Monsanto

MONSANTO COMPANY • CENTRAL ENGINEERING DEPARTMENT

TRANSMITTAL

DATE AUG 26 71

CEA NO. 2417 LOCATION W G KRUMMRICH TRANSMITTAL NO. _____

PROJECT TITLE MCS-1016 DISTILLATION

DISTRIBUTION:

NORM WOLK (PROJECT MANAGER) FAWC T

BOB MCCUTCHAN WGK 1

ATTACHED ARE	THESE ARE	THESE ARE TO BE USED FOR	PLEASE
___ Prints	___ Preliminary	___ Design	___ Review & Comment
X Reproducibles	___ For Approval	___ Construction	___ Approve
___	___ Approved	___	___ Note Revisions
___	___	___	___ Acknowledge
___	___	___	___

REMARKS:

DRAWING NUMBER (OR EQUIPMENT NO.)	REV. NO.	DESCRIPTION
INSTRUMENT FUNCTION		OUTLINE (ORIGINAL COPY)
FOR LOOP NO'S		
PDI-301-4		
PICA-301-5		FIC-406-1 & FICA-7
FIC-303-1		FIC-414-1
XCV-308-1&2		FT-418-1
LRC-305-3		FIC-541-1 & FICA-32
BA-307-1		
FIC-307-1		
LIA-312-3		
LI-316-1		
LI-320-1		
TIC-325-3		
LIA-328		
LIA-329-1		
FIC-349-1		
KIC-352-1		

Signature C. J. HANS

CE-29 REV. 12-69

PCB-ARCH-EXT0372703

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. PDI-301-4		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET 1 OF

COLUMN ΔP INDICATOR

1.0 NEED FOR LOOP

Overall column ΔP is used to verify that the desired vapor rate is being generated in the reboiler furnace. It is also a desirable operating aid to manufacturing people.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to measure and indicate the pressure difference between the top and bottom of the distillation column.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

A differential pressure transmitter senses pressures at the top and bottom of the column and sends a proportional 3-15 psig signal to an indicator mounted on the panel.

PCB-ARCH-EXT0372704

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. PDI-301-4	
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Loss of air will cause indication to drop to zero.

3.3.2 Power Failure

Not affected.

PCB-ARCH-EXT0372705

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. PICA 301-5			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET 1 OF

1.0 COLUMN PRESSURE CONTROLLER

The column head pressure needs to be controlled (40 mm for 1016; 360 mm for "mono") to limit the still pot liquid temperature to a maximum of 300°C at 140 mm. The still pressure is set by the approximate 100 mm overall column ΔP for both operation.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to indicate and control the column's absolute pressure and active an alarm in the control room on high pressure.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

The column pressure is sensed at the top of the column by an absolute pressure type pneumatic transmitter. The transmitter sends a 3-15 psig signal to a local indication, a pressure switch in the field cabinet for the alarm function, and to an indicating controller mounted on the panel in the control room. The controller compares the signal with the set point and sends a compensating signal to the control valve. The control valve bleeds air into the vacuum system.

The pressure switch activates an alarm when it senses an abnormally high input signal.

PCB-ARCH-EXT0372706

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. PICA 301-5			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET OF

3.0 OPERATION OF LOOP

3.1 NORMAL OPERATION

Same as for a typical pressure loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Upon instrument air failure to controller, the valve will close, preventing air from being bled into the vacuum system. This would take all control of the vacuum system away from the controller. The vacuum system would lower the column down to its inherent limits.

3.3.2 Power Failure

Upon electrical power failure only the alarm would be inoperative.

PCB-ARCH-EXT0372707

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-303-1			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET 1 OF

1.0 COLUMN DISTILLATE CONTROLLER

The column distillate draw-off rate serves indirectly to control the column reflux ratio. This reflux ratio is automatically reset via this controller from 3:1 to 5:1 for 1016 and from 4:1 to 8:1 for "mono".

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to control the flow of product to storage and thereby set the reflux ratio.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

The distillate flow rate is controlled by measuring the rate of flow in the line using an armored tube rotameter transmitter. This transmitter sends a pneumatic signal to the panel mounted indicating controller. The indicating controller compares this signal with a set point signal and sends a varying 3-15 psig signal to the control valve which adjusts the valve to compensate for variation of the set point.

The same rotameter transmitter signal is also sent to an analogue computing station which squares the signal (to be compatible with the integration on the panel). This analogue computing station sends its output to the integrator on the new panel which totalizes the amount of distillate to storage. Upon a preset number of counts, a contact in the integrator closes causing a solenoid to energize and switch an air signal to the set point of the flow controller. This air signal comes from one of two manual loading stations which are preset to give a 3:1 and a 5:1 reflux ratio. At the predetermined count, the solenoid switches air from the 3:1 signal to the 5:1 signal.

On the "mono" operation these signals will be set for a 4:1 and 8:1 reflux ratio. Settings for these points or any intermediate reflux ratio may be found with the attached table D-10.

