6Tc
NOTE: ALL SOLENOIDS ARE RATED 6VDC
25 FOOT MAXIMUM CABLE LENGTH

SOL. TYPE	MANUFACTURER #	WELKER #	WELKER 6Tc TERMINAL NO.	
			TB1-1	TB1-2
VERSA	GSG-4222-S60161	ESVVE41AF11	BROWN	WHITE
SPARTIN	9-4200-003	SOL35F	WHITE	BLACK
CLIPPARD	ECO-3M-6VDC-D-V	ESVCL30E0E110	RED	BLACK

TABLE Δ
INPUT INTERFACE TO WELKER 6Tc

MANUFACTURER	MODEL	OUTPUT TYPE	WELKER 6Tc TERMINAL NO.	
			TB1-3	TB1-4
ANY	SIMPLE CONTACT CLOSURE	DRY CONTACT	EITHER	EITHER

* USE ONLY NON-ENERGY STORING OR GENERATING DEVICE.

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TITLE: WELKER 6Tc INTERFACE

COMPANY:

DRAWN BY:

RP

APPROVED BY:

Reference

SCALE:

none

SHEET:

DATE:

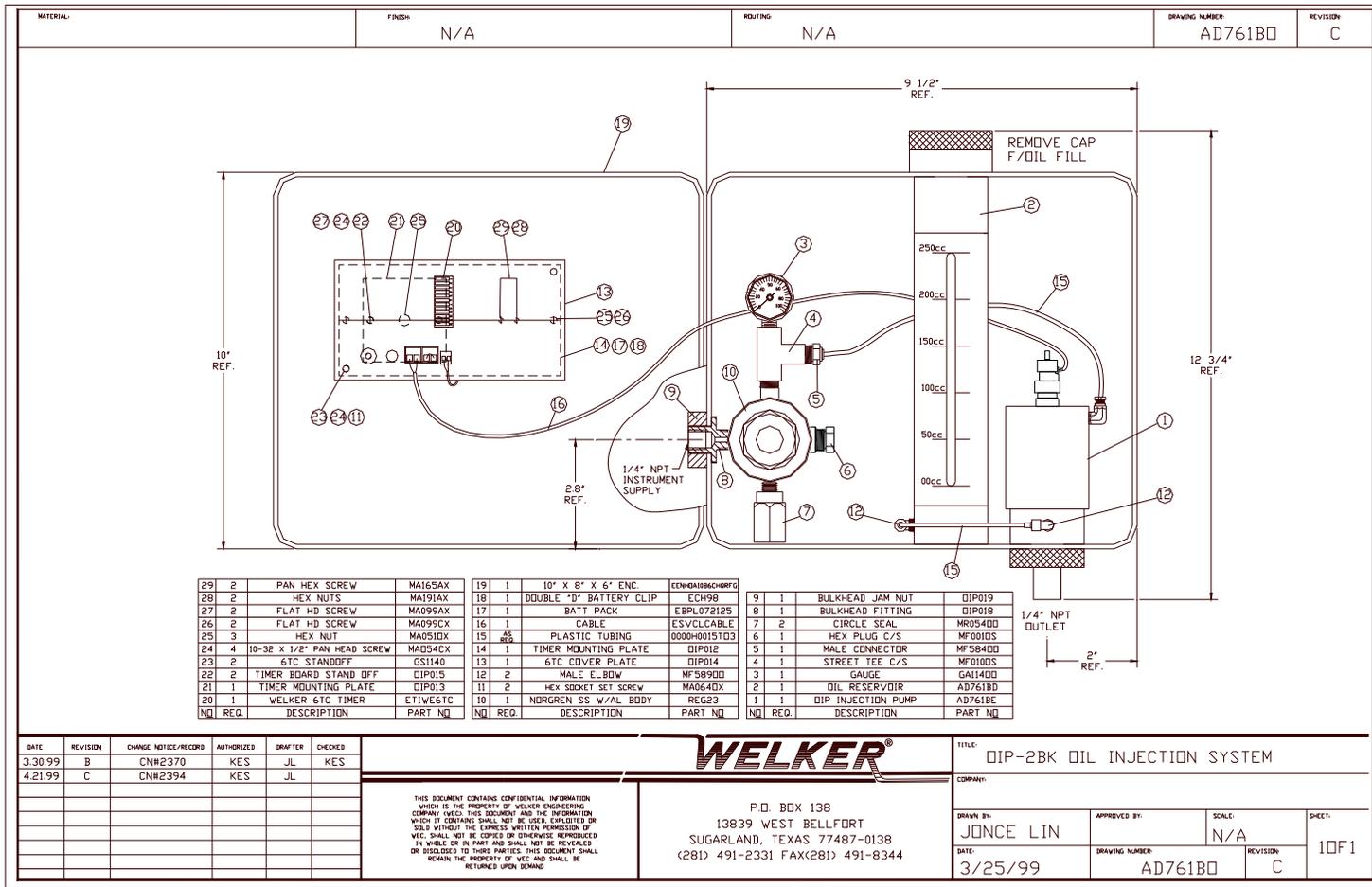
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EL-530

