

Operations & Parts Manual



A division of Sanweld Industries, Inc.

Torwel Spreader

Torwel Industries

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TORWEL SPREADER RECORD

DATE OF PURCHASE - _____

OWNER - _____

SERIAL # - _____

DEALER- _____

MODEL # - _____

1. INSTALLATION INSTRUCTIONS

Reminder: Any reference to directions concerning Torwel parts or as a whole, will be designated as a viewing the equipment from the rear of the vehicle as it would normally travel.

Example: Left - Drivers' side ; Right - Passengers' side
Front - Front of vehicle ; Rear - Rear of vehicle.

A) Dump Body Installation

First, remove tailgate completely from the vehicle. Center the spreader to the bed of the truck and move as far forward as possible. Be sure to leave enough clearance for the chute and spinner assemblies off the rear of the vehicle.

2 X 6 wood runners are fastened to the base channels to protect the body floor from wear.

Using the four (4) sets of holddown assemblies provided, secure the spreader to the lip of the dump body.

B) Chassis Installation

When the spreader is mounted directly onto the truck frame, it is general practice to mount the spreader on 2 X 3 oak rails, and sometimes it is necessary to increase the thickness of the rail in order to eliminate interferences caused by the make of vehicle involved. Do not mount metal to metal because spreader will shift and it should have the wood cushion.

The holddown assemblies for the chassis mount spreader (as well as the oak rails) are supplied by the customer, as different holddown assemblies are needed for different vehicle makes. When anchoring the spreader it is best to position the holddowns as close to the spreaders' four corners as possible. Be sure to leave enough clearance for the chute and spinner assemblies off the rear of the vehicle.

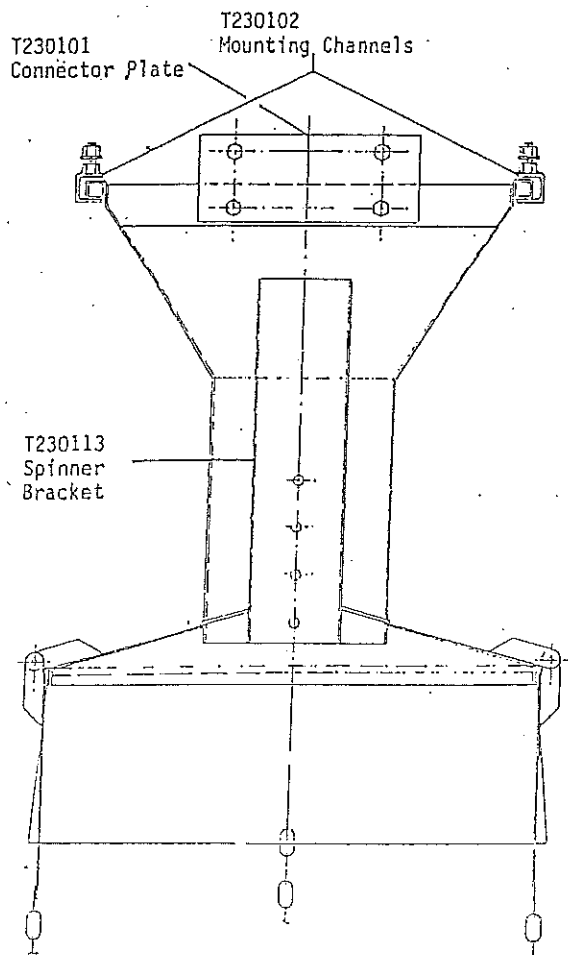
NOTE: DO NOT weld anchor bars or strips to truck frame.

When installing the spreader for Front Discharge, make sure there is enough clearance between the chute and driveshaft for the material disbursement. If a chute throat is desired, the length of the throat can be attained by measuring vertically from the bottom of the chute to the driveshaft, then add 6 inches. When ordering chute throat from Torwel, include the throat length, chute size (18" or 24"), and specify Twin Chute (quantity - 2) or LH Chute (quantity - 1).

NOTE: On a front discharge spreader, only a twin spinner chute (T230301 LH & RH) or a LH chute (T230302) will work.