PCB-ARCH-EXT0372708

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-303-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET OF

3.0 OPERATION

3.1 NORMAL

a. At the start of batch the controller manual output should be at 0 with the controller in manual position (for total reflux). Set the integration total to read 0 counts. Set the predetermining counter to read 7842 counts. (7842 x 2.44 factor = 19,135 gallons @ 3:1 ratio). Check setpoint regulator outputs so that reflux ratios will be 3:1 and 5:1 for 1016 operation and 4:1 and 8:1 for "mono" operation.

After column has lined out switch controller to automatic red pointer should move up to correct reflux ratio immediately.

If a forecut is taken it will be necessary to observe the integration reading to know where to switch XCV-303-1 open to divert product to the receiver.

When the predetermining counter reaches the number of counts previously set, the reflux ratio will automatically move to the correct reflux ratio for the last half of the distillation step.

3.1.1 Startup Instructions

a. Set controller manual output on 0, with switch in manual position.

b. Set PCV-303.1 and PCV-303.2 in field cabinet.

c. Set counter to zero

d. Set predetermining register to correct setting.

3.1.2 Shut-Down Instructions

a. Switch "auto manual" switch to "manual" on FIC-303-1 with output at 0 to go on total reflux.

3.1.3 Manual Operating Instructions

a. Switch "auto manual" switch to "manual" to control flow through FV-303-1 to receiver.

3.2 INTERLOCKS

None.

PCB-ARCH-EXT0372709

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-303-1			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.	
DIVISION	BLDG/DEPT	AUTH NO.	REV. BY	DATE	REV	SHEET
Organic	811.00	2417				OF

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Air failure to the loop will cause control valve FV-303-1 to close.

3.3.2 Power Failure

Power failure will cause reflux ratio set point to go to the ratio used in the first half of batch.

PCB-ARCH-EXT0372710

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. XCV 303-1 & XCV 303-2		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 246	AUTH NO. 2417	REV. BY	DATE	REV 1 / SHEET 1 OF

1.0 COLUMN TOP-PRODUCT DIVERTOR

These valves are needed to divert top product from the column (Item 301) to various locations depending on the product specifications.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

These valves enable the operator, at his discretion, to divert all product flow either to the MCS 1016 product receiver (Item 542, #4 product tank), to the light ends receiver (Item 328) or back to the column (Item 301).

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

Placing panel switch SS-5 in the "light ends" position opens valve XCV 303-2 and closes XCV 303-1.

All column top product then flows to the light ends receiver (item 328). Placing the switch in the "closed" position closes XCV 303-1 and XCV 303-2 and diverts all top product, as reflux, back to the column (Item 301). Placing the switch in the "product" position opens XCV 303-1 and closes XCV 303-2. This diverts all product to the #4 product tank (Item 542).

PCB-ARCH-EXT0372711

3.0 OPERATION OF LOOP

3.1 NORMAL OPERATION

Typical.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATION

3.3.1 Air Failure

Air failure to the valves will cause both valves to close which puts column on total reflux.

3.3.2 Power Failure

Same as air failure.

PCB-ARCH-EXT0372712

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LRC-305-3			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET 1 OF

1.0 STILL POT LEVEL CONTROLLER

This instrument serves two needs: a) level recording for 1016A and "mono"; and b) level control of still pot feed during 1016 semi-continuous operation and the chain feed part of the "mono" operation. This instrument allows a volume of crude feed to enter the still equal to the distillate volume drawn off via FIC 303-1.

1.1 DESCRIPTION

1.1.1 Function

a. To indicate, record the level of liquid in the still pot.

b. To control the level of liquid during semi-continuous operation.

c. To activate and alarm on high or low liquid level.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

A displacer type level transmitter senses the level and senses a 3-15 psig signal to the level indicating controller and also to the recorder. The controller compares this signal with a set point and send a 3-15 psig signal to control valve FV-305-3 to compensate for variations from the set point.

Two pressure switches mounted in the field cabinet also receive this signal and sound an alarm in the control room upon high or low level.

Note: This level transmitter has been calibrated to give a 100% output for a 100% level on MCS-1016 operation. (Sp. gr. 1.178.) For mono operation the output would be about 76% assuming a gravity of .885, therefore a Foxboro computer has been added which will multiply the signal by a factor of 1.31 to bring the output to the panel indicator and the pressure switches up to 100% for 100% level during mono operation. A 3-way switch in the field cabinet must be placed in "mono" position during "mono" operation to accomplish this.

PCB-ARCH-EXT0372713

Monsanto	INSTRUMENT FUNCTION OUTLINE	CED LOOP NO. LRC-305-3	
	PLANT W. G. Krummrich	ISSUED BY C. J. Hans	DATE 7/19/71
			PLANT LOOP NO.

