

MODEL 1280® MULTI-COLOR SPRAY MARKING SYSTEM





R.K.B. OPTO-ELECTRONICS, INC. 6677 Moore Road Syracuse New York, 13211 Tel#: (315) 455-6636 • Fax#: (315) 455-8216 service@rkbopto.com

Table of Contents

1.0 SPECIFICATIONS	1
1.1 Operation Specification	1
1.2 Equipment Specification	1
1.2.1 Control Enclosure	1
1.2.2 Marker Assembly	1
1.2.3 Over-spray collector	2
2.0 INSTALLATION INSTRUCTIONS	2
2.1 Installation of the spray head assembly	2
2.1.1 Location of the Inspection Device	2
2.1.2 Roll Handling	2
2.1.3 Accessibility of the Web	
2.2 Spray Head Rotation	2
2.3 Edge Guide Positioning	2
2.3.1 Environment	2
2.3.2 Ink Obstruction	2
2.3.3 Edge sensor operation	3
2.4 Mounting the spray head assembly	3
2.4.1 Mounting Studs	3
2.5 Mounting the control enclosure	3
2.6 Power requirements	3
2.6.1 Electrical	3
2.6.2 Pneumatic	3
2.7 Environment	3
3.0 Operation Instructions	3
3.1 Marker operation on initial start up	3
4.0 ELECTRONIC CIRCUIT DESCRIPTION	4
4.1 Sequence of operation	4
4.1.1 Web Break	4
4.1.2 Start/Stop	4
4.1.3 Spray Functions	5
	_
5.0 DESCRIPTION OF PNEUMATIC CIRCUIT OPERATION	5
5.1 Spray Marking Operation Sequence	5
6.0 MAINTENANCE INSTRUCTIONS	5
6.1 Preventative maintenance	5
6.1.1 Cleaning	5
6.2 Trouble shooting guide	5
6.2.1 No spray cycle	5
6.2.2 Single color malfunction	6
6.2.3 Marker does not retract on web break	6
6.2.4 Marker does not advance when web is present	6
ole . I the state of the state	O

1.0 SPECIFICATIONS

1.1 Operation Specification

The R.K.B. OPTO-ELECTRONICS, INC. web markers are intended to be employed in industrial web manufacturing processes for marking the edge of moving webs that are reeled up subsequent to the application of the mark. Spraying suitable marking fluids on to the sheet edge makes the marks such that when reeled up, the marks are visible as concentric colored rings on the end of the reel (**Figure 1**).



Figure 1 – Concentric Colored Marks

The marker may be employed with various types of automatic web inspection, or process control equipment to place marks at the sheet edge whenever a defect is identified in the web. Multi-color markers provide a red, green, blue, black, or brown spray for different defect signals. This enables the colors to be used to indicate defect location in the cross machine direction or to be used to class different types of defects.

The marks are applied by means of a spray nozzle that projects a controllable jet of fluid at the web. The spray system is operated under pneumatic pressure, with spray intensity adjustments available (**Figure 2**).



Figure 2 – Automated Spray Nozzle Assembly

The marker assembly is equipped with a web follower system (Figure 3) and, when operating in its automatic mode, will position the movable carriage of the assembly accurately over the edge of the web. A fine adjustment is provided to ensure that the spray is directed onto a narrow band at the web edge when the carriage is positioned.

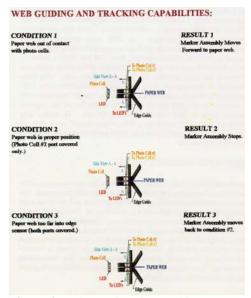


Figure 3 – Electronic Edge Tacking System

R.K.B. OPTO-ELECTRONICS, INC. provides all ink and spare parts required for the proper operation and maintenance of the model 1280 Spray Marker. RKB requests that the customer use manufacturer supplied water base ink. Should the customer desire alternate ink, we ask that you send a small amount to RKB for testing. Viscosity, acidity, and other factors may affect operation and the life of the marker. Failure to use manufacturer-supplied inks, or obtain manufacturer approval for other inks, may forfeit warranty agreements.

1.2 Equipment Specification

The Model 1280 consists of the following components:

1.2.1 Control Enclosure:

The marker control enclosure is a wall mounted NEMA 4X enclosure containing all marker controls, control electronics, the system low voltage power supply, CMOS digital control board, solid state relay board, sheet break relay and the marker test station (Figure 4).