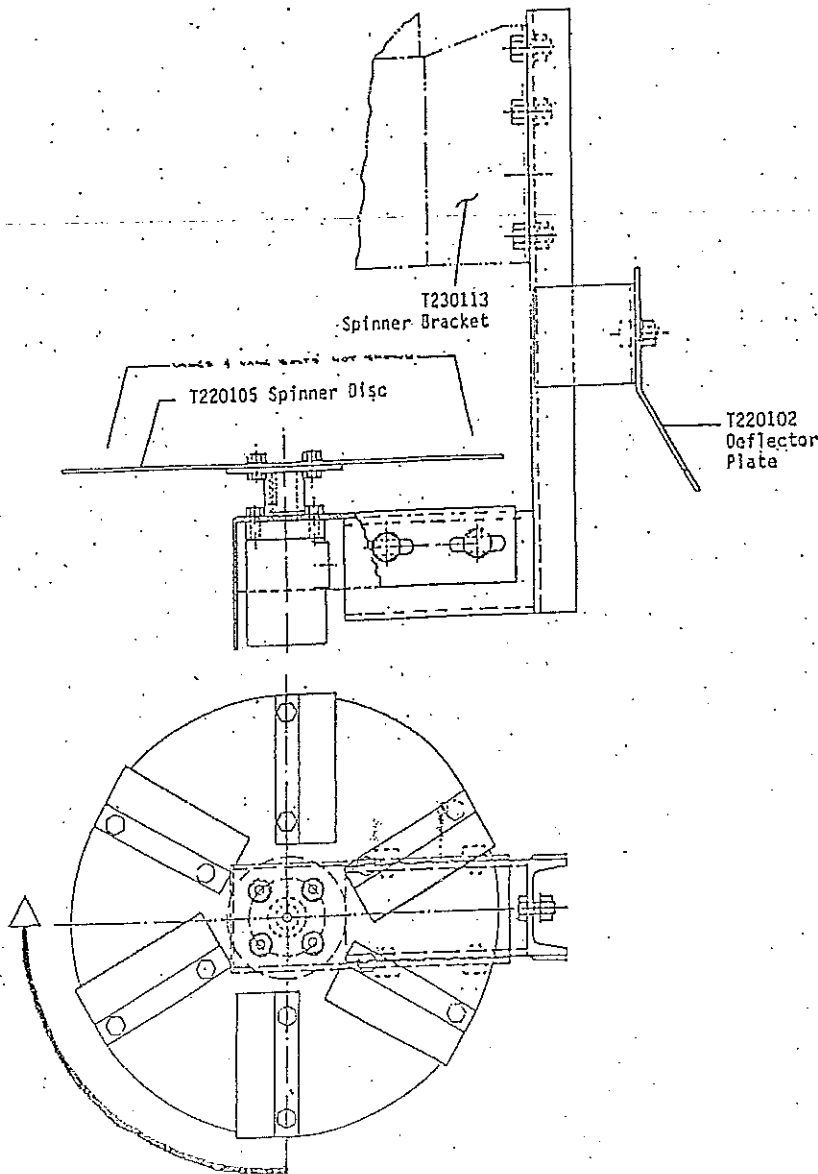
C) Chute Installation

First, mount chute mounting channels (T230102) to corresponding holes in motor (or PTO) bed side channels, with opening facing inward. Leave loose. Place chute onto channels and slide forward. Mount chute connector plate (T230101) to chute and motor bed, and tighten. Tighten mounting channels.



D) Single Spinner Installation

Mount spinner assembly onto chutes' spinner bracket (T230113) and fasten with (3) 1/2-13 x 1 1/2" hex bolts w/flatwashers, lockwashers and hex nuts. Mount spinner disc (T220105) onto spinner assembly and tighten allen screw. Ideally, it is best if spinner disc is centered to chute deflector plates when everything is assembled. Mount deflector plate (T220102) onto spinner with bend facing front.



NOTE: A Single Spinner Assembly may Not be used with a Chassis Front Discharge installation.

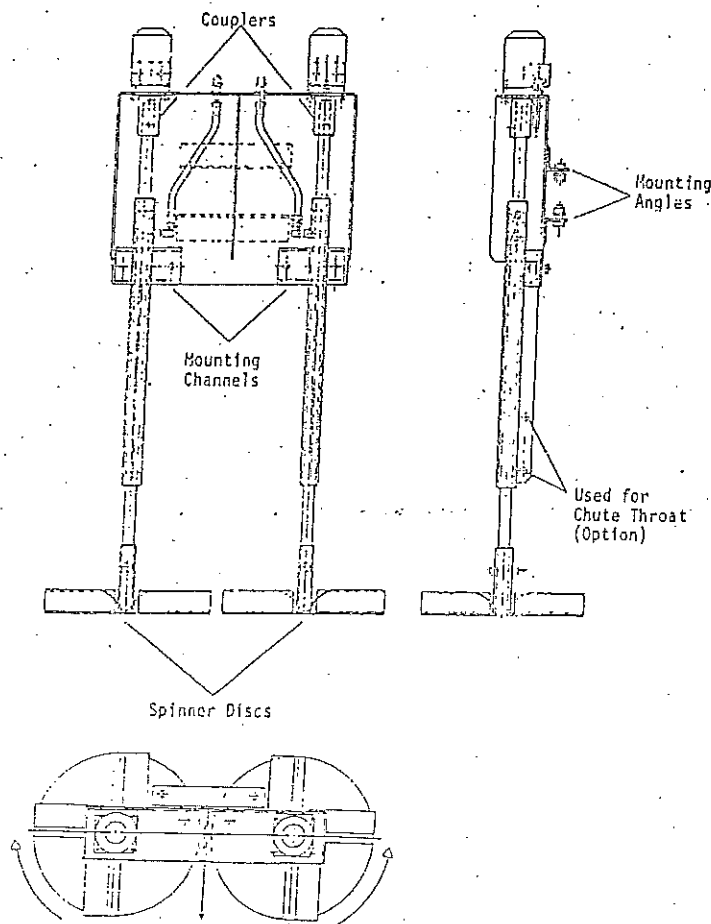
E) Twin Spinner & Twin Chute Installation