DIVISION	BLDG/DEPT	AUTH NO.	REV. BY	DATE	REV	SHEET
Organic	811.00	2417				OF

3.0 OPERATION

Typical ⌒ loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Upon air failure to the loop the valve will close and the alarm will sound.

3.3.2 Power Failure

Upon power failure the alarm will be inoperative.

ES 141
(8/69)

PCB-ARCH-EXT0372714

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. BA307-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans DATE 7/23/71		PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV	SHEET 1 OF

FURNACE - 307 - SHUTDOWN SYSTEM

1.0 NEED FOR LOOP

The purpose of this description is to define the furnace shutdown system. The purpose of the system is to protect the plant and personnel against abnormal operating conditions.

1.1 DESCRIPTION OF LOOP

The shutdown loop is composed of several components as follows:

1.1.1 BE 307-1

The furnace is provided with three (one for each burner) ultra-violet flame scanners. A failure of any burner flame will shutdown that furnace burner and signal a "furnace shutdown" alarm.

1.1.2 TIA 307-4

High stack temperature monitor (located in the field cabinet). High furnace stack temperature can be caused by excess fuel feed, abnormal firing conditions or a deficiency of circulating aroclor. Actuation of this alarm will signal a "furnace stack high temperature" alarm and a subsequent "furnace shutdown" alarm.

1.1.3 TJRIA-300-5

Aroclor from furnace high temperature alarm. This alarm is actuated by an alarm contact, associated with point 5, in multipoint recorder TJRI-300. High aroclor temperature can be caused by excess furnace fuel feed, or low aroclor flow. Actuation of this alarm will signal a "aroclor from furnace high temperature" alarm and a subsequent "furnace shutdown" alarm.

1.1.4 FIA 307-5

This is a low flow alarm for aroclor flow through the furnace. Low aroclor flow can be caused by a blockage in the furnace, an aroclor leak in the furnace or a failure of circulating pump 306. The alarm contact is located in FIA 307-5. Actuation of this alarm will signal a "aroclor through furnace low flow" alarm and a subsequent "furnace shutdown" alarm.

1.1.5 TJRIA - 300 - 16

Non-condensables from vent cooler - 324 high temperature furnace shutdown. This shutdown is actuated by an alarm contact associated with point 16, in multipoint recorder TJRI-300. High temperature at this point could result in aroclor pollution of the atmosphere. An actuation of this alarm will signal a "furnace shutdown" alarm. In this case, however, the "furnace shutdown" alarm will be preceded by a "vent cooler exit high temperature" alarm.

PCB-ARCH-EXT0372715

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. BA-307-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV / SHEET OF

1.1 DESCRIPTION OF LOOP (Cont'd.)

1.1.6 Fuel Pressure Switches

Each burner has four pressure switches, high gas pressure, low gas pressure, low fuel oil pressure and low atomizing steam pressure. When operating on gas the gas pressure switches must be satisfied or the individual burner will shutdown. When operating on fuel oil the gas pressure switches are by passed, and the low fuel pressure and low atomizing steam pressure switches must be satisfied. Pressure switches on one burner do not effect the operation of the other burners. The "furnace shutdown" alarm will sound when the first burner is shutdown. Addition burner failures failures will not alarm in the control building but will alarm at the field cabinet.

PCB-ARCH-EXT0372716

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-307-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV 1 / SHEET OF

1.0 FURNACE FUEL FLOW CONTROLLER

The fuel flow and thus the furnace firing level serves as the basis of the column vapor through-put. This is the primary instrument concerned with column capacity.

1.1.1 Function

The function of this loop is to control the flow of fuel gas or fuel oil to the reboiler furnace.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

The fuel gas flow is controlled by measuring the rate of flow in the line via an orifice plate and differential pressure transmitter. The D/P transmitter sends a 3-15 psig signal to the indicating controller. The controller compares this signal with a set point and sends a carying 3-15 psig signal to the fuel gas control valves to compensate for variation from the set point.

When using fuel oil the measurement is made using an integral orifice. D/P transmitter, a switch on the field panel, selects either fuel gas or fuel oil operation and at the same time selects the D/P transmitter for that service, and either the fuel gas or fuel oil control valves. One, two or three burners can be used. Each one having its on control valve which can be selected from the field panel.

PCB-ARCH-EXT0372717

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-307-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical flow control loop.

3.1.1 Startup

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATION

3.3.1 Air Failures

Air failure to the loop will cause the furnace to shutdown.

3.3.2 Power Failure

Power failure to the loop will cause the control valves to close shutting down the furnace.

PCB-ARCH-EXT0372718

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LIA-312-3		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET 1 OF

RESIDUE SURGE TANK LEVEL

1.0 NEED FOR LOOP

Residue from 1-312 is fed to the existing No. 2 still for distillation. Surge tank level must be known prior to pumping residue from the still pot after a column run.

