

DRYBLEND SAMPLE LINE OPERATING MANUAL

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16.3.1

1.0 Background

The dryblend sample line was originally located in Austin at the Vista R&D facility. It was operated by Lyndol Clopton. The dryblend sample line was moved to Aberdeen to reduce the time required for dryblend sample preparation (the time between the order and shipment). The dryblend sample line is to be used for rigid dryblends only. The dryblend sample line is not currently designed to mix blends containing lead or lead compounds.

2.0 Process Description

The dryblend sample line contains two major pieces of equipment; the Welex intensive mixer, and the ribbon blender. The dryblend ingredients are added to the Welex intensive mixer where they are mixed. The mixing causes the temperature of the dryblend to rise. The dryblend is discharged from the Welex mixer at 220° F into the ribbon blender where it is cooled to 120° F before being dropped into a Galord box. The blender can hold two Welex batches. Cooling water is connected to the ribbon blender. A pressure regulator in the cooling water line ensures that the 50 psig maximum allowable working pressure (MAWP) of the ribbon blender is not exceeded. The cooling water return is sent to the cooling tower via the cooling tower water return sump outside the south wall of the Line 1 building.

3.0 Normal Operations

3.1.0 Start-up

- 3.1.1 Collect all additives required and record lot number.
- 3.1.2 Weigh up the liquid stabilizer into a one quart stainless steel container with a lid. Weigh both the TiO_2 and the filler into a bag. Weigh all of the remaining ingredients into a second bag.
- 3.1.3 Lock out the Welex and the ribbon blender.
- 3.1.4 Open the damper on the ventilation line to the Welex mixer and ribbon blender.
- 3.1.5 Verify that the ventilation system is working i.e., verify that there is a positive air flow into the Welex and into the ribbon blender (CAUTION: Do not operate the dryblend sample line if ventilation system is not working. Refer to section 4.3.3).
- 3.1.6 Disconnect the Welex Thermocouple. Open the lid on the Welex intensive mixer. Check the Welex to see if it is clean (if cleaning is necessary follow steps 3.3.3-3.3.15).
- 3.1.7 Visually verify that the Welex discharge gate is closed.
- 3.1.8 Close and secure the Welex lid (tighten the hold down nuts evenly). Reconnect the Welex thermocouple.
- 3.1.9 Open the lids on the ribbon blender. Check the ribbon blender to see if it is clean (if cleaning is necessary follow steps 3.3.3-3.3.15).
- 3.1.10 Verify that the ribbon blender discharge gate is closed.
- 3.1.11 Close and secure the lids on the ribbon blender.
- 3.1.12 Unlock the breakers for the Welex and the ribbon blender and turn them to the ON position.
- 3.1.13 Provide cooling water to the ribbon blender (cooling tower water). To use process water for cooling refer to Section 4.1.2.0 Cooling Tower Failure/Shutdown.
 - 3.1.13.1 Ensure that the PWS(process water supply) valve on the PWS/CWS(cooling tower water supply) header is closed.
 - 3.1.13.2 Close the PWS valve on the cooling water supply line.
 - 3.1.13.3 Verify that the CWS valve on the CWS/PWS header is open.
 - 3.1.13.4 Open the CWS valve on the cooling water supply line.

3.1.13.5 Open the remaining valve in the cooling water supply line to the ribbon blender.

3.1.13.6 Verify that the cooling water supply line pressure is less than 50 psig upstream of the ribbon blender.

3.1.13.7 Verify that water is flowing through the ribbon blender by verifying that water is flowing into the cooling tower water return sump (located outside Line 1 building) from the ribbon blender.

3.1.13.8 Verify that there are no leaks in the water supply and return line (if leaks are found proceed with Shutdown steps 3.3.1, 3.3.12, 3.3.13, and repair).

3.1.14 Start the ribbon blender motor by pressing the START switch located near the motor.

3.1.14.1 Verify that the ribbon blender blade is turning (this should be done without opening the lid).

3.2.0 Operation procedure

3.2.1 Mixing Cycle (Automatic)

For Manual operation see Section 4.4.0 Manual Control. CAUTION: If the temperature readout disappears, displays an unlikely temperature, or the controller malfunctions follow emergency shutdown procedures in Section 4.1.1.0 then see section 4.1.3.0.

3.2.1.1 Ensure that no more than one Welex batch is in the ribbon blender (if more than one Welex batch is in the ribbon blender follow steps 3.2.2.1 through 3.2.2.5) before continuing.

3.2.1.2 Verify that the Welex mixer discharge temperature set point is 220°F by pressing the * button on the Welex temperature controller panel (if the set point needs to be changed follow the directions in Section 6.1.0).

3.2.1.3 Open the lid on the Welex addition hopper and add the resin.

3.2.1.4 Close the lid on the Welex addition hopper.

3.2.1.5 Turn the Automatic/Hand selector switch to the AUTOMATIC position. Verify that the Welex discharge gate switch is in the CLOSED position.

3.2.1.6 Press the CYCLE START switch.

3.2.1.7 ^{When} ~~When~~ the dryblend temperature is 120°F, open the lid on the Welex addition hopper and add the stabilizer.

3.2.1.8 Close the lid on the Welex addition hopper.

3.2.1.9 When the dryblend temperature is between 170°F, open the lid on the Welex addition hopper and add the remaining ingredients except TiO₂ and Filler.

3.2.1.10 Close the lid on the Welex addition hopper.

3.2.1.11 When the dryblend temperature is between 190°F, open the lid on the Welex addition hopper and add the TiO₂ and Filler.