The twin spinner assembly should be mounted first. Mount assembly Inside of motor bed with holes on mounting angles lining up with corresponding holes in the motor bed. Fasten with (4) 1/2-13 x 1 1/4 hex bolts, lockwashers and nuts.

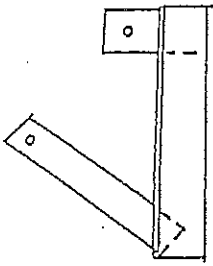
Mount spinner shafts (T220203 & T220204) to assembly by sliding coupler over the hydraulic motor shaft and bolting shaft mounting channels to the corresponding holes in the box assembly. Use (4) 1/2-13 x 1 1/4 hex bolts, lockwashers and nuts. Tighten all bolts and coupler allen screws. Attach grease lines to shafts.

Mount the Left Side and Right Side Chutes to the motor bed. The chutes are mounted so that the rear of the chutes will go straight down (90°) from the motor bed end channel. Use (4) 1/2-13 x 1 1/2 hex bolts, lockwashers, nuts, and (8) flatwashers. Use (2) 1/2-13 x 1 1/4 hex bolts, lockwashers, nuts, and (4) flatwashers to mount chutes together. Tighten all bolts.

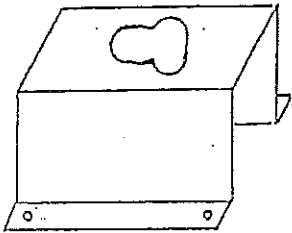
Mount spinner discs using (2) 1/4-20 x 2 hex bolts, lockwashers and nuts (not supplied). It is important that the discs are mounted with the vanes facing outwards, so that the material being spread is thrown outwards to the rear and sides. (Shown below).



F) Valve Mounting Brackets



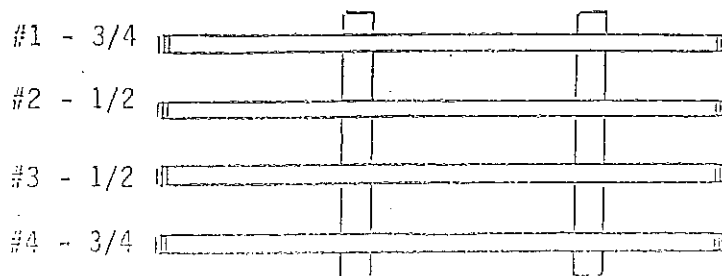
The Rear Control Bracket is mounted inside the engine compartment and is located on the left side of the motor bed. It is welded into place, approximately 3" in from the rear, on the left side channel. When mounted, the brackets mounting arms will face towards the engine.



The Cab Control Bracket is mounted inside the cab on the floor, with easy access for the operator. It can be secured with either hex bolts or screws (not supplied). When running hydraulic lines to the valve, avoid placing hoses near vibrating parts or sharp objects. Make sure all connections and fittings are tight. Using thread sealant is suggested.

G) Hydraulic Pipe Connections (Cab Control only)

When connecting hydraulic hoses from the control valve in the cab to the hydraulic pipes, refer to the diagrams on pages 27 to 32 for the correct application. Fittings for the pipes are not supplied as they may vary with each vehicle application. For spreaders that are removed from the vehicle each season, quick disconnects are suggested. Pipe sizes are listed below.



H) Wiring Harness (T44-Female Plug)

Reminder: Engine side wiring is already connected, so use care when connecting all wires and cables as a short in the system may cause damage to the engine.