1.1 DESCRIPTION OF LOOP

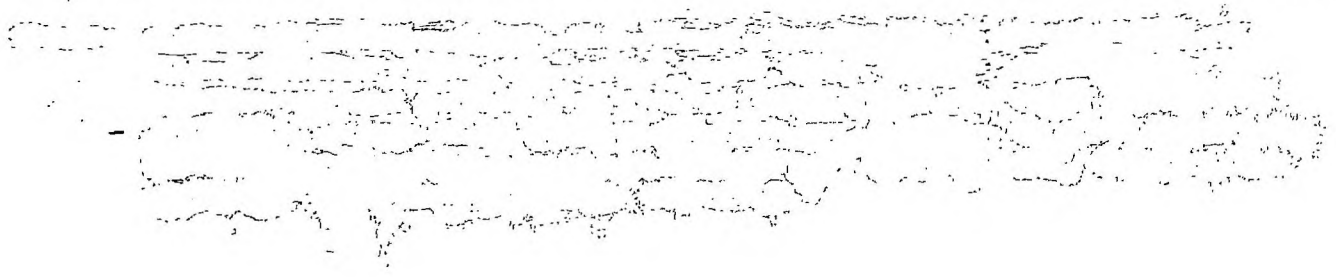
1.1.1 Function

The function of this loop is to provide an indication of the residue surge tank level at both the control panel and in the field. Also to give an alarm on high or low level and to shutdown the still circulating pump on high level.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

The level in the tank is sensed by a displacer type level transmitter which sends a 3-15 psig air signal to a 0-100% indicator on the control panel as well as a field mounted 0-100% indicator. This signal also sends an air signal to two pressure switches in the field panel. One switch is for low alarm and the other operates a relay which shuts down pump 1-306 and gives an alarm on high level.



PCB-ARCH-EXT0372719

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LIA-312-3			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical level indicator loop.

3.2 INTERLOCKS

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

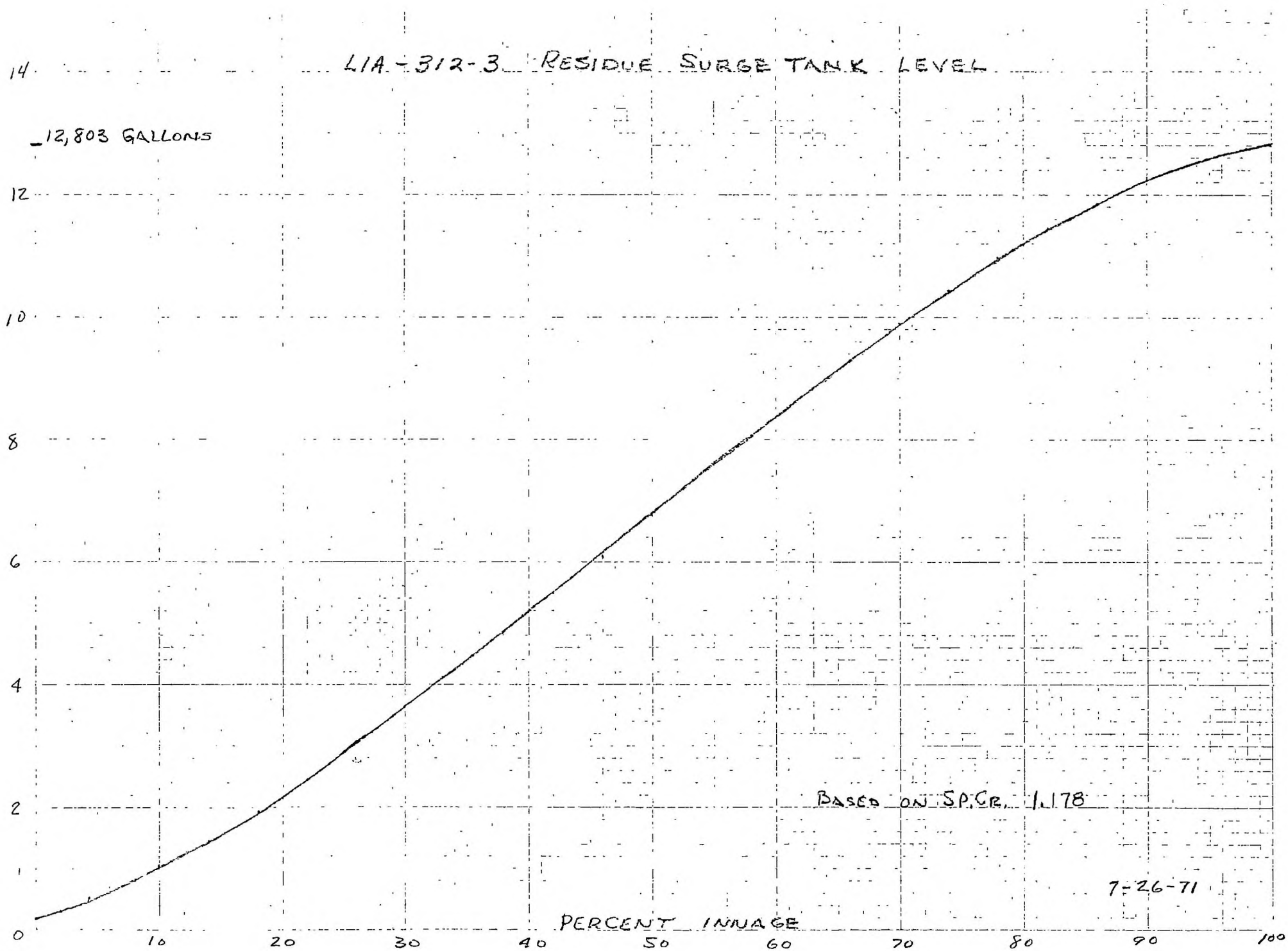
Air failure to this loop will cause loss of indication and an alarm indicating low level.