3.2.1.12 Close the lid on the Welex addition hopper.

3.2.1.13 Verify that the Welex motor stops when the Welex discharge temperature set point is reached. Verify that steps a through d occur automatically in the listed sequence after the Welex motor stops:

- a. The Welex discharge gate OPENS
- b. The Welex motor starts and runs at SLOW speed for 2-3 minutes
- c. The Welex discharge gate CLOSES
- d. The Welex motor stops.

3.2.1.14 Verify that the Welex has emptied.

3.2.1.15 Continue to make dryblend following steps 3.2.1.1 through 3.2.1.14 until the order is filled.

3.2.2.0 Cooling and Boxing Cycle

3.2.2.1 When two Welex batches have been dropped into the ribbon blender, cool them to 120°F before discharging them into a box (the ribbon blender can cool one or two batches at a time).

3.2.2.2 Ensure that a Galord box is under the ribbon blender discharge chute before discharging the ribbon blender.

3.2.2.3 Open the valve on the ribbon blender discharge chute.

3.2.2.4 Discharge the blender (CAUTION: do not stick any objects up the chute while the ribbon is moving. The ribbon will usually be moving while the blender is being discharged).

3.2.2.4 Close the valve on the ribbon blender discharge chute when the ribbon blender is empty or the Galord box is full. If the Galord box is full place a lid on it and remove the box. Continue to discharge the blender following steps 3.2.2.1 through 3.2.2.4.

3.2.2.5 Continue to make dryblend following steps 3.2.1.1 through 3.2.1.14 until the dryblend sample order is filled.

3.2.2.6 Stop the ribbon blender motor by pressing the STOP switch located near the motor when the order is filled or the unit is to be shut down.

3.3.0 Shut Down Procedure

3.3.1 Turn OFF the breakers for the Welex and the ribbon blender.

3.3.2 Lock out the Welex and the ribbon blender.

3.3.3 Wait until the temperature of the Welex and of the ribbon blender is below 100°F before proceeding with the following cleaning/shut-down steps.

3.3.4 Disconnect the Welex thermocouple. Raise the Welex probe(baffle). Unlatch the Welex lid and raise the lid using the air operated hydraulic lift. Swing the lid counter-clockwise.

3.3.5 Clean (vacuum out) the Welex. A vacuum hook-up is located on the platform near the Welex. The Welex can be wiped down with cloth rags.

3.3.6 Clean the Welex blade.

3.3.6.1 The blade can be removed for easier cleaning. A wrench is located on the platform near the vacuum hose rack.

3.3.6.2 Unscrew the cap nut at the top of the impeller center. This is a left hand thread nut. Use the wrench provided and jerk the nut free.

3.3.6.3 Lift off the upper impeller and clean

3.3.6.4 Lift off the lower impeller and clean

3.3.6.5 Remove the spacer ring and clean

3.3.6.6 Remove the nilos ring and clean(BE CAREFUL, it is a thin brass sheet)

3.3.6.7 Reassemble in the reverse order.

3.3.7 Swing the lid over the Welex. Lower the Welex lid using the hydraulic lift. Lower the Welex probe(baffle) and ensure that it is in the correct position (see Drawing 9.5). Secure the lid on the Welex (tighten the hold down nuts evenly).

3.3.8 Open the lids on the ribbon blender.

3.3.9 Clean (vacuum out) the ribbon blender.

3.3.10 Close and secure the lids on the ribbon blender.

3.3.11 Unlock the Welex and the ribbon blender but leave breakers in the OFF position.

3.3.12 Close the CWS valve on the cooling water supply line to the ribbon blender. Ensure that the PWS valve on the cooling water supply line to the ribbon blender is closed.

3.3.13 Close the remaining valve in the cooling water supply line to the ribbon blender.

3.3.14 Close the damper on the ventilation line to the Welex mixer and the ribbon blender.

3.3.15 Remove and dispose of any palettes, empty bags, or trash on the platform or around dryblend sample line area. Clean up around the area.

4.0 Non-Routine Operations

4.1.0 Emergency Operations

4.1.1.0 Plant Wide Emergency

4.1.1.1 In case of a plant wide emergency, turn the breakers for the Welex and the ribbon blender OFF.

4.1.1.2 Proceed to handle the emergency as required by plant emergency procedures policy.

4.1.1.3 When the emergency is over, box out any material in the Welex or the ribbon blender that may have been ruined due to the emergency following steps 4.1.1.3.1 through 4.1.1.3.15.

4.1.1.3.1 Turn the Welex and the ribbon blender breaker ON.

4.1.1.3.2 Place an empty Galord box under the ribbon blender discharge chute.

4.1.1.3.3 Turn the ribbon blender ON by pressing the ON switch located near the motor.

4.1.1.3.4 Open the ribbon blender discharge chute valve and empty the ribbon blender.

4.1.1.3.5 Close the ribbon blender discharge chute valve.

4.1.1.3.6 Turn the Automatic/Hand selector switch on the Welex controller to the HAND position.

4.1.1.3.7 Turn the discharge gate switch to the OPEN position.

4.1.1.3.8 Press the Welex SLOW switch.

4.1.1.3.9 Allow the Welex to run in SLOW for 5 minutes.

4.1.1.3.10 Turn the Welex discharge gate switch to the CLOSED position.

4.1.1.3.11 Press the Welex STOP switch.

4.1.1.3.12 Turn the Automatic/Hand selector switch on the Welex controller to the AUTOMATIC position.

4.1.1.3.13 Open the ribbon blender discharge chute valve and empty the ribbon blender.

4.1.1.3.14 Close the ribbon blender discharge chute valve.

4.1.1.3.15 Stop the ribbon blender by pressing the STOP button located near the motor.

4.1.2.0 Cooling Tower Failure/Shutdown

4.1.2.1 Close the CWS valve on the cooling water supply line.

4.1.2.2 Open the PWS valve on the CWS/PWS water header.

4.1.2.3 Open the PWS valve on the cooling water supply line.

4.1.2.4 Open the remaining valve in the cooling water supply line to the ribbon blender.

4.1.2.5 Verify that the cooling water supply line pressure is less than 50 psig upstream of the ribbon blender.

4.1.2.6 Verify that water is flowing through the ribbon blender by verifying that water is into the cooling tower water return sump (located outside the Line 1 building) from the ribbon blender.