- 1) Feed male harness cable (T43-engine side) to the rear of the vehicle cab.
- 2) If permanent location of T44 harness is preferred, find an unobstructed area in the left side of the cab and drill a 1 3/8" hole in the cab wall. A permatex sealant may be used around the contact area for a watertight seal. (It is best to make a horizontal connection with the male and female plug, as a vertical connection will allow water and moisture to enter the plugs).

If drilling is not desired and vehicle is equipped with a rear sliding window, feed the exposed end of the cable (wire terminal end) under the seat to the dash. Be sure to leave enough cable at the plug end for easy connection to the male plug of the engine harness cable.

- 3) Connect female harness cable to the control panel (T70) as shown in diagram T44. (Make sure the ignition key on the panel is in the OFF position).
- 4) Mount panel to the underside of the vehicle dash (or anyplace that is within easy reach for the operator), making sure the ignition switch ground wire is grounded properly to the vehicle dash.

Note: Spreader MUST be grounded to the vehicle through the holddowns.

Diagram T44 - Female Harness (cab side)
Located on page 24.

Diagram T43 - Male Harness (engine side)
Located on page 24.

I) Headboard Installation

For Standard Headboard:

Place headboard on top of screen support of the side desired. Position so that screens will close without interference and that 15" notch fits evenly around hinge pipe support plate. Headboard may be fastened by drilling approximately 10 holes (3/8" preferred) through the headboard and screen support and fastening with 3/8-16 x 3" hex bolts, lockwashers and nuts ; or by welding into place.

For Stainless Headboard with Standard Screen Support:

Same procedure as above.

For Stainless Headboard with Stainless Screen Support:

Place headboard so that 2" lip on the sides rests between the hopper lifting hooks and the screen support. Center the headboard on the hopper making sure it doesn't tilt when fastening. The headboard can be fastened by drilling 3/8" holes through the sides (and screen support) and rear (hopper body) and using 3/8-16 x 1 1/4 hex bolts, lockwashers and nuts ; or by welding into place.

J) Ladder Installation

First, fasten angled standoffs to ladder so that they form a 90° angle at the top. Position ladder with standoffs approximately 2" from the top of the hopper and mark holes (make sure the ladder is stright). Drill two (2) 3/8" holes and fasten with 3/8-16 x 1 1/4 hex bolts, lockwashers and nuts. Position mounting bar between ladder sides so that it is centered on catwalk lip. Weld bar to ladder and fasten to catwalk using (2) 3/8-16 x 1 1/4 hex bolts, lockwashers and nuts.

K) Parts Checklist (found in Hopper when shipped)

CHUTE

- ___ T230100 Chassis Chute - 18" (22" at top; 19" height)
- ___ T230101 Chassis Chute - 24" (27½" at top; 19" height)
- ___ T230200 Dump Chute - 18" (22" at top; 27½" height)
- ___ T230201 Dump Chute - 24" (27½" at top; 27½" height)
- ___ T230301 LH & RH Twin Spinner Chutes

DUMP MOUNT HOLDDOWNS

- ___ (4) Top Holddown Assemblies (w/chain)
- ___ (4) Holddown Rod Assemblies (w/hook)
- ___ (4) Bottom Holddown Assemblies
- ___ (4) 5/8-11 Hex Nuts, Flatwashers & Lockwashers

T220100 SINGLE SPINNER ASSEMBLY

___ T220105 SPINNER DISC (18" Diameter)

___ T220102 DEFLECTOR PLATE (Single Spinner only)

___ T230101A CONNECTOR PLATE (Single Spinner only)

___ T230102 LH & RH MOUNTING CHANNELS (Single Spinner only)

OR ___ T220200 TWIN SPINNER ASSEMBLY

___ T220203LH LH SHAFT ASSEMBLY

___ T220203RH RH SHAFT ASSEMBLY

___ T220205 LH TWIN SPINNER DISC (14" Diameter)

___ T220206 RH TWIN SPINNER DISC (14" Diameter)

___ FLUID CONTROL VALVE

___ VALVE MOUNTING BRACKET (Cab control only)

___ HYDRAULIC HOSES (Refer to pages 27 - 32 for Application)

Engine Powered Spreaders Include:

___ T44 WIRING HARNESS

___ T70 CONTROL PANEL

Fuel Tank w/ filter & hose and Battery w/ storage box & cables
(connected)