3.3.2 Power Failure

Power failure to the loop will cause the annunciator to be inoperative and pump 1-306 will shut down.

PCB-ARCH-EXT0372720

CONVIT PRESS, INC. BROCKLYN 17, N.Y.
TOOL NO. [illegible]



PCB-ARCH-EXT0372721

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LI-316-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION	BLDG/DEPT	AUTH NO.	REV. BY	DATE	REV / SHEET
Organic	811.00	2417			1 OF

FUEL OIL STORAGE LEVEL

1.0 NEED FOR LOOP

A level gauge is needed for proper oil inventory control. Fuel oil is needed as back-up fuel for the reboiler operation.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to provide an indication of the level of oil in the fuel oil storage tank and to actuate an alarm upon high or low level.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

The level in the fuel oil tank is sensed by a diaphragm type level transmitter which sends a 3-15 psig proportional signal to a 0-100% indicator mounted near the tank. This signal is also sent to two pressure switches mounted in the field panel which actuate an alarm on high or low level.

PCB-ARCH-EXT0372722

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LI-316-1	
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY / DATE	REV / SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical level loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Air failure to the loop will cause loss of indication and low level alarm.

3.3.2 Power Failure

Power failure will cause alarm to be inoperative.

PCB-ARCH-EXT0372723

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LI-320-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET 1 OF

LIME SLURRY LEVEL INDICATOR

1.0 NEED FOR LOOP

Slurry level indication is important in this tank as required lime concentrations will be made up according to this gauge. The lime will be added and mixed with the crude Aroclor by concentration.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to measure and indicate the level of slurry in the lime slurry tank.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

A displacer type level transmitter serves the level and sends a 3-15 PSIG signal to a receiver gauge, mounted near the vessel, which needs 0-100% level.

PCB-ARCH-EXT0372724

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LI-320-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical level indicator loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.1.1 Air Failure

Upon air failure there will be no indication of level.

PCB-ARCH-EXT0372725

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. TIC-325-3		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET 1 OF

TEMPERED WATER CONTROLLER

1.0 NEED FOR LOOP

Condenser cooling water must be heated and maintained at elevated temperatures for both the 1016 and "mono" operations to prevent freeze-ups in the condenser. Water must be controlled at the proper temperature to minimize "PCB" emissions to the atmosphere.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to maintain a constant temperature of the cooling water to the column condensor and to actuate an alarm on high temperature @ 70°C.

1.1.2 System Performance Required

The temperature should be maintained ± 5°C of set point (65°C).

1.1.3 Accomplishment of Function

The temperature in the water line is sensed by a temperature indicating controller using a capillary bulb sensing element. The controller compares this temperature with a set point and sends a 3-51 psig air signal to a control valve to compensate for variations from the set point. As hot water leaves via the control valve, cold city make-up water enters the system in a equal volume.

PCB-ARCH-EXT0372726

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. TIC-325-3	
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION	BLDG/DEPT	AUTH NO.	REV. BY	DATE	REV	SHEET
Organic	811.00	2417				OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical local temperature control loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Air failure to the loop will cause the control valve to open.

3.3.2 Power Failure

Loss of power will cause the alarm to be inoperative.

PCB-ARCH-EXT0372727

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LIA-328			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET 1 OF

LIGHT ENDS RECEIVER LEVEL

1.0 NEED FOR LOOP

Reliable level measurement is essential in this receiver for proper balance of light ends received from the column and LE's feed to the chlorinators.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this instrument is to measure and indicate the level of material in the light ends receiver and to provide an alarm on high or low level.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

A diaphragm type level transmitter senses the liquid level in the tank and sends a proportional 3-15 psig air signal to a 0-100% indicator mounted near the transmitter. This signal is also sent to two pressure switches in the field cabinet which are set to provide an alarm at the panel on high or low level.

PCB-ARCH-EXT0372728

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LIA-328		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION	BLDG/DEPT	AUTH NO.	REV. BY	DATE	REV / SHEET
Organic	811.00	2417			OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical level loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Air failure to the loop will cause loss of indication and the low level alarm will actuate.