Figure 4 - Marker Control Enclosure

The CMOS Control Board controls all functions of the marker's operation. This board contains the logic to control the automatic web tracking, activate appropriate spray and color valves, control dwell and spray time and control all movement of the spray head assembly. This board is a 15 DC Volt CMOS digital circuit receiving input signals from the inspection or control device, sheet break indicator, edge sensors, test station and control station. Outputs all go to a solid state relay board. The solid state relay board is used to convert the DC output of the CMOS control board to 110-Volt AC capable of driving 2.5 amp non-inductive loads.

The power supply provides regulated DC power for use on both the control board, and the relay board.

The test station is a control station that is to be used to test the application of ink. The test station has an activation button for each color and a web break bypass button for sheet break periods. The test station may also be used for manual activation of the marker.

1.2.2 Marker Assembly

This assembly contains all mechanisms required to mark the sheet and follow any web drift if required. The Marker consists of two major sub-assemblies. First, the head of the marker (**Figure 5**). The head of the marker contains the ink applicator and the web guide unit. The mounting arrangement of the head will allow for a path that deviates +/-30 degrees. The body of the marker (**Figure 6**) contains all color valves, ink wells and associated components to deliver ink to the head. The body of the marker also incorporates the mechanism to allow for movement of the unit.



Figure 5 – Spray Head Assembly



Figure 6 – Marker Body

1.2.3 Over-spray collector

The overspray collector (**Figure 7**) mounts to the web guides on the spray head assembly to contain overspray from the marking nozzle. Because the marking ink is atomized when leaving the marking nozzle, it is strongly recommended that the overspray collector be installed on the unit. If physical restraints prevent installation of the supplied over-spray collector, contact RKB to produce an appropriate collector, or modify the collector supplied with the marker.

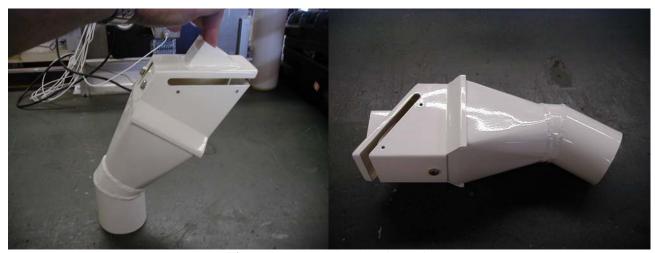


Figure 7 – Overspray Collection Unit

2.0 INSTALLATION INSTRUCTIONS

2.1 Installation of the spray head assembly

When installing the spray head assembly, it is important to consider the following factors:

2.1.1 Location of the Inspection Device

The location of the spray head assembly must be downstream from the inspection device (**Figure 8**) in order to permit accurate marking of the web. The marker must not be too far downstream from the inspection device or the spray will begin before the defect arrives.



Figure 8 – Position of Marking Unit

2.1.2 Roll Handling

The markings on the web should be visible to the rewinder operator. If the rolls are not turned around before being mounted on the rewinder, then marking should occur on the operator side of the web. If the reel is turned around before rewinding, then the marks should be made on the backside of the web, which when mounted on the rewinder would become the operator side. If physical constraints force marking the web on the side that will be opposite the rewinder operator, a mirror mounted at the rewinder can still enable the operator to see the markings.

2.1.3 Accessibility of the web

To properly install the spray head, a span of web < 4.25" wide, free of excessive edge flap, and with draw angle no more than 30 degrees from horizontal is required (**Figure 9**).



Figure 9 – Proper Installation relative to angle

2.2 Spray Head Rotation

The spray head assembly must be mounted appropriately to allow proper flow of ink through the ink system. The acceptable range of mounting positions is shown on the dimensional drawing located elsewhere within this manual. Rotation of the spray head is done by loosening two bolts on the subassembly coupling and rotating the spray head until the paper guides are aligned with the web.

2.3 Edge Guide Positioning

In order to automatically track the drift of the web, the marker must sense the location of the web edge. A pair of edge sensors is used to accomplish this. The sensors are optoelectronic.

2.3.1 Environment

These sensors must be kept clean and free from dirt, oils, coatings, and other debris in order to function properly.

2.3.2 Ink Obstruction

The edge sensors must be mounted upstream from the spray nozzle since mounting them beneath, or downstream from the nozzle would permit the ink to cover the sensors and cause the marker to track incorrectly (**Figure 10**).