4.1.2.7 Proceed with normal start-up procedures (Section 3.1.0).

4.1.2.8 Include the following steps in shutdown procedures: Close the PWS valve on the CWS/PWS water header and close the PWS valve on the cooling water supply line to the ribbon blender.

4.1.3.0 Welex Controller Failure

CAUTION: Do not run the unit if there is a controller failure. The following steps will verify if the controller is functioning properly. CAUTION: Only perform steps 4.1.3.1 through 4.1.3.7 if the Welex is empty.

4.1.3.1 Turn ON the breaker that provides power to the Welex.

4.1.3.2 Verify that the temperature readout is reasonable.

4.1.3.3 Input a set point of 150°F to the Welex discharge temperature controller (see section 6.1.0).

4.1.3.4 Press the CYCLE START switch.

4.1.3.5 Verify that the Welex motor starts, runs at SLOW speed for a few seconds, and then runs at FAST speed.

4.1.3.6 When the Welex motor has run at FAST speed for a few minutes, change the temperature set point to 50°F (see section 6.1.0).

4.1.3.7 Verify that the following steps occur automatically in the sequence listed:

- a. The Welex motor stops
- b. The Welex discharge gate OPENS
- c. The Welex motor starts and runs at SLOW speed for 2 to 3 minutes.
- d. The Welex discharge gate CLOSES
- e. The Welex motor stops.

4.1.3.8 Turn OFF the breaker that provides power to the Welex.

4.1.4.0 Electrical Failure

4.1.4.1 In case of electrical failure, turn the breakers for the Welex and the ribbon blender to the OFF position.

4.1.4.2 When the electrical failure has been corrected, box out any material in the Welex or the ribbon blender that may have been ruined due to the failure following steps 4.1.1.3.1 through 4.1.1.3.15.

4.1.5.0 Plant Air Failure

4.1.5.1 In case of plant air failure, turn the breakers for the Welex and the ribbon blender to the OFF position.

4.1.5.2 When the plant air failure has been corrected, box out any material in the Welex or the ribbon blender that may have been ruined due to the failure following steps 4.1.1.3.1 through 4.1.1.3.15.

4.2.0 Off Spec Material

4.2.1 Box out any off spec material following steps 4.1.1.3.1 through 4.1.1.3.15.

4.3.0 Maintenance

4.3.1 Welex Maintenance(See the "Installation and Operation Manual for Welex High Intensity Mixer Model #200M")

LUBRICATION

4.3.1.1 Lubricate the Discharge and Lid air cylinders every six months with a good grade of non-detergent oil, SAE 10, paraffin base.

4.3.1.2 Lubricate the bearings at each end of the Welex motor every six months.

4.3.1.3 Lubricate the upper and lower Welex mixer bearings (the nipples are located at the side and front of the Welex) with good quality ball bearing grease once every 1000 hours (once every six months). Approximately one ounce of grease is required.

4.3.1.4 Lubricate the Welex mixer seal assemblies (the grease nipples project from the packing gland just below the vessel) with ball bearing grease every 500 to 1000 hours (once every three to six months) or after disassembly. About one ounce is required.

OTHER MAINTENANCE (see the "Installation and Operation Manual for Welex High Intensity Mixer Model #200M")

4.3.2 Ribbon Blender Maintenance

4.3.2.1 Lubricate the ribbon blender shaft bearings (located on the east and west side of the blender) every six months. Use good quality bearing grease.

4.3.2.2 Check the oil level on the torque reducer every two months. Drain, flush, and refill the torque reducer with clean oil and clean the magnetic plug every six months. Use 5 quarts of SAE 10 or SAE 30.

4.3.2.3 Lubricate the ribbon blender discharge chute valve handle grease nipple every two months. Use ball bearing grease.

4.3.3 Ventilation Line Maintenance (perform every six months)

4.3.3.1 Remove the flexible ventilation lines connected to the Welex mixer and the ribbon blender.

4.3.3.2 Clean the flexible ventilation lines.

4.3.3.3 Clean the ventilation line downstream of the damper. Inspect the ventilation line upstream of the damper and clean as needed.

4.3.3.4 Ensure that the damper provides a positive seal when it is closed.

4.3.4 Air Line Maintenance

4.3.4.1 Check the oil level in the air line oiler bowl every six months.

4.4.0 Manual Control

(Replace steps 3.2.1.1 through 3.2.1.13 with 4.4.1 through 4.4.18)

4.4.1 Ensure that no more than one Welex batch is in the ribbon blender (if more than one Welex batch is in the ribbon blender follow steps 3.2.2.1 through 3.2.2.5) before continuing.

4.4.2 Verify that the Welex discharge temperature set point is 220°F by pressing the * button on the Welex temperature controller panel (if the set point needs to be changed follow the directions in section 6.1.0).

4.4.3 Open the lid on the Welex addition hopper and add the resin.

4.4.4 Close the lid on the Welex addition hopper.

4.4.5 Turn the Automatic/Hand selector switch to the HAND position. Verify that the Welex discharge gate switch is in the CLOSED position.