3.3.2 Power Failure

Power failure will cause alarms to be inoperative.

PCB-ARCH-EXT0372729

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LIA-329-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET 1 OF

NO. 2 INTERMEDIATE STORAGE LEVEL

1.0 NEED FOR LOOP

The still pot is both batch charged and "chain" fed with Aroclors in this tank. Accurate level measurement is essential for this very active in-process tank for smooth refining operations.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to measure and indicate the level of material and to alarm on high level.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

A diaphragm type level transmitter senses the liquid level in the tank and sends a proportional 3-15 psig air signal to a 0-100% indicator on the panel and also one near the transmitter. This signal is also sent to a pressure switch which actuates an alarm on high level.

PCB-ARCH-EXT0372730

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. LIA-329-1	
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY / DATE	REV / SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

Typical level loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Air failure to the loop will cause loss of indication.

3.3.2 Power Failure

Loss of power will cause alarm to be inoperative.

NOTE: The zero of level transmitter should be set after N_2 blanketing system is in operation. N_2 enters and is regulated @ 4" W.C. and relieves at 7" W.C. Since the low side is not compensated, it will be necessary to run the zero elevated @ almost 5" W.C.

PCB-ARCH-EXT0372731

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-349-1	
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans DATE 7/19/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY / DATE	REV 1 / SHEET OF

1.0 NO. 5 ABSORBER FEED FLOW CONTROLLER

This controller regulates the feed rate through and thus the ΔP across No. 5 absorber to allow the (exist) 538 feed pump to operate within its head-volume capability.

1.1 DESCRIPTION

1.1.1 Function

The function of this loop is to measure and control the flow by feed to No. 5 absorber and to provide an alarm on low flow.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

The feed flow is controlled by measuring the rate of flow with an integral orifice differential pressure transmitter. The D/P transmitter sends a 3-15 psig signal to the indicating controller. This signal is compared to a set point and the controller sends a varying 3-15 psig signal to the control valve FV-349-1 to compensate for variation from the setpoint.

A pressure switch activates an alarm on low flow.

PCB-ARCH-EXT0372732

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-349-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/19/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET OF

3.0 OPERATION

3.1 MANUAL OPERATION

Typical flow loop.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATION

3.3.1 Air Failures

Upon air failure to the loop the valve will close and the alarm will sound.

3.3.2 Power Failure

Upon power failure the alarm will be inoperative.

PCB-ARCH-EXT0372733

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. KIC-352-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV / SHEET 1 OF

SLURRY CONTROL VALVE TIMER

1.0 NEED FOR LOOP

Allow lime slurry to be mixed on a semi-continuous basis with the crude Aroclors on the way to intermediate storage. Lime mixing on this basis is necessary to neutralize essentially all the HCL dissolved in the Aroclors prior to charging the Aroclors to the still pot. This in turn is required to minimize the potential of chloride stress corrosion cracking in the 316 SS column.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to control the flow rate by lime slurry addition to the product going to intermediate storage.

1.1.2 System Performance Required

1.1.3 Accomplishment of Function

The flow rate is adjusted by two timers mounted on the panel which control the amount of time a pneumatic actuated ball valve is open and how long it is closed each cycle. The valve is continuously cycled open and closed after the open-close selector switche is turned to "open".

PCB-ARCH-EXT0372734

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. KIC-352-1			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV	SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

The slurry timer is turned on during the time material is going to intermediate storage from the chlorinators.

3.1.1 Startup Instructions

Set "open" timer for number of seconds valve is to be open (0-6 sec.)
Set"cycle"timer for number of minutes valve is to be closed (0-6 min.)
Turn selector switch to "open" position.

3.1.2 Shut-Down Instructions

Turn selector switch to close position.

3.2 INTERLOCKS

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Upon air failure valve will fail closed.

3.3.2 Power Failure

Upon power failure valve will fail closed.

PCB-ARCH-EXT0372735

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-406-1 & Existing FICA-7		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET 1 OF

#6 CHLORINATOR BIPHENYL FEED CONTROLLER

1.0 NEED FOR LOOP

This loop is needed to assure that the proper amount of Biphenyl is added to the chlorinator. The parallel feed controller is needed to maximize the production of "mono" in the column system. The flow through-put of the existing FT-7 was too small to perform this function.

1.1 FUNCTION

1.1.1 Function

The function of this loop is to control the rate of flow of Biphenyl into the chlorinator and sound an alarm on low flow.

1.1.2 System Performance Required

The flow rate should be maintained ± 1/8 GPM of set point.

