

WesTech

Heavy Machinery Division

A Control Flow Company

JAPANESE NAVY FLEET OILER PROJECT



WesTech

Heavy Machinery Division

A Control Flow Company

- **Owned 100% by Control Flow, Inc.**
 - 25 Years in Petroleum Industry
 - Factory in Houston, TX
 - ISO 9001 Certified
 - Worldwide Sales \$25MM+
- **Leader in Pipe Lay, Offshore Drilling, Marine Hydraulics & Motion Control**
 - Military Grade Ram Tensioners
 - FAS and RAS Equipment Systems
 - Linear & Flexible Tensioners
 - Motion Compensation Equipment



160 Kip Ram Tensioners on Drill Rig

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A Control Flow Company

Providing Full Service in
FAS and RAS System Supply



WesTech-HMD

*Field Service & Technical Support
Military Support Anytime & Anywhere!*

6 Full Time Field Service Engineers
Specialties in Hydraulics, Mechanics,
Electrical and Controls
Fast Delivery on parts, worldwide



WesTech-HMD

*Refueling at Sea (RAS) System:
Used by Navies Around the World!*



WesTech-HMD



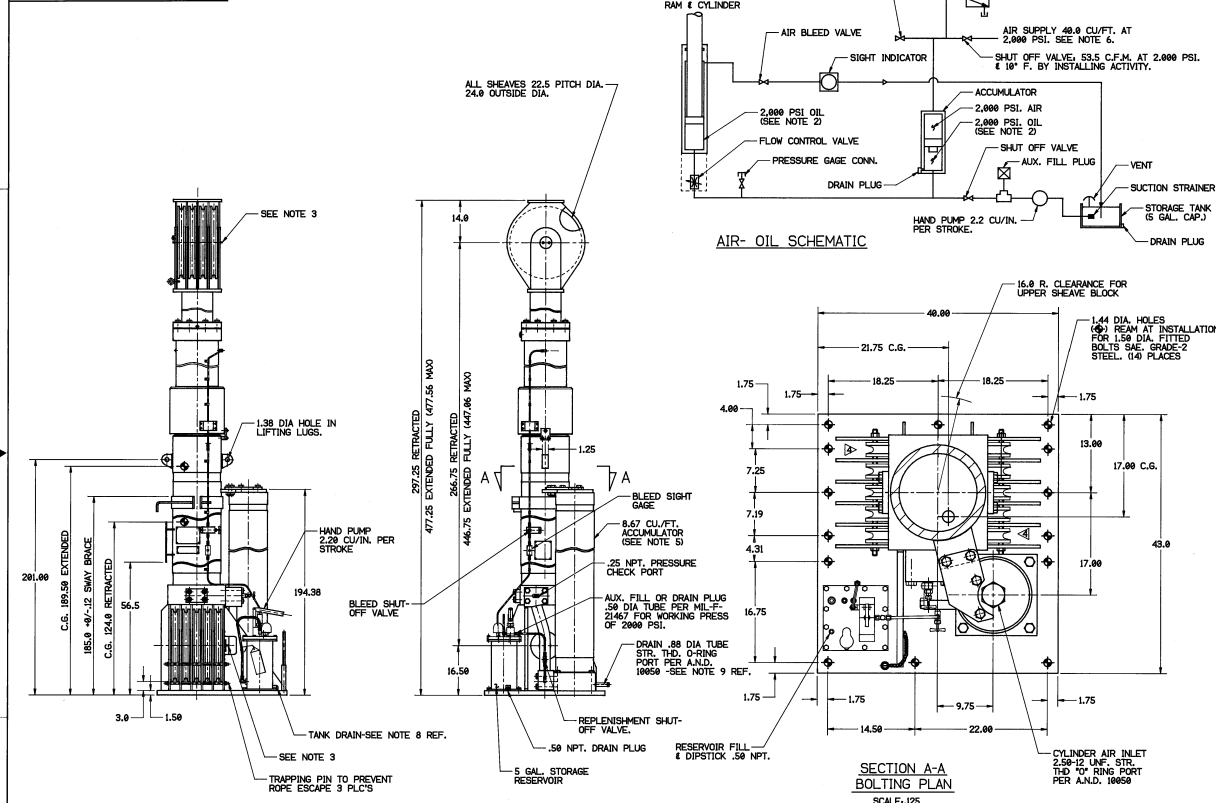
- **Turn-Key**
- Systems Shipped Ready for Installation.
- Fast Start-Up
- Complete Training for Crews
- Full Warranty
- Int'l Parts & Service