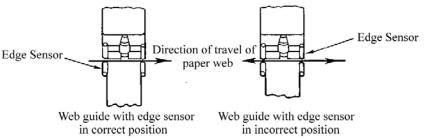


Figure 10 – Edge Sensor Mounting Position

One of the spray markers web guides houses the mounting for the edge sensors. If the web guide with the sensors is forced to be downstream from the nozzle, remove both web guides and return them to R.K.B. OPTO-ELECTRONICS, INC. The guides are oriented left and right. We will replace your guides with a new set having the opposite orientation (if they are returned unused prior to the initial installation of the marker). This will enable the sensors to be upstream from the nozzle.

DO NOT OPERATE THE MARKER WITH THE EDGE SENSORS DOWNSTREAM FROM THE SPRAY NOZZLE. USED WEB GUIDES WILL NOT BE REPLACED FREE OF CHARGE.

2.3.3 Edge sensor operation

Two infra red light sources are placed beneath the web and two infra red detectors are placed above the web. Counting the number of light sources detected monitors web position. No detection indicates that the marker must retract away from the web. A single light source detected indicates correct positioning, and two light sources detected prompts the marker to advance toward the web.

2.4 Mounting the spray head assembly

2.4.1 Mounting Studs

The spray head assembly is rigidly secured to a support structure using mounting studs extending out of the bottom of the spray head chassis. Dimensional information regarding the mounting of the spray head assembly is given elsewhere within this manual. An adjustable height stand allowing height adjustments from 1/2" to 7" is included, and mounts onto the spray head chassis.

2.5 Mounting the control enclosure

The control enclosure is a wall mountable enclosure that should be located in an area convenient to operators. The enclosure is rated NEMA 4X.

2.6 Power requirements

Electrical: 110 AC Volts, 50/60 Hz, and 10 Ampere

Pneumatic: 65-90 p.s.i., clean air

2.7 Environment

The marker will operate reliably in temperatures of 30 to 140 degrees Fahrenheit with relative humidity between 0 and 95 percent, non-condensing.

3.0 OPERATION INSTRUCTIONS

After proper installation the following procedure should be used to set up and operate the marker.

- 3.1 Marker operation on initial start up
 - (a) Place the Start/Stop selection switch located on the control enclosure door in the Stop position.
 - (b) Press the Power Switch to the ON position.
 - (c) With no web present, place the Start/Stop selection switch to Start.
 - (d) With no paper present, press the Test push button located on the test station. The ink carriage spray head assembly will move forward. There will be a delay of 2-3 seconds before the marker moves forward.
 - (e) Place a piece of paper in the web guide so that both sensors are blocked or covered. The carriage should retract to the stop position. There will be a delay of 2-3 seconds before the marker moves.
 - (f) Slide the paperback so that only the sensor nearest the web is covered. Note that the carriage should not move.
 - (g) Remove the paper. The carriage should now move forward until it reaches the stop. There will be a delay of 2-3 seconds before the marker moves.
 - (h) Press the Stop button on the Start/Stop switch, the carriage should retract. There will be no delay, marker will move immediately.
 - Position the marker to allow enough space beyond the widest web width to allow complete retraction of the marker.
 - (j) Ensure that the marker is able to travel from its fully retracted position to the narrowest web width. The maximum travel is 12 inches. If more travel than this is required, a manual adjustment must be provided to move the entire assembly for different grades or materials.
 - (k) Verify that the web guides are parallel to the web. If the guides are not parallel, loosen the two hex head bolts on the spray head coupling, and rotate the spray head to the proper position.
 - (l) Verify that the web guides are the proper height to engage the web with minimal contact. Adjust as required.
 - (m) Install the inks by removing the shipping caps, and replacing them with the gravity flow caps provided with the marker. Install filters in inkwells over opening. Place the bottles with gravity flow caps attached in the inkwells. Squeeze the bottle to start the ink flowing. The ink level in the ink well must be above the filter.
 - (n) Test the colors at the test station by pressing the appropriate switches. If the web is not present, Test will have to be held to perform this step.
 - (o) Place the Start/Stop switch in the Start position. The spray head assembly should move out onto the web and stop with the web between the edge sensors. The marker is now in an operational position.

- (p) The marker is now functional except for occasional addition of ink. Maintenance is outlined later in the manual.
- (q) Changing the setting of the air regulator may vary the spray. The factory setting is 10 p.s.i.