2. GENERAL INFORMATION

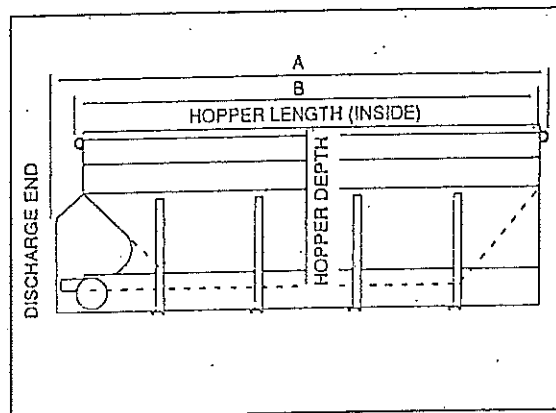
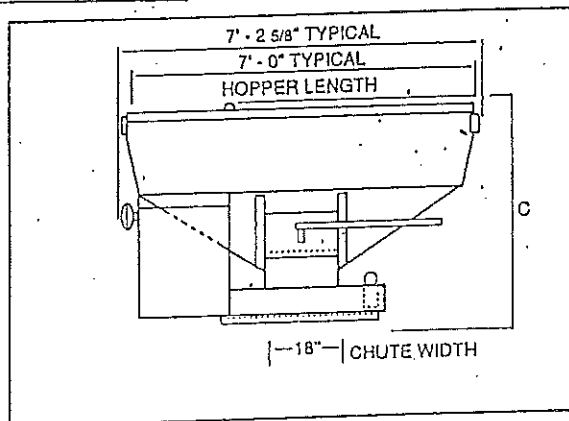
A) Safety Procedures

- 1) Do not operate spreader without first reading operation manual.
- 2) Do not lubricate or repair moving parts while operating spreader.
- 3) Do not go into hopper while chain is moving.
- 4) Do not refuel a hot engine or while engine is running.
- 5) Do not stand behind chute while spreader is discharging.
- 6) If conveyor becomes clogged, do not attempt loosening chain while machine is operating.
- 7) Keep hands, feet, and loose clothing away from moving parts.

B) Store Properly

- 1) Wash unit thoroughly.
- 2) Oil chains.
- 3) Lubricate bearings and bushings.
- 4) Disconnect battery.

C) Specifications



A. Overall Body Length	130 7/8"	130 7/8"	130 7/8"	130 7/8"	154 7/8"	154 7/8"	154 7/8"
B. Body Inside Length	120"	120"	120"	120"	144"	144"	144"
C. Body Height	52 3/4"	57 3/4"	62 3/4"	66 3/8"	64 3/8"	72 1/8"	76"
D. Body Depth	42 3/16"	47 3/16"	52 3/16"	56 13/16"	53 3/8"	61 9/16"	65 7/16"
Capacity Level	6 yd.	7 yd.	8 yd.	9 yd.	10 yd.	12 yd.	13 yd.
Weight (with engine) Approximately	2850 lb.	3000 lb.	3110 lb.	3240 lb.	3430 lb.	3590 lb.	3740 lb.

D) Material Weights (lbs. per cu. yd.)

Sand - 2800 lbs.

Chlorides - 2900 lbs.

RockSalt - 2100 lbs.

Cinders - 2900 lbs.

Peastone - 2700 lbs.

E) CALIBRATION CHART

Agency: _____

Location: _____

Truck No.: _____

Spreader No.: _____

Date: _____

By: _____

Gate Opening _____ (Hopper Type Spreaders)				POUNDS DISCHARGED PER MILE								
Control Setting	A Shaft RPM (Loaded)	B Discharge Per Revolution (Pounds)	C Discharge Rate (lbs/Min)	MINUTES TO TRAVEL ONE MILE								
				5 mph × 12.00	10 mph × 6.00	15 mph × 4.00	20 mph × 3.00	25 mph × 2.40	30 mph × 2.00	35 mph × 1.71	40 mph × 1.50	45 mph × 1.33
1		This Weight Remains Constant										
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												

SPREADER CALIBRATION PROCEDURE

Calibrating is simply calculating the pounds per mile discharge at various truck speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the salt discharged in one revolution, then multiplying the two and finally multiplying the discharge rate by the minutes it takes to travel one mile.

With hopper type spreaders you must calibrate for specific gate openings. Measure from floor of conveyor to edge of gate. Each spreader must be calibrated individually; even the same models can vary widely at the same setting.

Equipment needed:

1. Dairy scale.
2. Canvas or bucket.
3. Chalk, crayon or other marker.
4. Watch with second hand.

Calibration steps:

1. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
2. Put partial load of salt on truck.
3. Mark shaft end of auger or conveyor.
4. Dump salt on auger.
5. Rev truck engine to operating RPM.
6. Count number of shaft revolutions per minute at each spreader control setting; record.
7. Collect salt for one revolution, weigh, deducting weight of container. (For greater accuracy, collect salt for several revolutions and divide by this number of turns to get the weight for one revolution).
8. Multiply Shaft RPM (Column A) by Discharge per Revolution (Column B) to get Discharge Rate in pounds per minute (Column C), then multiply Discharge Rate by Minutes to Travel One Mile at various truck speeds to get Pounds Discharge per Mile.*

* For example, at 20 MPH with 30 Shaft RPM and 7 lbs. discharge — $30 \times 7 = 210 \times 3.00 = 630$ lbs. per mile.