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D322694		DATE	BY
ZONE	REV	DESCRIPTION	DATE
A	1	SEE ECN 17790	7/12/88
B	1	SEE ECN 17958	10/3/88

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- NOTES:**
1. RATINGS: MAXIMUM OPERATING PRESSURE = 2000 P.S.I.
 2. RATED PULL, C.Y.E. END INMANU = 19,200 LBS. PAYOUT = 22,000 LBS.
 3. LINE SPEED (LIVE END) = 700 FPM MAX.
 4. CABLE INMANU (FULLY RETRACTED TO NORMAL EXTENSION) = 500 FT.
 5. CHARGE WITH PETROLEUM FLUID (MIL-F-1711).
 6. GREASE SHEAVES EVERY 60 MONTHS WITH 6 OZ. MIL-G-18789 PER FITTING (9 PLACES).
 7. ENTRY OR EXIT OF CABLE AT THIS POINT WILL PREVENT ROTATION OF HEAD UNDER LOAD DUE TO CABLE LAY & LINE PULL (SEE 8).
 8. INSTALLATION NOTE - CAUTION - DO NOT WELD, CLAMP, OR IN ANY MANNER DISTORT ACCUMULATOR CYLINDER. DEFORMATION OF THE ACCUMULATOR CYLINDER WILL DAMAGE THE ACCUMULATOR PISTON & RESULT IN MALFUNCTION.
 9. SHIPS INTERCONNECTING PIPING MUST COMPLY WITH THE REQUIREMENTS OF THE APPLICABLE REGULATORY AGENCIES.
 10. WEIGHT - DRY = 14,750 LBS. NET = 15,200 LBS.
 11. TANK DRAIN ASSY B313630.
 12. ACCUMULATOR CYLINDER DRAIN ASSY B313675.

EXCEPT AS NOTED		ORIGINAL CONTRACT OR S.O. NO.	
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED		SIGNATURE	
ANGLES ARE 1:1 UNLESS OTHERWISE SPECIFIED		DATE	
LINEAR: .0005 - .0100		DWN: BOB ILLER 3/31/88	
.0100 - .0300		CHGR: R.C. 5/31/88	
.0300 - .0500		ENGR:	
.0500 - .1000		APVD: T. PALMISTO, S. B. / J. B.	
.1000 - .2500		DWG NO: 022100	
.2500 - .5000		REV: D	
.5000 - 1.0000		DRAWING NO: D322694	
1.0000 - 2.0000		SCALE: .125	
2.0000 - 5.0000		SEE NOTE 7	
5.0000 - 10.0000		SHEET 1 OF 1	

WESTECH HEAVY CORPORATION Floor Office Box 7010
8800 East Imperial Highway
Lynwood, CA 92556