4.0 ELECTRONIC CIRCUIT DESCRIPTION

4.1 Sequence of operation

Schematic D110563 shows all the following description in standard electronic notation, and may be of greater value to an experienced individual. For those inexperienced with digital electronics, attempts to perform your own service, normally end up requiring more work at substantially greater cost from RKB personnel than simply replacing the defective board with a spare, and returning the defective board to RKB for service.

All logical controlling of the marker spray functions and web-tracking functions are controlled by the marker controller circuit board normally located in the control enclosure.

4.1.1 Web Break

If the web is not present, a DC signal is applied to the N card edge. This signal is passed through the OR gate (Z2) and inverted (Z17) forcing the output of the AND gate (Z20) low which blocks triggering of the forward one shot (Z21) which inhibits forward movement of the spray marker. Simultaneously, the output of the OR gate (Z2) prior to being inverted, asserts another OR gate (Z2) triggering the reverse one shot which initiates retraction of the spray marker.

4.1.2 Start/Stop

If Stop is asserted, the signal passes through the two OR gates (Z2) to an AND gate (Z20), and triggers the reverse one shot, this same trigger disables the forward one shot. Thus the marker retracts off the web.

If Start is asserted, and the web is present, the forward one shot is triggered and the spray marker moves forward until the leading edge sensor is covered. At this point, the forward input (L) drops low, blocking all triggering signals to the forward one shot, and the marker movement stops.

4.1.3 Spray Functions

When any input channel is asserted the signal is gated through an AND gate, and triggers both it's associated D flip flop, and the Dwell and Spray one shots. The flip-flop outputs are gated with the web break information, and output to the spray marker. The dwell and spray one shots generate appropriate delays to position the marking and the defect together, and time the length of spray. After the spray is complete, the channel flip-flops are cleared and the water one shot is activated for approximately 2 seconds. This will allow the spray nozzle to spray water that keeps the nozzle clean and prevents clogging.

5.0 DESCRIPTION OF PNEUMATIC CIRCUIT OPERATION

5.1 Spray Marking Operation Sequence

When a mark signal is received, the signal is processed as described in section 4.0. Two signals sent to the spray marker are 110 AC volts and activate the color selection valve, and the spray solenoid.

There is only one spray solenoid, but there are as many color valves as there are colors. There is also a valve for water. When the color signal is received, the valve allows the ink to flow to the spray solenoid. When the spray signal is received, the spray nozzle sprays the ink onto the web. When the spray signal is removed, the spray nozzle switches from spraying ink to spraying water for approximately 2 seconds, thus keeping the nozzle clean and reducing clogging.

6.0 MAINTENANCE INSTRUCTIONS

6.1 Preventative maintenance

The Model 1280 multi-color spray marker should be connected to filtered mill air. Every six to twelve weeks, the airline filter should be changed to insure no excess build up of oil or dirt. The transparent ink well covers should be kept on at all times. The model 1280 is an industrial piece of equipment and will operate with a minimum amount of preventative maintenance and cleaning, however it is always sound practice to clean mechanical equipment at regular periodic intervals.

6.1.1 Cleaning

The edge sensors should be kept free of dirt and build up. Clean them by spraying air across their surfaces each shift. Heavy build up can be removed with a soft cotton cloth. Avoid the use of solvents and harsh chemicals.

The ink system will also require occasional flushing. To clean the ink system, first remove the inkbottles and wash gravity flow caps. Obtain empty inkbottles and fill with luke warm water and place gravity flow caps on the bottles. Place the bottles of water into the inkwells. Using the test station activate each color spray until all water has been sprayed out. Remove the empty water bottles and check condition of the ink well filter located on the bottom of the ink well. Wash if necessary. If dirt, debris, or other matter exists in the ink well, remove as much as possible. ALWAYS REPLACE THE INK WELL DUST COVERS. The dust covers prevent dust infiltration into the ink system and slow evaporation of the marking ink.

6.2 Trouble shooting guide

6.2.1 No spray cycle

Check the setting of the Dwell and Spray time controls. Using a multimeter, check the output voltage of the solid state relay associated with the spray solenoid. (See the relay board schematic)

If you have 110 AC volts for the interval of the desired spray, the trouble is in the spray marker assembly. Be certain that the input air is 65-90 p.s.i. Also check the electric solenoid, and verify that it is functioning. Verify that the color valve is not plugged, or defective.

If the 110 VAC is not exiting the relay, the relay may be at fault. Check the relay, only after verifying that the Start/Stop switch is set to Start.

If neither of these solves the problem, test the Dwell and Spray one shots on the marker controller board (D110563).