CALIBRATING AUTOMATIC CONTROLS

Automatic controls come with factory calibration cards that tell the rate of spread for each setting. However, should you need to calibrate, use the following steps:

1. Remove spinner.
2. Set auger on given number, such as #2.
3. Tie sack or heavy canvas under spreader discharge chute.
4. Mark specific distance, such as 100 or 1,000 feet.
5. Drive that distance with spreader operating.
6. Weigh salt collected in sack or canvas.
7. Multiply weight of salt by 5.2 (in case of 1,000 feet) or 52.8 (in case of 100 feet).

Answer will be salt discharged per mile, which remains constant regardless of speed, but calibration must be done for each control setting.

F) TORWEL MODEL CODES

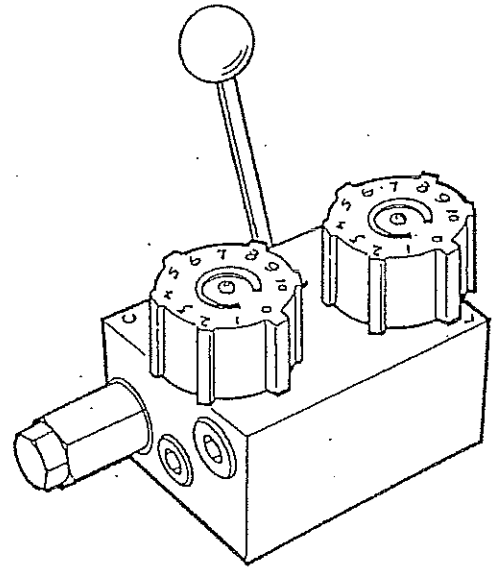
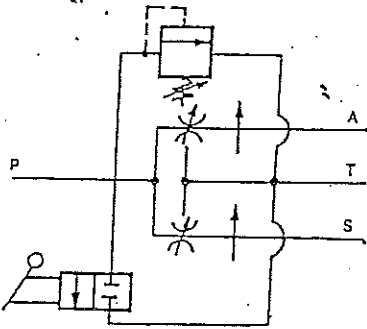
4D Means Single Spinner on Rear
 ID " Twin Spinner (front or rear), Front or Rear
 should be specified.
 G " Gas Engine
 D " Diesel Engine
 H " Hydraulic
 W " Wisconsin Engine
 D " Deutz Engine
 B " Briggs Engine
 PTO " Power Take-Off-using a front mount pump,
 clutch pump, or pump off the transmission. Type should be
 specified.
 6,7, etc. " Yards Capacity (level)
 C " Chassis (frame) mount
 D " Dump Mount
 10'-18" " 10ft hopper, 18 inch conveyor width
 10'-24" " 10ft hopper, 24 inch conveyor width
 12'-18" " 12ft hopper, 18 inch conveyor width
 12'-24" " 12ft hopper, 24 inch conveyor width
 Examples:

Model 4DGHW6C-10'-18" Single
 spinner(rear), gas, hydraulic, Wisconsin, 6 yard, chassis
 mount, 10' hopper, 18" conveyor.
 Model 4DGHW10C-12'-18" Single
 spinner (rear), gas, hydraulic, Wisconsin, 10 yard, chassis
 mount, 12' hopper, 18" conveyor.
 Model 4DHPT06D-10'-18" Single
 spinner (rear) hydraulic, PTO, 6 yards, dump mount; 10'
 hoper, 18" conveyor.
 Model IDHPT010C-12'-24" Twin
 spinner, hydraulic, PTO, 10 yards, chassis mount, 12' hopper, 24"
 conveyor. (specify front or rear).
 Model IDDHD8D-10'-24" Twin
 spinners, diesel, hydraulic, Deutz, 8 yard, dump mount, 10' hopper
 24" conveyor (specify front or rear).