OUTLINE DIMENSION & OIL-AIR SCHEMATIC
120" RAM TENSIONER

DWG NO: 022100
REV: D
DRAWING NO: D322694
SCALE: .125 SHEET 1 OF 1

8 7 6 5 4 3 2 1

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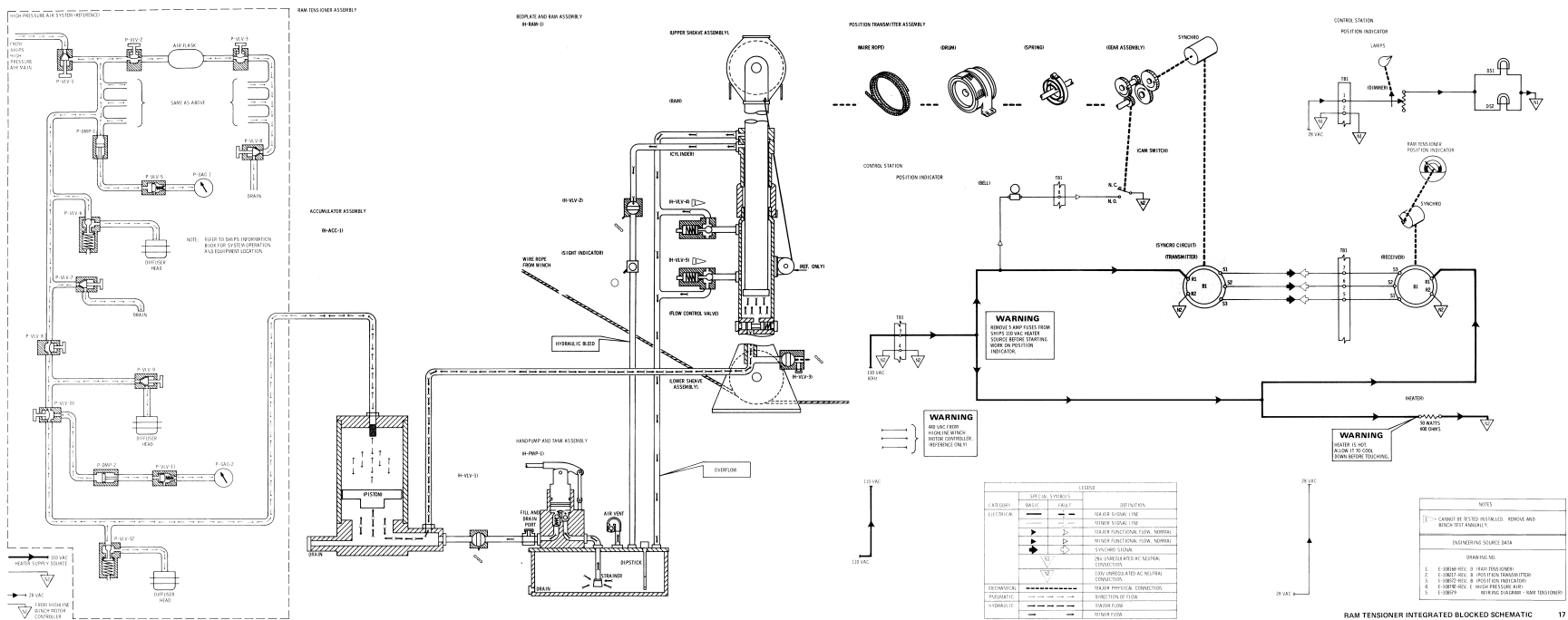
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NAVSHIPS 0920-093-0010



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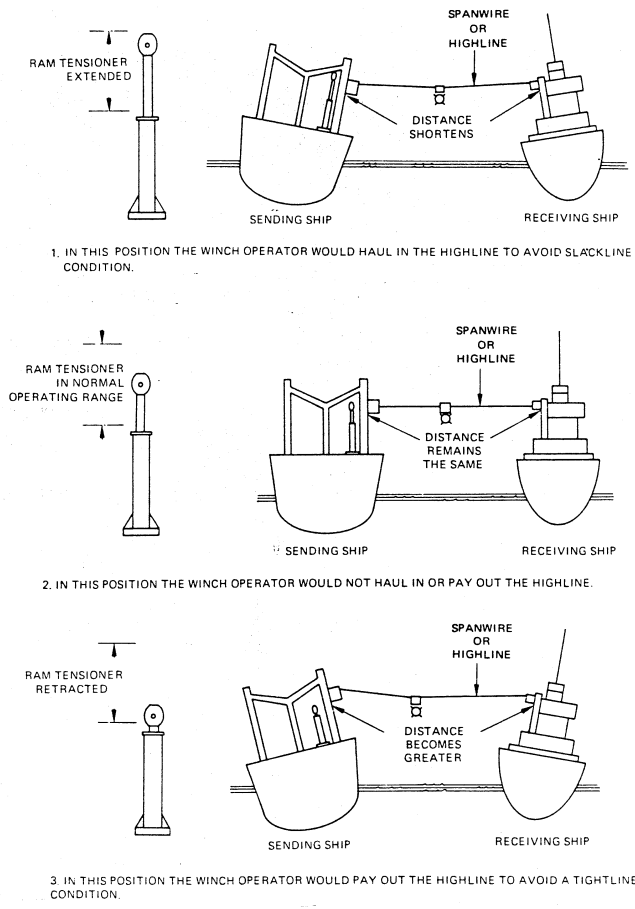