6.2.2 Single color malfunction

Check ink flow system. Gravity flow cap and ink well filter must not be clogged. Check the ink level in the ink well. Check the associated relay output voltage as described above.

If the relay outputs 110 AC volts after triggering, and the ink passage is clear, verify the air-input pressure is 65-90 p.s.i. Check the color valve and the color solenoid.

If the 110 VAC is not present, test the marker controller board, and then the relay.

6.2.3 Marker does not retract on web break

Verify that the web break signal is getting to the marker controller board, and that 110 AC volts is being sent to the marker assembly.

6.2.4 Marker does not advance when web is p	Marker does	not advance	when	web is	present
---	-------------	-------------	------	--------	---------

Follow the same instructions as 3 above.

SPARE PARTS LIST

ITEM NUMBER	QTY USED	RKB PART NUMBER	DWG/MFG PART #	ORDERING
NUMBER	USED	NUMBER	REF DES./DESCRIP	CODE
0001	1 ea	400183	Relay, KRP 11AG	PE
0001	1 cs	400754	Ink, Brown 28-129	PC
0002	1 cs	400755	Ink, Blue 28-131	PC
0003	1 cs	400756	Ink, Red 28-131	PC
0004	1 cs	400757	Ink, Red 28-133 Ink, Black 28-128	PC
0005	1 cs	400757	Ink, Green 28-132	PC
0007	1 ea	400738	Block, Contact M1XB1	PE
0007	1 ea	400789	Button, Flash, White	PE
0009	1 ea	400791	Button, Flash, Blue	PE
0010	1 ea	400791	Button, Flash, Black	PE
0010	1 ea	400792	Button, Flash, Green	PE
0011	1 ea	400795	Button, Flash, Red	PE
0012	1 ea	401027	Gauge 274Z16071	PE
0013	1 ea	401027	Regulator R162/1612	PE
0014	1 ea	401028	Valve, Regulator, Control	PE
0015	1 ea	401239	Assembly, Ink Flow Cap, Bottle	MM
0017	1 ea	401682	Filter, Ink Well	MM
0017	1 ea	401693	Fuse, 5 Amp, 250 VAC	PE
0018	1 ea	401811	Block, Contact 21AX7	PE
0019	1 ea	401923	Module, Relay Assembly	ME
0020	1 ea	401923	Web Guide Assembly, Non-Sensing	MM
0021	1 ea	402298	Module, Marker Control	ME
0022	1 ea	402298	Nozzle, Spray, Air Atomizing	PM
0023	1 ea	403810	Button Assembly, "ON/OFF", Main Power	MM/ME
0024	1 ea	403810	Indicator Assembly, Spray	MM/ME
0025	1 ea	403816	Button Assembly, "START/STOP", Spray	MM/ME
0020	1 ea	403844	Cylinder, Rodless, Pneumatic	PM
0027	1 ea	403863	Valve, Solenoid, MB-12-3CSC	PM/PE
0029	1 ea	403945	Block, Terminal, UK2.5B	PM
0020	1 ea	403946	Block, Cover, Terminal, D-UK 2.5	PM
0030	1 ea	403955	Clamp, End, E/UK12-01-442	PM
0032	1 ea	404078	Valve, Solenoid, EC1 620-220-115	PM/PE
0032	1 ea	404093	Web Guide Assembly, Sensing	MM/ME
0034	1 ea	404094	Valve, Solenoid, 1/8", 4200-0C-5387	PM/PE
0035	1 ea	404154	Supply, Power, Assembly	ME
0036	1 ea	404156	Assembly, Potentiometer	ME
0037	100	101130	1155cmery, 1 otentionices	17112
0038				
0039				
0040				
0041				
0042				