4.4.6 Press the SLOW switch on the Welex control panel to start the Welex motor in slow speed.

4.4.7 After the Welex has run in slow speed for 1 minute, press the FAST switch on the Welex control panel to run the Welex in fast speed.

4.4.8 When the dryblend temperature is 120°F, open the lid on the Welex addition hopper and add the stabilizer.

4.4.9 Close the lid on the Welex addition hopper.

4.4.10 When the dryblend temperature is 170°F open the lid on the Welex addition hopper and add the remaining ingredients except TiO₂ and Filler.

4.4.11 Close the lid on the Welex addition hopper.

4.4.12 When the dryblend temperature is 190°F open the lid on the Welex addition hopper and add the TiO₂ and Filler.

4.4.13 Close the lid on the Welex addition hopper.

4.4.14 When the dryblend temperature reaches 220°F, press the STOP switch on the Welex control panel to stop the Welex motor.

4.4.15 Open the Welex discharge gate by turning the discharge gate switch on the Welex control panel to the OPEN position.

4.4.16 Start the Welex motor in slow speed by pressing the SLOW switch on the Welex control panel. Let the Welex run at slow speed for 5 minutes (to empty the Welex).

4.4.17 Close the Welex discharge gate by turning the discharge gate switch on the Welex control panel to the CLOSED position.

4.4.18 Stop the Welex motor by pressing the STOP switch on the Welex control panel.

5.0 Trouble Shooting

5.1 Welex Trouble Shooting (see the "Installation and Operation Manual for Welex High Intensity Mixer Model #200M")

5.1.1 Welex mixer and motor trouble shooting

5.1.1.1 Symptom: Noises in the machine while running
Possible Causes: Belts may be too loose, The impeller may be rubbing vessel, There may be foreign matter in the vessel.

5.1.1.2 Symptom: Mixer motor exceeds full load amperage.
This can happen during brief periods. If it is continuous try adjusting the deflector baffle to a different height or angle. If the high amperage persists, reduce batch size and check for other possible problems.

5.1.1.3 Symptom: Leakage of material at mixer discharge.
Action: Check the air pressure for the discharge gate actuator, Check the gaskets on the discharge gate, Check for material preventing the full closure of the discharge gate.

5.1.1.4 Symptom: Leakage of material at impeller shaft.
Action: Clean the impeller shaft seals or replace (see the "Installation and Operation Manual for Welex High Intensity Mixer Model #200M").

5.1.1.5 Symptom: Leakage of material at Welex lid gasket.
Action: Check the lid gasket for proper fit and clean the area that the gasket seats on. Eventually the gasket will need to be replaced. Tighten hold down nuts evenly but not excessively. Excessive tightening will deform the Welex lid and cause permanent damage and more leakage. Check that the hydraulic lid lifter is completely down.

6.0 Control Scheme

The Welex mixer is the only piece of equipment that has automatic controls. See "Omega CN9000 Series Miniature Microprocessor Temperature Controllers" operation manual for controller function/programming details that are not provided below.

6.1.0 Set Point Changes

6.1.1 Press and hold the * button on the Welex temperature controller panel. Press the up arrow or down arrow button to change the set point. Release the arrow button and then the * button when the desired temperature set point is displayed.

6.2.0 Controller Function

6.2.1.0 Automatic Control

NOTE: Automatic/Hand selector switch in the AUTOMATIC position, Discharge gate switch in the CLOSED position.

6.2.1.1 Operator Action: Input the Temperature Set point

6.2.1.2 Operator Action: Press the CYCLE START switch

6.2.1.3 Automatic: Monitor Welex temperature

When the Set point is reached:

6.2.1.4 Automatic: Stop the Welex motor

6.2.1.5 Automatic: Open the Welex discharge gate

6.2.1.6 Automatic: Start the Welex motor(SLOW)

6.2.1.7 Automatic: Welex motor runs at SLOW speed for 2-3 minutes.

6.2.1.8 Automatic: Close discharge gate

6.2.1.9 Automatic: Stop the Welex motor

At this point the control loop is finished. Operator action is required before further automatic action will take place.

6.2.2.0 Manual Control

NOTE: Automatic/Hand selector switch in the HAND position and the discharge gate switch in the CLOSED position. All action is manual until the set point is reached.

When the set point is reached:

6.2.2.1 Automatic: Stop the Welex motor

6.2.2.2 Automatic: Open the Welex discharge gate

6.2.2.3 Automatic: Close discharge gate

At this point the control loop is finished. Operator action is required before further automatic action will take place.

6.3.0 Controller Configuration

Below is listed the Welex temperature controller configuration.

6.3.1 The allowable set point range is 0-240°F.

6.3.2 The audible alarm will sound 20°F above the set point or at a maximum temperature of 260°F.

6.3.3 The following is the list of controller function parameter settings(option#.parameter#): 1.1, 20.2, 0.3, 7.4, 7.5, 0.6, 0.7, 0.8, 0.9, 0.10, 0.11, 0.12, 0.13, 0.14, 0.15, 0.16, 0.17, 0.18, 1.19, 0.20, 0.21, 1.22, 2.23

The parameter settings can be verified by press the p button and then press the up or down arrow button change the function number. The parameter(option) number will be displayed next to the function number (see Omega instruction book).

7.0 Safety

Avoid contact with ingredients, especially liquid stabilizer. Rubber gloves (for handling liquids) and a protective (Tyvek or similar) suit are required.

Avoid inhaling dust when weighing, charging, and dumping ingredients and products. A 3M dust mask is required.