Figure 1-2. Ram Tensioner Operation

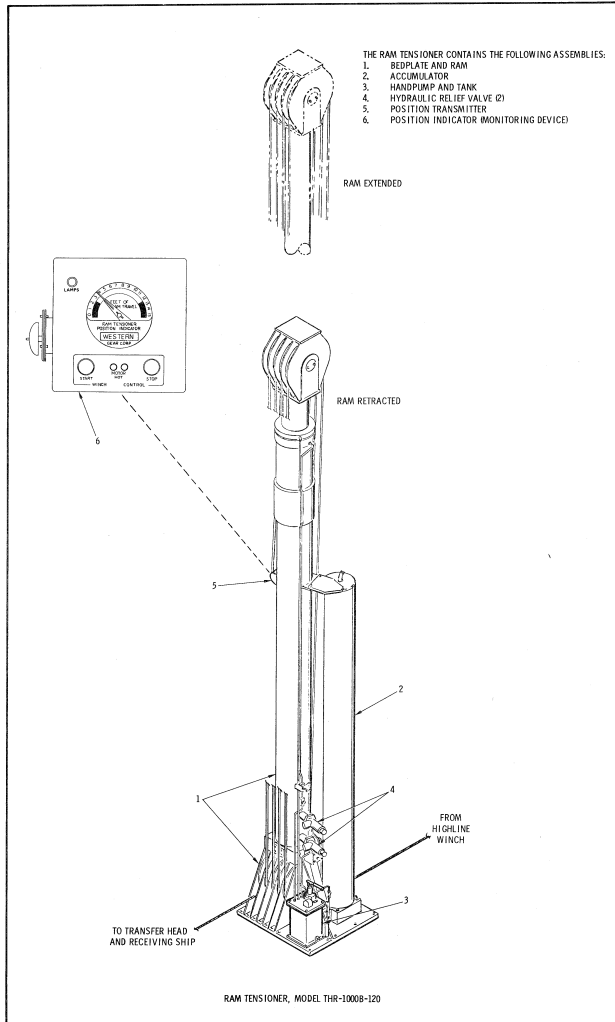


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GENERAL DESCRIPTION:

THE RAM TENSIONER, MODEL THR-1000B-120, IS ONE OF SEVERAL EQUIPMENTS THAT, OPERATING IN UNISON, COMPRISE AN UNDERWAY REPRESENTMENT (UNREP) DELIVERY SYSTEM OR STATION ABOARD NAVAL AMMUNITION AND GENERAL CARGO SUPPLY SHIPS. WHEN AMMUNITION OR GENERAL CARGO ARE TRANSFERRED FROM A DELIVERY SHIP TO A RECEIVING SHIP, USING A WIRE ROPE HIGHLINE AND TROLLEY TO TRANSPORT AND SUPPORT THE LOAD BETWEEN SHIPS, THE HIGHLINE IS SENT OVER TO AN ATTACHMENT POINT ON THE RECEIVING SHIP. ABOARD THE DELIVERY SHIP, THIS HIGHLINE MUST BE KEPT IN CONSTANT HIGH TENSION IN ORDER TO SUPPORT THE CARGO LOAD. OPERATING IN CONJUNCTION WITH A HIGHLINE WINCH, THE RAM TENSIONER ASSISTS IN MAINTAINING REQUIRED TENSION ON THE HIGHLINE, DEPENDING ON THE DEMANDS OF THE LOAD BEING TRANSFERRED AND CONDITIONS OF WIND AND SEA.

THE RAM TENSIONER IS A TALL, HEAVY, TUBULAR-SHAPED TENSIONING DEVICE MOUNTED UPON A SINGLE FOUNDATION AND BOLTED TO THE SHIP'S DECK IN THE VICINITY OF THE HIGHLINE WINCH. IT CONSISTS OF A BEDPLATE AND RAM ASSEMBLY THAT INCLUDES A BEDPLATE, A LOWER SHEAVE BLOCK, A HYDRAULIC CYLINDER AND RAM, AND AN UPPER SHEAVE BLOCK CONNECTED TO THE TOP OF THE RAM, AN AIR-OIL ACCUMULATOR, A HAND PUMP AND STORAGE TANK, AND A POSITION TRANSMITTER ARE MOUNTED ON THE BEDPLATE OR ATTACHED TO THE HYDRAULIC CYLINDER. A POSITION INDICATOR, ELECTRICALLY OPERATED AT A COMMON CONTROL STATION IN CONJUNCTION WITH THE TRANSMITTER, IS NOT A PART OF THE RAM TENSIONER ASSEMBLY BUT IS CONSIDERED A FUNCTIONAL ENTITY WITHIN THE OVERALL RAM TENSIONER SYSTEM AS A POSITION MONITORING DEVICE.