LIST OF DOCUMENTS

REVISION: 01 DATE: 10JUL95

DWG NUMBER	REV NUMBER	RKB PART NUMBER	DWG/MFG PART # REF DES./DESCRIP	QTY
A108676	NUNIDER	NONIDER	NUT, REGULATOR, SPRAY MARKER	1
A110632			TAG (SH.3)	5
A111264			BALL, BRASS	1
A111265			GASKET	1
A111266			CAP, MODIFIED	1
A112189			ADAPTER	1
A112230			COVER, GLASS, GUIDE	1
A112231			COVER	1
A113011			TUBING	1
A113033			ROD, SPRING	1
A113034			SCREW, ADJUSTABLE	1
A113037			GASKET	1
A113195			BRACKET, FLANGE, HOSE	6
A113196			TUBING	6
A113204			FLANGE	6
A113208			SHIM	6
A113209			BAR, SUPPORT	6
A113210			STAND	6
A113212			ANGLE	6
A113214			ANGLE, SUPPORT	6
A113215			STANDOFF	6
A113218			GASKET, RUBBER	6
A113228			TUBING	1
B111245			INK WELL, BASE	1
B111247			B111246 TUBE GRADE 2 PVC GREY	1
B111250			ASSEMBLY, ELBOW, MAIL & TUBING	1
B111627			PLUNGER, BRASS	1
B111268			SPACER, BRASS	1
B111983			RAIL, TERMINAL L=6.75	1
B112166			ANGLE, BLOCK, MOUNTING, TERMINAL	1
B112167			ANGLE, MOUNTING, REGULATOR	1
B112176	1		TUBING, RECT.	1
B112179			ANGLE, MOUNTING	1
B112180			ANGLE, MOUNTING, VALVE	1
B112188			BLOCK, MOUNTING, MAIN VALVE	1
B112199			ASSEMBLY, PCB, LAMP	PC FILE
B112201			ASSEMBLY, PCB, SENSOR	PC FILE
B112229			GUIDE, SUPPORT, ARM-WEB	1
B112400			BRACKET, MOUNTING, MODULE, RELAY	5
B112401			PLATE, MOUNTING, POTENTIOMETER	5
B112404			PLATE, MOUNTING, POWER SUPPLY	5
B112408			ANGLE, MOUNTING, TERMINAL RAIL	5
B113030			PLATE, MOUNTING, NOZZLE	1
B113031			BRACKET, PIVOT	1
B113032			BRACKET, PIVOT	1
B113154			BRACKET, MOUNTING, WATER REGULATOR	1

B113202		COVER, TERMINAL STRIP	6
B113206		BRACKET, MOUNTING, TOP	6
B113211		TUBING, SUPPORT	6
B113216		ANGLE, SUPPORT	6
C104196		CYLINDER, INK WELL, SPRAY MARKER	2
C111654		PLATE, MOUNTING, MARKER	2
C111860		BRACKET, ADJUST, SPRAY HEAD, PART #1	2
C111860		BRACKET, ADJUST, SPRAY HEAD, PART #2	2
C111860		BRACKET, ADJUST, SPRAY HEAD, PART #3	2
C112168	1	COVER, BODY	2
C112171	1	COVER, SPRAY MARKER	2
C112175	1	COLLECTOR, OVERSPRAY, TOP PART	2
C112181	1	PLATE, MOUNTING, SPRAY HEAD	2
C112184		CHANNEL, SIDE, LEFT	2
C112185		CHANNEL, SIDE, RIGHT	2
C112227	1	GUIDE, UPPER EDGE	2
C112228	1	GUIDE, LOWER EDGE	2
C112233		GUIDE, LOWER EDGE	2
C112234		GUIDE, UPPER EDGE	2
C112399		PANEL, CONTROL, DETAIL, MARKER	5
C112403		DWG. SCHEMATIC	EL.FILE
C112421		DOOR, CONTROL ENCLSURE, MARKER	5
C113201		ANGLE, SIDE PART #1 & #2	6
C113213		ANGLE, PART #1 AND #2	6
C113229		COVER, SUPPORT, SPRAY MARKER	2
D112172	2	SPRAY COLLECTOR, TOP PART	3
D112183	3	PLATE, MOUNTING, INK WELL	3
D112186	3	CHANNEL, BOTTOM	3
D112256		INTERCONNECTION, SPRAY MARKER	EL. FILE
		(RETRACTILE CORD FOR CUSTOMER ONLY)	
D113193		TANK, POLYETHLENE	6
D113198		PLATE, TANK, TOP	6
D113200		ANGLE, PART #1 AND #2	6

[•] Comments: This manual contains privileged and confidential information and is the property of RKB. The individual or entity named above intends it only for use. If you are not the intended recipient you must not peruse, use, disseminate, distribute or copy this manual and/or its attachments. Any unauthorized use of this information will be construed as a violation to the directives as outlined in the "Economic Espionage Act of 1996," title 18, United States Code, sections 1831 and 1832. The obligations of any person or organization as prescribed by RKB's confidentiality provisions and as described by law will survive termination of this information, contract, projects, discussion and/or any agreement in force. Any violation herein constitutes a breach of these terms and a United States Court of the State of New York jurisdiction will hold law enforceable.