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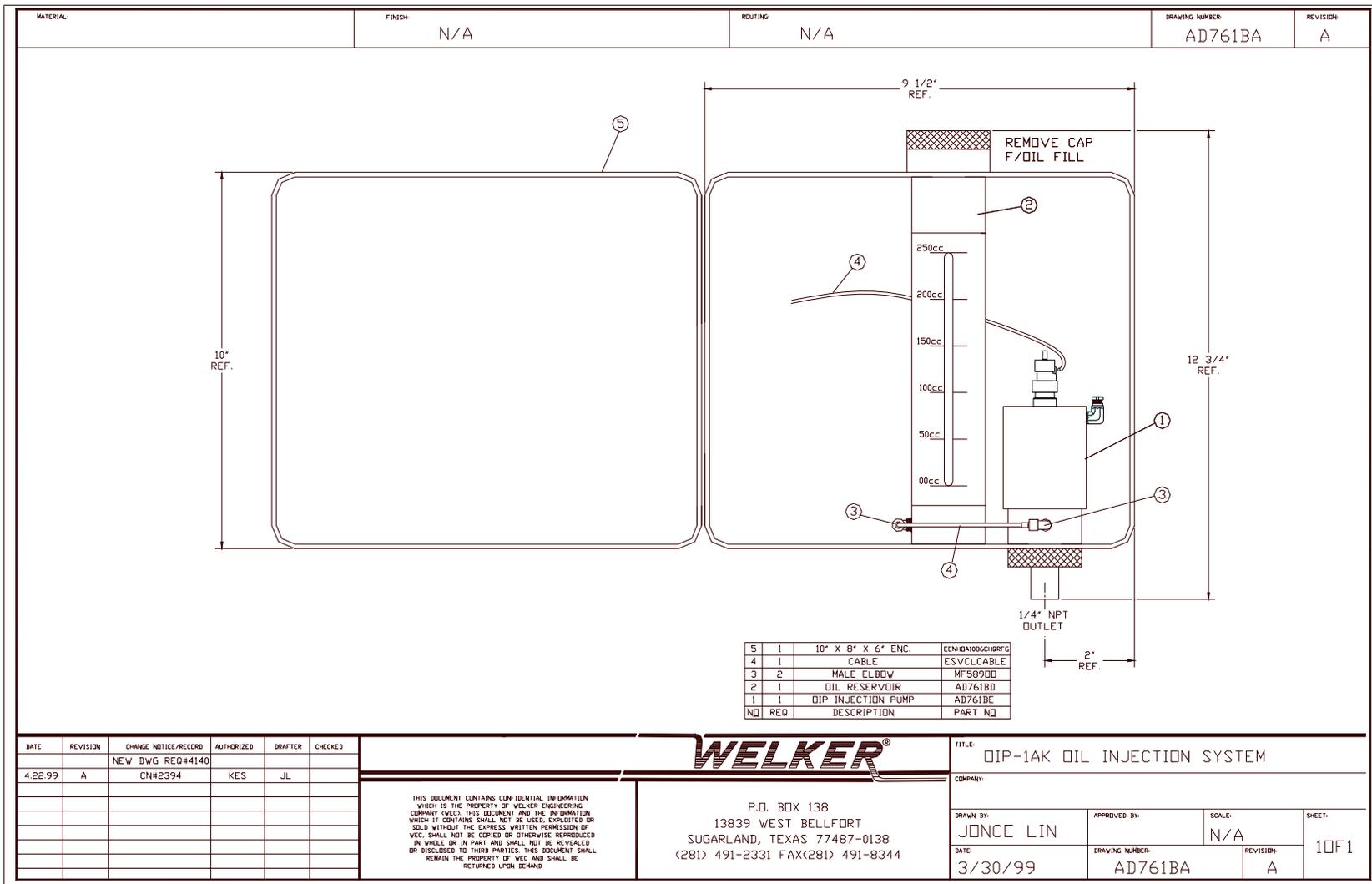
29	2	PAN HEX SCREW	MA165AX	19	1	10" X 8" X 6" ENC	CEN-0408RCH0RFG	9	1	BULKHEAD JAM NUT	DIP019
28	2	HEX NUTS	MA191AX	18	1	DOUBLE "D" BATTERY CLIP	ECH98	8	1	BULKHEAD FITTING	DIP018
27	2	FLAT HD SCREW	MA099AX	17	1	BATT PACK	EBPL072125	7	2	CIRCLE SEAL	MR054DD
26	2	FLAT HD SCREW	MA099CX	16	1	CABLE	ESVCLCABLE	6	1	HEX PLUG C/S	MF001DS
25	3	HEX NUT	MA051DX	15	AS REQ	PLASTIC TUBING	0000H0015T03	5	1	MALE CONNECTOR	MF584DD
24	4	10-32 X 1/2" PAN HEAD SCREW	MA054CX	14	1	TIMER MOUNTING PLATE	DIP012	4	1	STREET TEE C/S	MF010DS
23	2	6TC STANDOFF	GS114D	13	1	6TC COVER PLATE	DIP014	3	1	GAUGE	GA114DD
22	2	TIMER BOARD STAND OFF	DIP015	12	2	MALE ELBOW	MF589DD	2	1	OIL RESERVOIR	AD761BD
21	1	TIMER MOUNTING PLATE	DIP013	11	2	HEX SOCKET SET SCREW	MA064DX	1	1	DIP INJECTION PUMP	AD761BE
20	1	WELKER 6TC TIMER	ET1WE6TC	10	1	NORGREN SS W/AL BODY	REG23				
NO	REQ.	DESCRIPTION	PART NO	NO	REQ.	DESCRIPTION	PART NO	NO	REQ.	DESCRIPTION	PART NO