8.0 Environmental

8.1 Stabilizer Spill

Stabilizer used to make dryblend is a hazardous material. It becomes a hazardous waste when spilled (if it is not reclaimed). Follow plant procedure for cleaning up any stabilizer spill.

9.0 Drawings

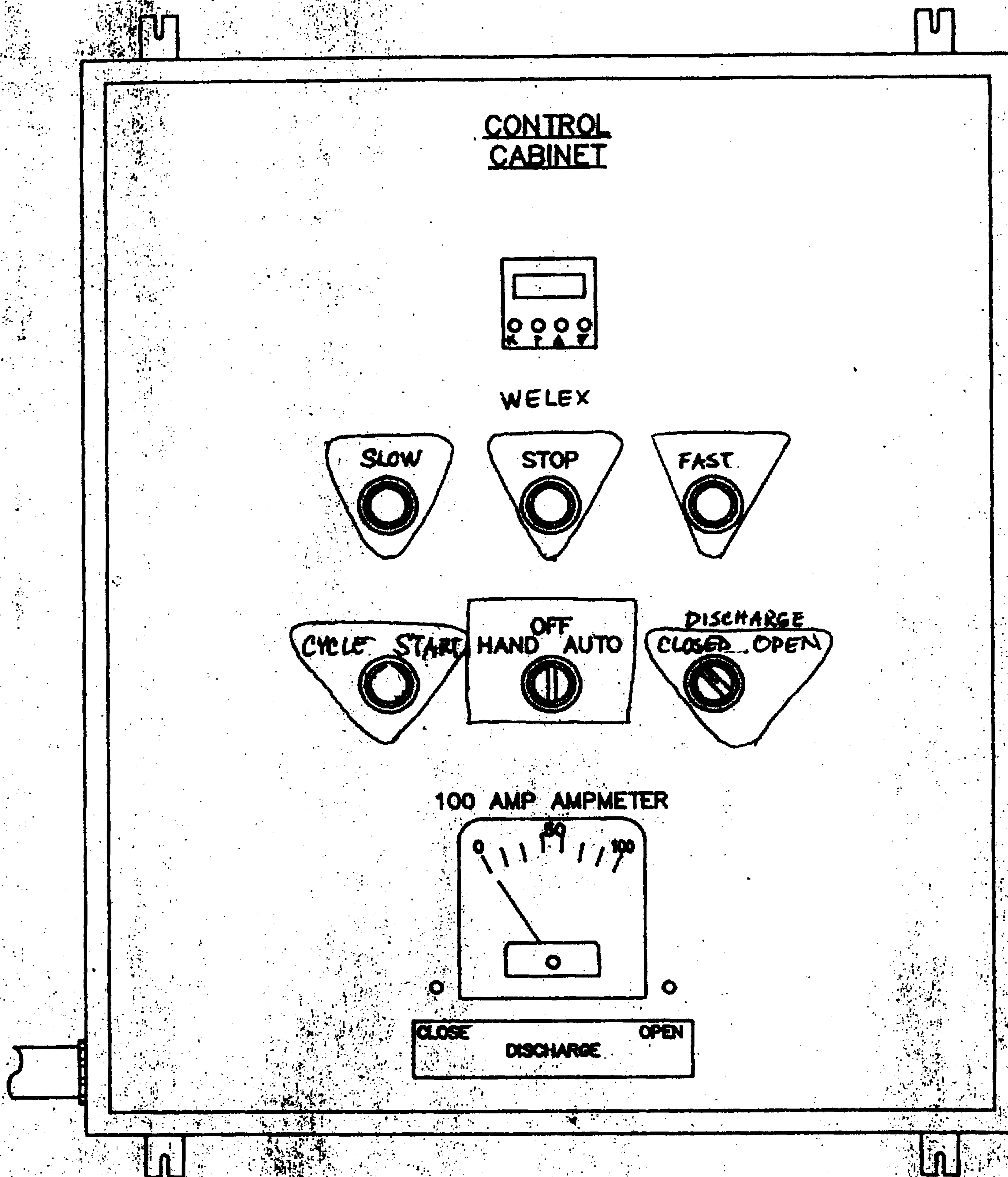
9.1 Welex Control Panel

9.2 Process and Instrumentation Diagram

9.3 Cooling Water Valve Location (Isometric)

9.4 Welex Drive Shaft (Blade) Assembly

9.5 Welex Probe(Baffle) Position



WELEX CONTROL PANEL

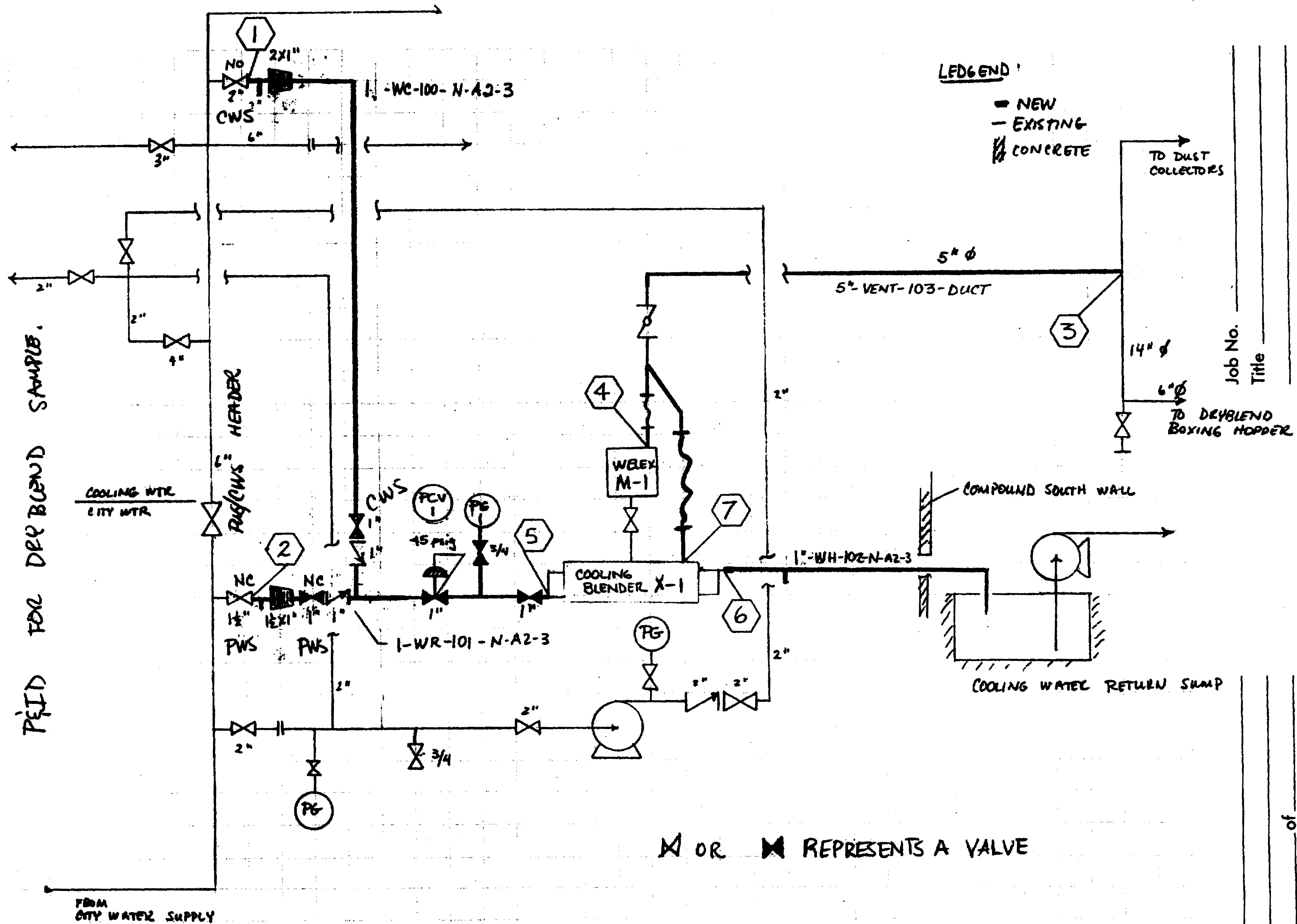
SCALE: CONTROL CABINET TO BE MOUNTED 3" - 1'-0"
ON SOUTHWEST CORNER OF PLATFORM ABOVE HANDRAIL