1.1.3 Accomplishment of Function

The Biphenyl flow rate is controlled by measuring the rate of flow in the line and transmitting an air signal proportional to this rate to an indicating controller; the measuring and transmitting is done by one of two differential pressure transmitters. One measures the flow across an orifice plate in the line for the "mono" operation and the other has an integral orifice for measuring the smaller flow in the 1016 operation. The indicating controller compares the air signal with a set point flow rate and sends a varying 3-15 psig signal to the Biphenyl control valve to compensate for variations from the set point. The transmitter also feeds an air signal to a pressure switch which activates an alarm on low flow. The flow is also field indicated at #6 chlorimator and at the Biphenyl feed pump pushbutton.

PCB-ARCH-EXT0372736

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-406-1 & Existing FICA-7			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV	SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

a. 1016 Operation

1. Set selector switch in field to "1016" portion
2. Close valve to FT-406-1
3. Open valve to FT-7
4. Set controller set point to flow rate desired and place controller in "auto"position.
5. Open block valves in feed line

b. "Mono" Operation

1. Set selector switch in field to "Mono" position
2. Close valve to FT-7
3. Open valve to FT-406-1
4. Set controller set point to desired flow rate and place controller in "auto" position.
5. Open block valves in feed line.

3.1.1 Start-up

Same as above plus alarms should be checked.

3.1.2 Shutdown

a. Set FIC-7 set point to 0.

b. Close block valves in Biphenyl feed line

3.1.3 Manual Operating Instructions

a. Set FIC-7 on manual and control flow through FV-7 to #6 chlorinator by adjusting air output to valve.

3.2 INTERLOCKS

None.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Air failure to the loop will cause control valve FV-7 to close.

3.3.2 Power

Power failure will cause the annunciator to be inoperative. The control valve will continue to operate.

PCB-ARCH-EXT0372737

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-414-1			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV	SHEET 1 OF

#8 CHLORINATOR CHLORINE FEED

1.0 NEED FOR LOOP

This new controller is required to accept the pneumatic output from the existing densitrol so as to make the required gravity Aroclor material in No. 8 unit for "mono" operation only. The Aroclor 1105 feed (for "mono") gravity is finished off in No. 8 chlorinator so that No. 9 chlorinator can be used for blowing (de-gassing).

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to control the flow rate of chlorine to #8 chlorinator by using the density measurement to reset the set point when on "mono" operation.

For operation on "1016" refer to IFO FIC-10.

1.1.2 System Performance Required

The flow rate schould be ± 1% of set point.

1.1.3 Accomplishment of Function

The chlorine flow is controlled by measuring the rate of flow in the line using an orifice plate and a differential pressure transmitter. The D/P transmitter sends an air signal (3-15 PSIG) proportional to the flow rate to the indicating controller. The controller compares this signal with a set point flow rate which is determined by a density indicating controller (DIC-39). The controller sends a varying 3-15 PSIG signal to the chlorine control valve to compensate for variation from the set point.

PCB-ARCH-EXT0372738

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FIC-414-1			
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV	SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

Set the specific gravity controller for #8 chlorinator in "auto". The set point will be determined by supervision. The densitrol will adjust the chlorine feed automatically to #8 to maintain the indicated specific gravity.
Note: The range of the densitrol for "mono" operation is 1.010 to 1.060.

3.1.1 Startup Instructions

a. Open manual valves in chlorine feed line.
b. Bring specific gravity up to desired level with controller "local-remote" in "local" position and on "auto.
c. When desired level is reached switch to "remote" to allow DIC-39 to adjust set point.
d. Check specific gravity manually every 2 hours.

3.1.2 Shut-Down Instructions

a. Close chlorine valves to distributor.
b. Switch controller to local and move set point to "0".

3.1.3 Manual Operating Instructions

Place controller in "local" and "manual". Adjust air to regulate control valve opening.

3.2 INTERLOCKS

There are two interlocks on this system. (1) Cl_2 valve will not operate if circ. pump is down, (2) on high temperature the Cl_2 valve will not operate (Hi temp. is 205°C). The reset button on panel board must be pushed after interlock has come in.

3.3 ABNORMAL OPERATIONS

3.3.1 Air Failure

Air failure to the loop will cause the feed valve to close and instrument will indicate no flow.

3.3.2 Power Failure

Power failure to the loop will cause the feed valve to close due to the interlock with chlorine pump. The instrument will indicate zero flow.

PCB-ARCH-EXT0372739

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FT-418-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV / SHEET 1 OF

NITROGEN TO NO. 9 CHLORINATOR

1.0 NEED FOR LOOP

A new integral orifice measures the required N_2 flow rate (via exist. controller) into No. 9 chlorinator. Range of existing Cl_2 orifice meter is too large to accomodate the relatively smaller N_2 flow. N_2 flow needs to be measured to insure the correct volume is used to de-gas the Aroclor 1105 to the desired level.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this transmitter along with FIC-11 controller and valve is to control the rate of N_2 to #9 chlorinator.

1.1.2 System Performance Required

The flow should be $\pm$ 1% of set point.