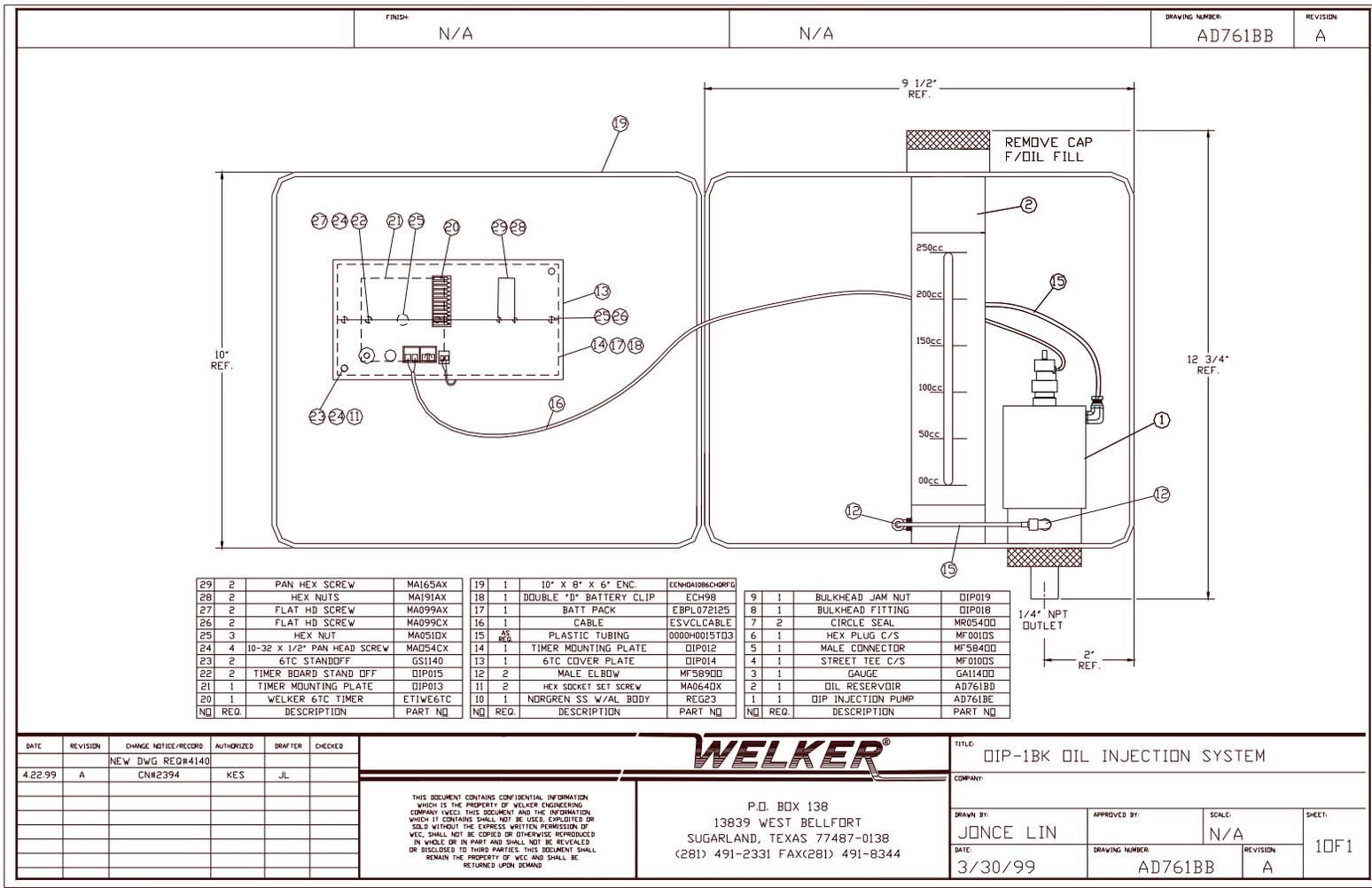
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4.21.99	C	CN#2394	KES	JL	