DWG 9.2

VISTA

Calculation Sheet

PEID FOR DRYBLEND SAMPLE LINE



OR REPRESENTS A VALVE

AFE C591 AS BUILT
REV 2 1/10/91

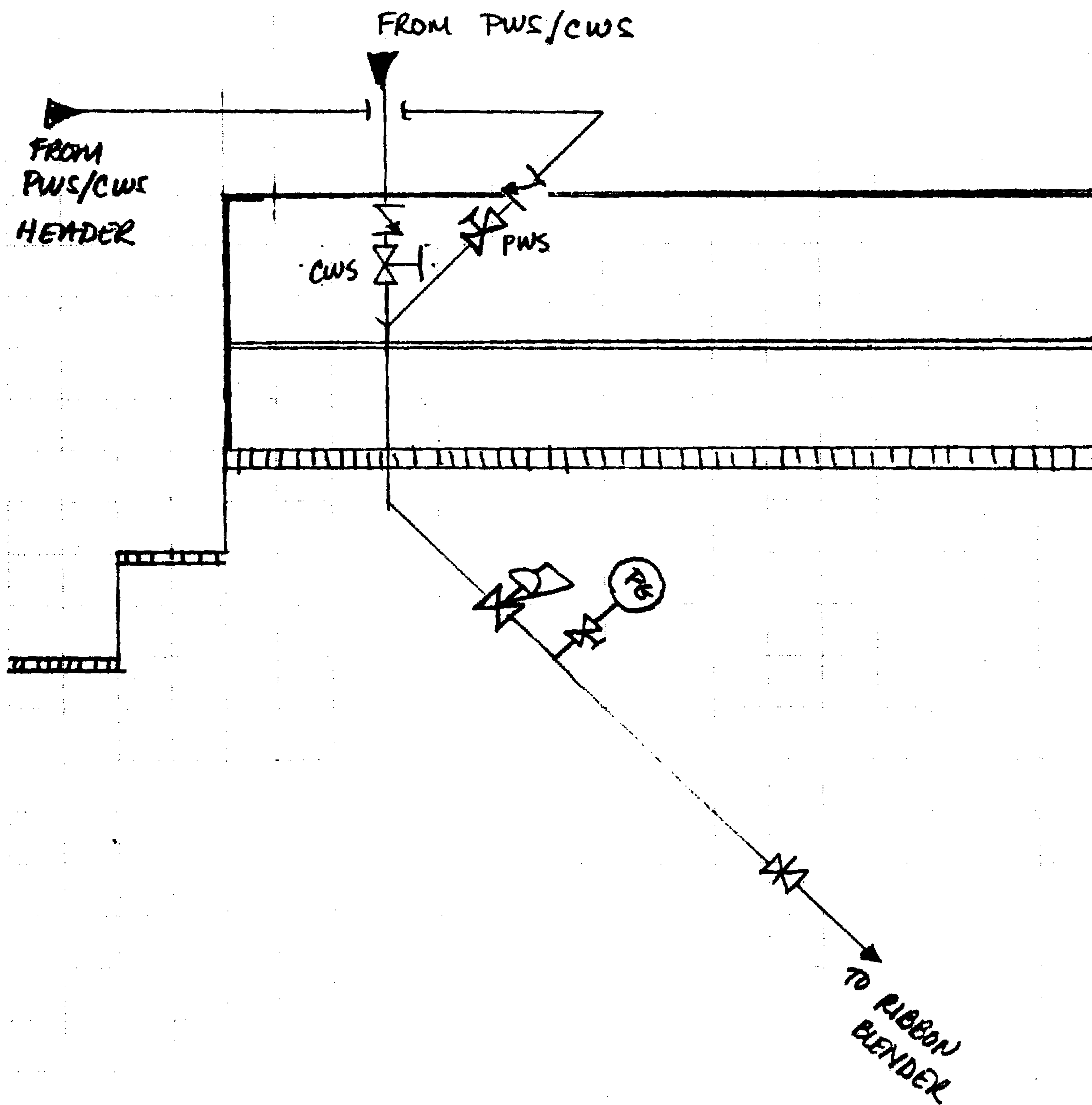
COOLING WATER FOR
DRYBLEND SAMPLE LINE

DWG: ND-001

BY: EES 9/20/91

Made By
Date
Page