UPPER AND LOWER SHEAVE BLOCKS OF THE RAM TENSIONER ARE REeved WITH CONTINUOUS LOOPS OF WIRE ROPE HIGHLINE FROM THE DRUM OF THE HIGHLINE WINCH. THE UPPER SHEAVE BLOCK IS CONNECTED TO THE TOP OF A HYDRAULIC RAM LOCATED WITHIN THE HYDRAULIC CYLINDER. IN OPERATION, THE HYDRAULIC CYLINDER AND LOWER PORTION OF THE ACCUMULATOR ARE FILLED WITH HYDRAULIC FLUID. HIGH PRESSURE AIR IS ADMITTED TO THE TOP OF THE ACCUMULATOR TO PRESSURIZE A FLOATING PISTON INSIDE THE ACCUMULATOR AND FORCE THE PISTON DOWN AGAINST THE HYDRAULIC FLUID. HYDRAULIC PRESSURE EXERTED AGAINST THE RAM FORCES THE RAM AND UPPER SHEAVE BLOCK TO EXTEND UPWARD. TENSION PRODUCED IN THE HIGHLINE, BY OPERATION OF THE HIGHLINE WINCH, FORCES THE RAM AND UPPER SHEAVE BLOCK TO OVERCOME PRESSURE IN THE HYDRAULIC CYLINDER, FORCE THE RAM TO RETRACT DOWNWARD, AND MAINTAIN A BALANCED CONDITION BETWEEN HIGHLINE TENSION AND HYDRAULIC PRESSURE IN THE RAM TENSIONER, WITH THE RAM AT NORMAL OPERATING MID STROKE POSITION.

BECAUSE OF WIND AND SEA CONDITIONS, DELIVERY AND RECEIVING SHIPS MAY TEND TO ROLL OR DEVIATE FROM TRUE COURSES DURING A REPRESENTMENT OPERATION. WHEN THE DISTANCE BETWEEN SHIPS WIDENS, THE WIRE ROPE HIGHLINE WILL TIGHTEN, FORCE THE HYDRAULIC RAM TO RETRACT AND OVERTENSION THE HIGHLINE. WHEN THIS OCCURS THE HIGHLINE WINCH PAYS OUT WIRE ROPE TO KEEP THE RAM WITHIN ITS NORMAL OPERATING RANGE (MID STROKE), PREVENT OVERTENSIONING OF THE WIRE, LENGTHEN THE WIRE ROPE BETWEEN SHIPS AND MAINTAIN REQUIRED HIGHLINE TENSION. WHEN THE OPPOSITE CONDITION OCCURS AND DISTANCE BETWEEN SHIPS LESSENS, THE HIGHLINE WILL TEND TO RELAX ITS TENSION AND ALLOW THE RAM TO EXTEND UPWARD. WHEN THIS HAPPENS, THE HIGHLINE WINCH HAULS IN WIRE ROPE, OVERCOMES HYDRAULIC PRESSURE IN THE RAM CYLINDER, SHORTENS THE WIRE ROPE BETWEEN SHIPS, AND RETURNS THE RAM TO NORMAL OPERATING POSITION TO MAINTAIN REQUIRED HIGHLINE TENSION.

THE AMOUNT OF TENSION PRODUCED IN THE HIGHLINE IS DEPENDENT UPON THE AMOUNT OF AIR PRESSURE IN THE ACCUMULATOR. RATIO OF AIR PRESSURE TO HIGHLINE TENSION IS APPROXIMATELY 1 TO 10, I.E., 1800 PSI AIR PRESSURE EQUALS 18,000 POUNDS HIGHLINE TENSION. AIR PRESSURE IS SUPPLIED TO THE ACCUMULATOR BY FOUR 10-CUBIC FOOT AIR FLASKS LOCATED BELOW DECKS.