3. OPERATION

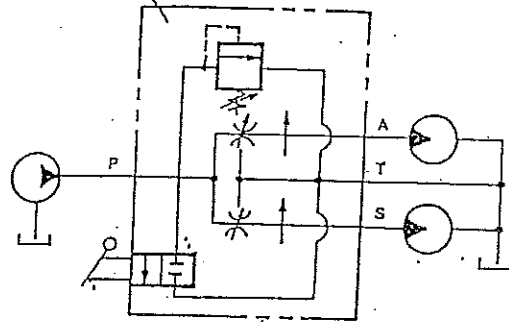
A) Cab Control Valve (T260100-HAN)

SYMBOL



DUAL FLOW REGULATOR WITH BUILT-IN ON-OFF CONTROL & SYSTEM RELIEF

TYPICAL CIRCUIT



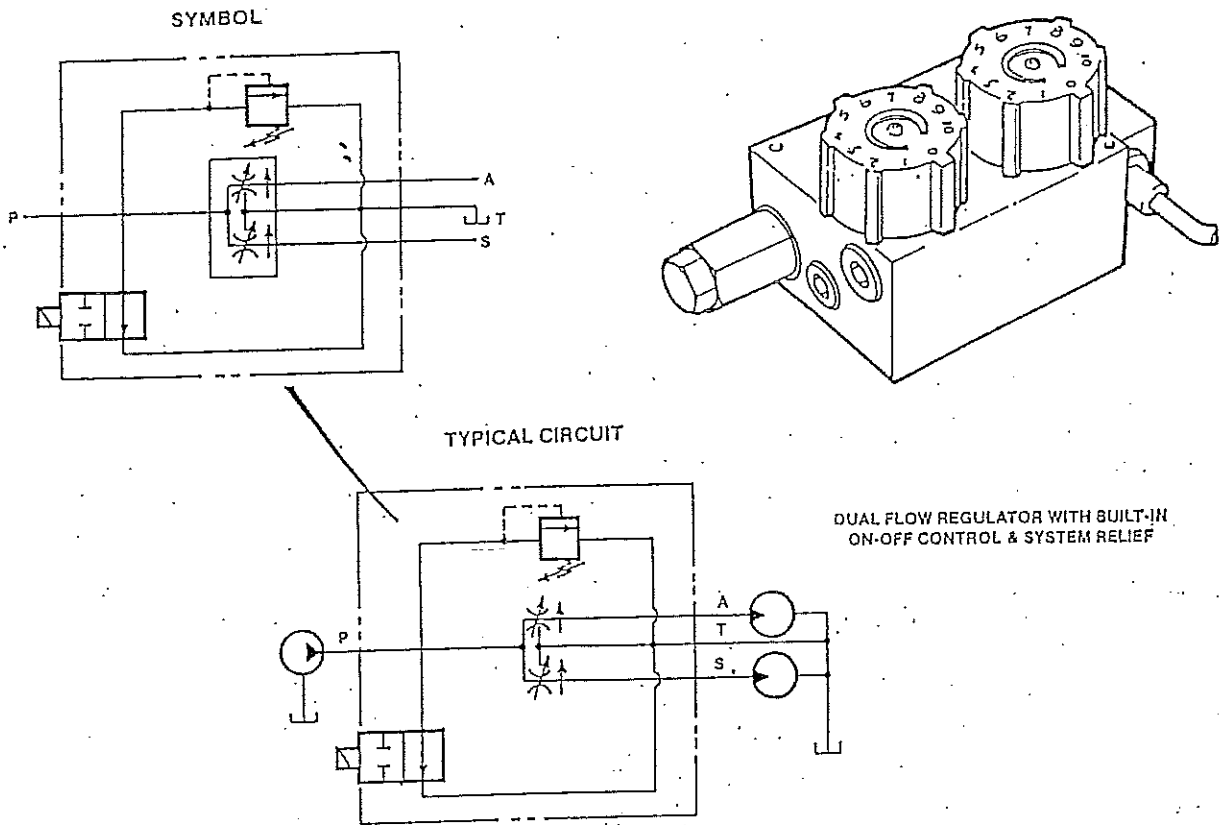
Specifications

Model	Weight		Rated Flow		Working Pressure		Body Material	Comments
	Lbs	Kg	gpm	l/min	psi	bar		
2FFL12	6.75	3.1	40	155	2000	140	Aluminum	1L10-F-25S Relief Cartridge Std. Setting 1500 psi (105 bar)

Operation

The valve maintains constant regulated flow to two actuators even with changes in load pressure or input flow. The "patented" pressure compensated regulating section bypasses excess pump flow to tank. The pump operates at the highest load pressure plus control section pressure drop. The tank or bypass port must be referenced directly to tank and not to a working line. The direct acting relief valve senses system pressure and protects the pump from shock or overload pressure surges. The built-in lever operated two-way valve dumps system flow to tank. This allows on-off control of both regulated flows without changing either flow setting.