1.1.3 Accomplishment of Function

The N_2 flow is controlled by measuring the rate of flow in the line using an integral orifice differential pressure transmitter. The D/P transmitter sends a 3-15 PSIG pneumatic signal to the controller. The controller compares this signal with a set point flow rate. The controller sends a varying 3-15 PSIG air signal to the control valve to compensate for variations from the set point.

PCB-ARCH-EXT0372740

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FT-418-1		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/23/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2471	REV. BY	DATE	REV / SHEET OF

3.0 OPERATION

3.1 NORMAL OPERATION

a. Close chlorine block valve ahead of control valve.
b. Open N_2 block valve ahead of control valve.
c. Set selector switch in field to "N_2".
d. Set controller "local remote" switch to "local".
e. Adjust setpoint as required for "mono" operation.
f. Open N_2 feed valve.

3.1.1 Startup Instructions

Same as above.

3.1.2 Shut-Down Instructions

Close N_2 valves to distributor and set controller set point to "0".

3.1.3 Manual Operating Instructions

Set controller to "manual" and adjust air to FV-11.

3.2 INTERLOCKS

Same as FIC-11

3.3 ABNORMAL OPERATIONS

Same as FIC-11.

PCB-ARCH-EXT0372741

Monsanto	INSTRUMENT FUNCTION OUTLINE		CED LOOP NO. FICA-541-1 & FICA-32		
	PLANT W. G. Krummrich		ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET 1 OF

#2 AND #3 ABSORBERS INLET FLOW CONTROL & ALARM

1.0 NEED FOR LOOP

This loop is needed to insure proper flow of aroclor to the absorber.

1.1 DESCRIPTION OF LOOP

1.1.1 Function

The function of this loop is to control the flow of material into the absorbers and to sound an alarm if flow is too low.

1.1.2 System Performance Required

The flow rate should be maintained $\pm$ ½ GPM of set point.

1.1.3 Accomplishment of Function

The flow rate is sensed by a differential pressure transmitter across an orifice plate in the line. The transmitter sends a 3-15 psig air signal to a flow indicating controller. The controller compares this signal to a set point and sends a 3-15 psig air signal to a control valve to compensate for variation from set point. The transmitter also sends an air signal to a pressure switch which activates an alarm on low flow.

PCB-ARCH-EXT0372742

Monsanto	INSTRUMENT FUNCTION OUTLINE	CED LOOP NO. FICA-541-1 & FICA-32			
	PLANT W. G. Krummrich	ISSUED BY C. J. Hans	DATE 7/29/71	PLANT LOOP NO.	
DIVISION Organic	BLDG/DEPT 811.00	AUTH NO. 2417	REV. BY	DATE	REV / SHEET OF

2.0 COMPONENT AND CALIBRATION DATA

OPERATING DATA

A. FT-541-1 Differential Press. Trans.

Supply: 20 psig
Output: 3-15 psig
Flow: 0-15 GPM
Span: 0-100" W.C.
Location: Ground Level, NE of Tank 530

B. FIC-32 Flow Indicating Controller

Input: 3-15 psig
Output: 3-15 psig
Action: Inc. Input
Dec. Output
Supply: 20 psig
Location: Panel

C. FV-32 Control Valve

Input: 3-15 psig
Action: Air to open
Fails Close
Location: 14' Level, NE of Tank 530

D. FSA-32 Pressure Switch

Input: 3-15 psig
Set Point: 33%
FCT: Lo Flow Alarm at 3.3 GPM
SPDT Contact/115 V., 10A
Location: Panel

MECHANICAL DATA

A. Foxboro Integral Orifice Diff. Press. Trans. W/Piped & Mt'd. Air Set W/Gauge

Model #: 13A-HS2
Range: 0-200 to 0-850" W.C.
Calibrated Range: 0-400" W.C.
316 SS Body
Process Conn: ½" NPT
Orifice: .350" Bore
.316 SS
Accuracy: ½%
Serial #: 1947915
IPMO: 001

B. Fischer & Porter Flow Ind. Cont.

Model #: 51-1351 ABEC
Range: 3-15 psig sq. rt.
Scale: 0-100 sq. rt.
Prop. Band: 2-500%
Reset Rate: .02 to 5 min.
Accuracy: ½%
IMO:
IPMO: 165

C. Fisher Gov. Control Valve #667-BF

Actuator Size 30 Travel 3/4"
1" 150# Flg. 316 SS Body
Packing Set 1U2546-0101
3/4" 316 SS Trim, Micro-Flute
Valve Plug 2J7335-3507
Valve Ring 1R1262-3507
Teflon Packing, Skirt-Top Guiding
Spare Valve S.C. 07-75671
IMO: 45
IPMO: 126
Serial: 4435034

D. Barksdale Pressure Switch #DIT-H18

Range: 0-18 psig
Bronze Diaphragm, ¼" IPS
Conduit Conn: ½" NPS
Setting Trips at 4.08# on drop
Stores Code: 44-73246

PCB-ARCH-EXT0372743