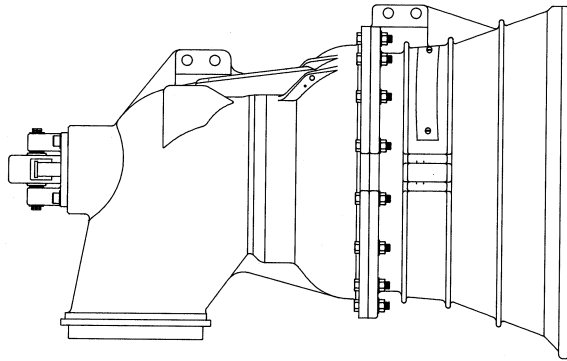
THE RAM TENSIONER IS CAPABLE OF HAULING 120 FEET OF HIGHLINE IN EITHER PAY-OUT OR HAUL-IN MODES OF OPERATION. WHEN MOVING FROM FULL-DOWN TO FULL-UP POSITIONS, THE HYDRAULIC RAM HAS A MAXIMUM STROKE LENGTH OF 15 FEET. WHEN RETRACTING DOWNWARD, THE RAM CAN HANDLE MAXIMUM PAY-OUT CAPACITY OF THE HIGHLINE WINCH (750 FEET PER MINUTE). WHEN EXTENDING UPWARD, THE RAM TENSIONER WILL ONLY ALLOW THE RAM TO MOVE AT A RATE OF APPROXIMATELY 10 FEET PER MINUTE, WHEN UNRESTRICTED BY THE PRESSURE OF THE HIGHLINE.



RECEIVER

SINGLE PROBE

MATERIAL: BRONZE AND ALUMINUM



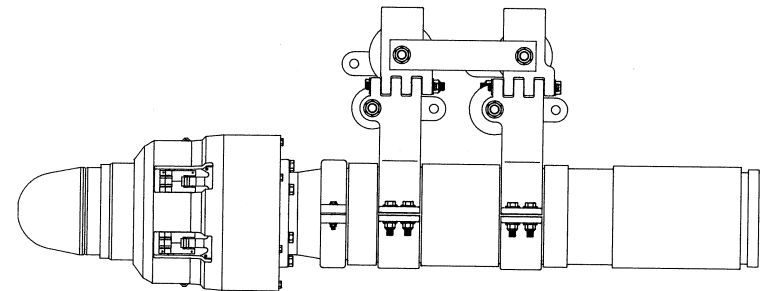
THE SINGLE PROBE RECEIVER IS USED TO RECEIVE FUEL FROM SHIPS EQUIPPED WITH EITHER THE SINGLE OR DOUBLE PROBE SENDERS. THE SINGLE PROBE RECEIVER HAS INTERNAL TAPERING SURFACES WHICH PROVIDE A SELF-ALIGNING FEATURE FOR PROPER ENGAGEMENT OF THE PROBE. TWO SPRING LOADED FLAGS PROVIDE VISUAL INDICATION OF PROPER ENGAGEMENT OF THE PROBE AND THE RECEIVER. THE END OF THE RECEIVER IS CONFIGURED TO CONNECT TO ONE END OF THE PROBE RECEIVER HOSE AND PADS ARE PROVIDED FOR ATTACHMENT TO THE SWIVEL ARM.

A SEPARATE SPARE PARTS LIST IS AVAILABLE UPON REQUEST.

PROBE ASSEMBLY

SINGLE

MATERIAL: BRONZE & ALUMINUM



THE SINGLE PROBE ASSEMBLY IS USED TO TRANSFER FUEL TO SHIPS EQUIPPED WITH A SINGLE OR DOUBLE PROBE RECEIVER. THE SINGLE PROBE ASSEMBLY CONSISTS OF THE PROBE, THE PROBE TUBE, AND THE TROLLEY ASSEMBLY. IT CONTAINS A SELF-ALIGNING FEATURE AND SPRING LOADED LOCKING MECHANISMS WHICH LOCK THE PROBE IN THE RECEIVER. THE SINGLE PROBE HAS A SPRING LOADED SLIDING SLEEVE VALVE WHICH IS ACTUATED AS THE PROBE IS MATED AND ALLOWS THE TRANSFER OF FUEL.

A SEPARATE SPARE PARTS LIST IS AVAILABLE UPON REQUEST.

PART NO.	DIMENSIONS			NAVSEA DWG. NO.	EST. WEIGHT
	LENGTH	HEIGHT	WIDTH		
B-S/P/REC	30	20	20	810-2255761	129 LBS.

PART NO.	LENGTH	WIDTH	HEIGHT	NAVSEA DRAWING NO.	EST. WEIGHT
B-AY-S/P	52"	11.5"	22"	810-2255758	290 LBS.

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Hitachi Zosen / Mitsubishi Corporation Presentation



CONTROL FLOW INC.

*WesTech Heavy Machinery Division
Manufacturing Facility and Headquarters*



Control Flow Inc., Houston, Texas (110,000 sq. feet)