V3-20G-S
VAB.0001135356

To _____
From COOLING WATER VALVE LOCATION (ISOMETRIC) Calculation Sheet



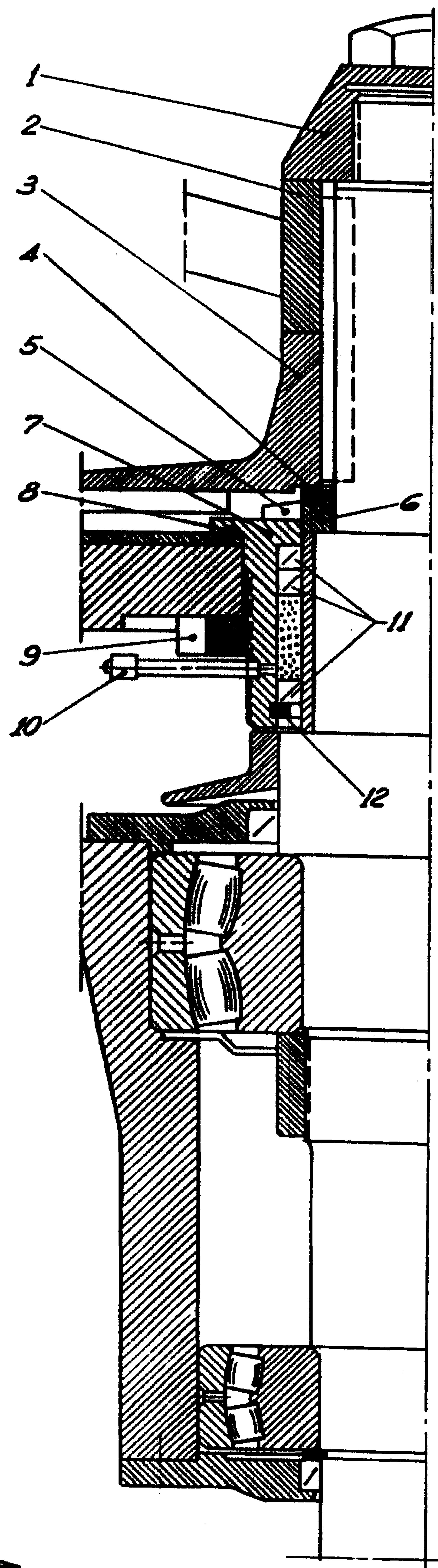
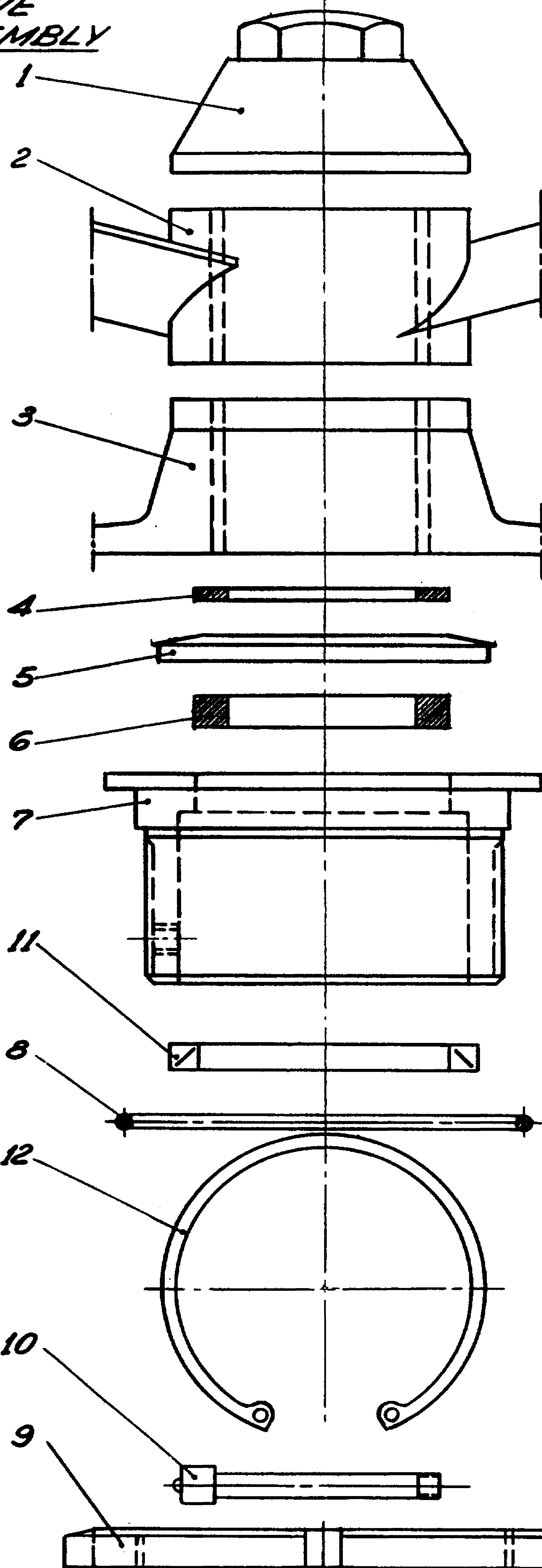
- HAND VALVE
- HAND VALVE
- CHECK VALVE
- PRESSURE REGULATOR
- PRESSURE GAUGE