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TITLE: DIP-2BK OIL INJECTION SYSTEM			
COMPANY:			
DRAWN BY: JDNCE LIN	APPROVED BY:	SCALE: N/A	SHEET: 10F1
DATE: 3/25/99	DRAWING NUMBER: AD761BD	REVISION: C	

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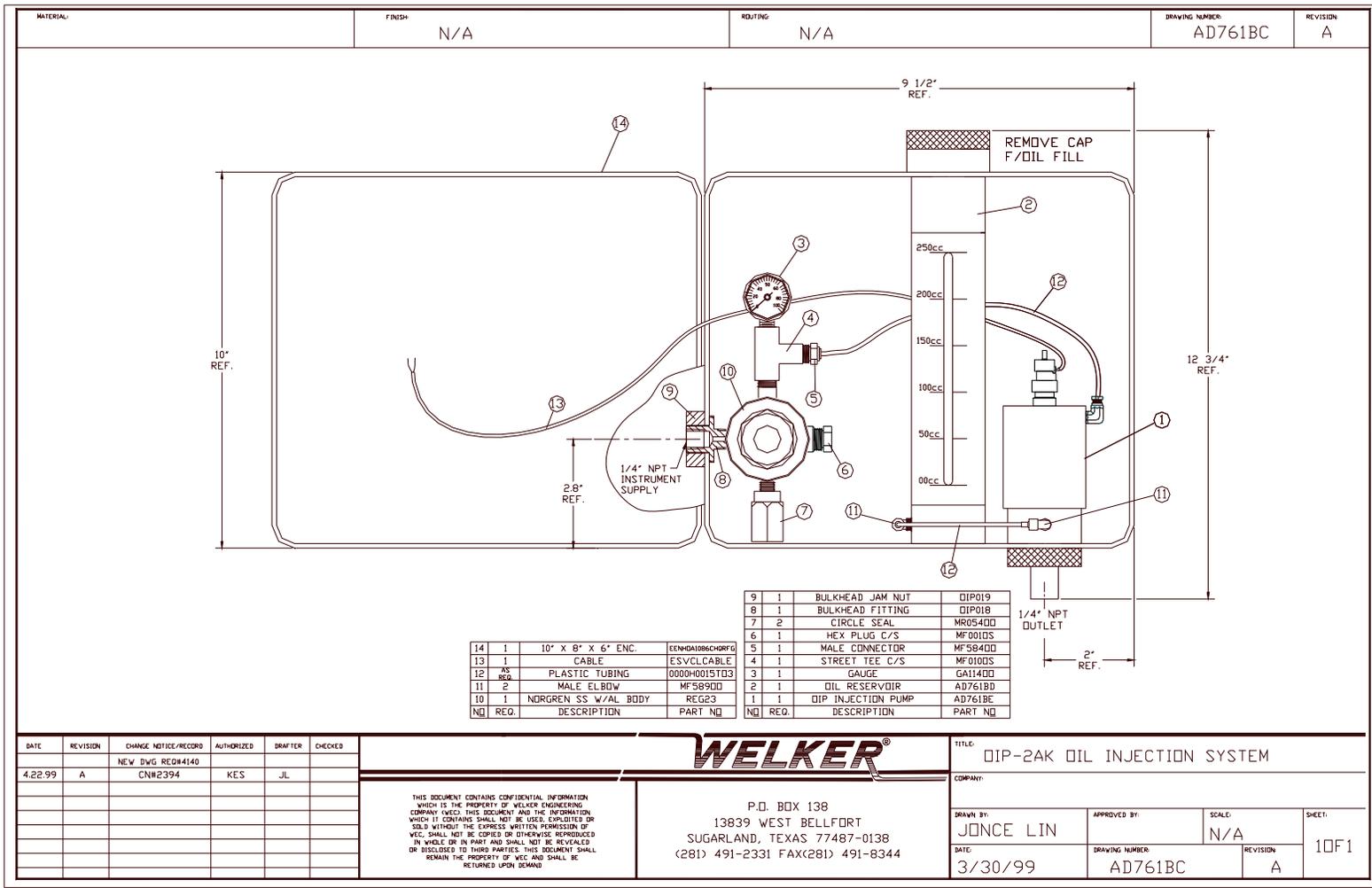