PWS - PROCESS WATER SUPPLY
CWS - COOLING TOWER WATER SUPPLY

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Date 1/16/92
Page _____ of _____
V3-20G-S

Job No. _____
Title _____
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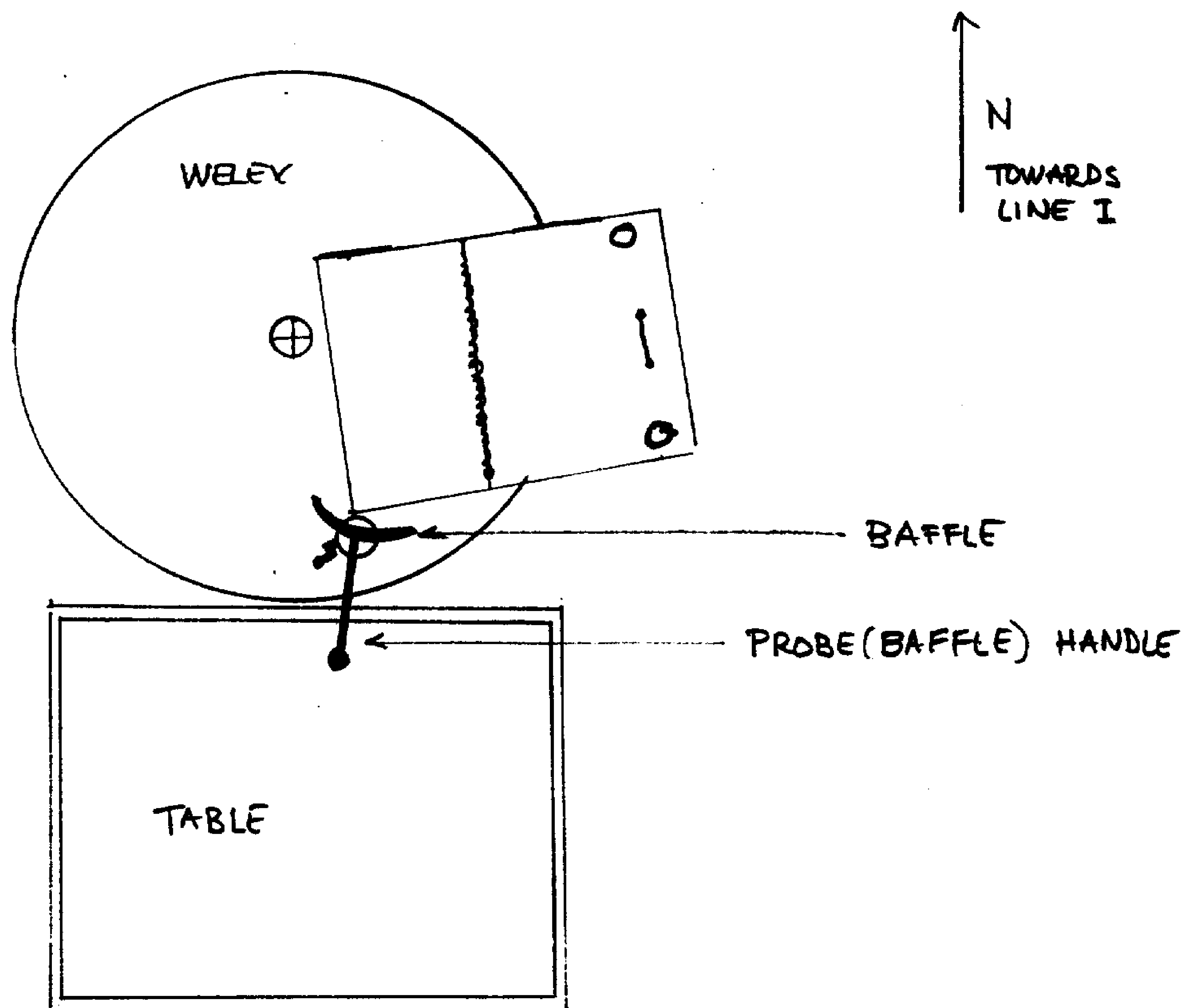
HYPER DRIVE SHAFT ASSEMBLY



To _____

From WELEX PROBE(BAFFLE) POSITION

Calculation Sheet



Made By EES

Date 1/20/92

Page _____ of _____

Job No. _____

Title _____

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