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COMPANY:			
DRAWN BY: JONCE LIN	APPROVED BY:	SCALE: N/A	SHEET: 10F1
DATE: 3/30/99	DRAWING NUMBER: AD761BB	REVISION: A	



14	1	10" X 8" X 6" ENC.	EENBARD8CHRRFG
13	1	CABLE	ESVCLCABLE
12	AS REQ	PLASTIC TUBING	000H0015D3
11	2	MALE ELBOW	MF589DD
10	1	NDRGREN SS W/AL BODY	REG23
REQ		DESCRIPTION	PART NO

9	1	BULKHEAD JAM NUT	DIP019
8	1	BULKHEAD FITTING	DIP018
7	2	CIRCLE SEAL	MR054DD
6	1	HEX PLUG C/S	MF001DS
5	1	MALE CONNECTOR	MF584DD
4	1	STREET TEE C/S	MF010DS
3	1	GAUGE	GA114DD
2	1	OIL RESERVOIR	AD761BD
1	1	DIP INJECTION PUMP	AD761BE
REQ		DESCRIPTION	PART NO

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DRAWN BY: JONCE LIN	APPROVED BY:	SCALE: N/A	SHEET: 10F1
DATE: 3/30/99	DRAWING NUMBER: AD761BC	REVISION: A	

MATERIAL: 6061-AL/ PLEXIGLAS	FINISH: N/A	ROUTING: N/A	DRAWING NUMBER: AD761BD
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10	1	STICKER	STK130
9	1	FILL CAP	OIP003
8	1	FILL CAP ADAPTER	OIP017
7	2	O-RING	VQ70224
6	2	SLOTTED ROUND HEAD SCREW	MA170BX
5	1	RESERVOIR TOP	OIP001
4	1	RESERVOIR	OIP005
3	2	TIE BOLT	OIP004
2	2	O-RING	VQ70222
1	1	RESERVOIR BASE	OIP002
NO	REQ.	DESCRIPTION	PART NO

DATE	REVISION	CHANGE NOTICE/RECORD	AUTHORIZED	DRAFTER	CHECKED	WELKER®	TITLE: OIL RESERVOIR - OIP3R
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						P.O. BOX 138 13839 WEST BELLFORT SUGARLAND, TEXAS 77487-0138 (281) 491-2331 FAX(281) 491-8344	DRAWN BY: JONCE LIN
							APPROVED BY: SCALE: N/A
							DATE: 3/25/99
							DRAWING NUMBER: AD761BD
							REVISION: SHEET: 1 OF 1