B) Rear Control Valve (T260100-SOL)



Specifications

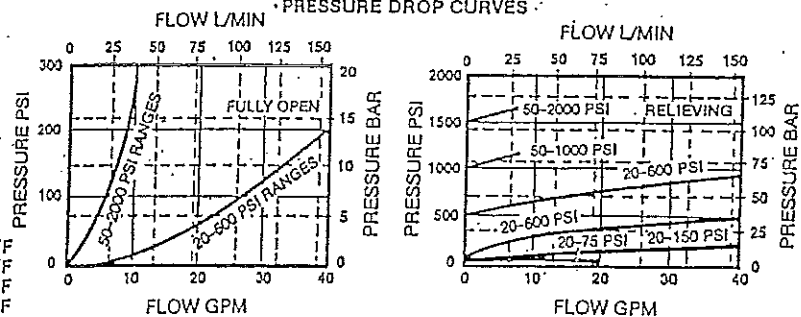
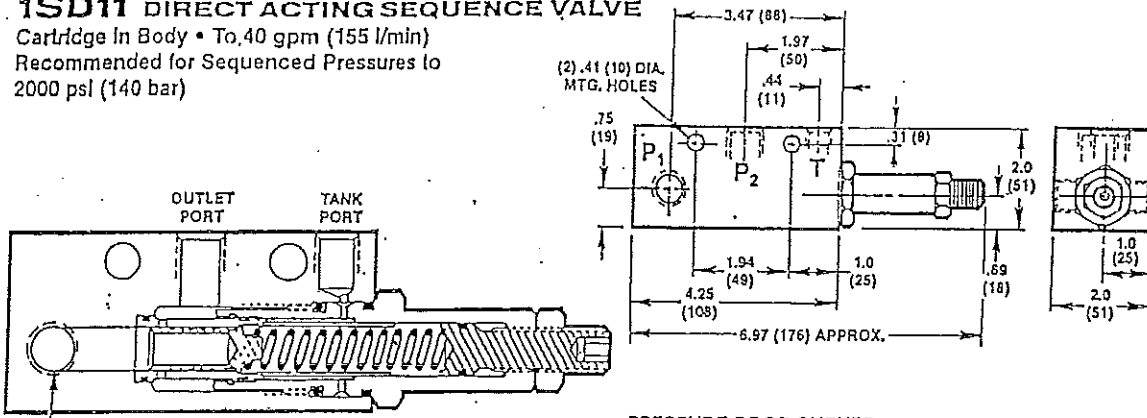
Model	Weight		Rated Flow		Working Pressure		Body Material	Comments
	Lbs	Kg	gpm	l/min	psi	bar		
2FFLW86	6.75	3.1	40	155	2000	140	Anodized Aluminum	1L10-F-25S Relief Cartridge Std. Setting 1500 psi (105 bar)

Operation

The valve maintains constant regulated flow to two actuators even with changes in load pressure or input flow. The "patented" pressure compensated regulating section bypasses excess pump flow to tank. The pump operates at the highest load pressure plus control section pressure drop. The tank or bypass port must be referenced directly to tank and not to a working line. The direct acting relief valve senses system pressure and protects the pump from shock or overload pressure surges. The built-in solenoid operated two-way valve dumps system flow to tank. This allows on-off control of both regulated flows without changing either flow setting.

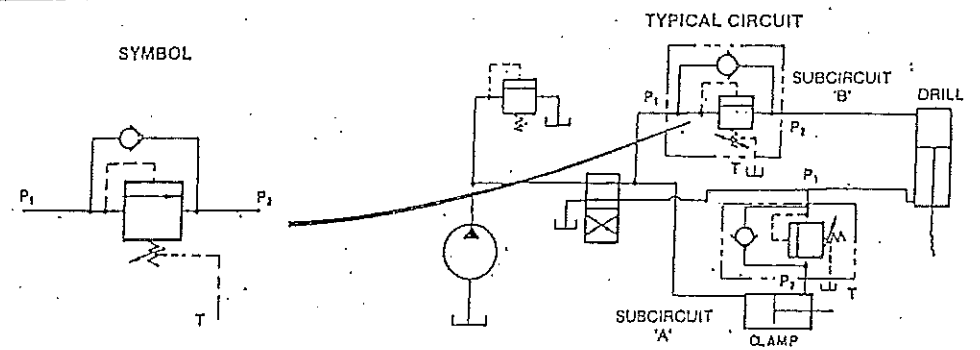
C) 1SD11 DIRECT ACTING SEQUENCE VALVE

Cartridge In Body • To, 40 gpm (155 l/min)
Recommended for Sequenced Pressures to
2000 psi (140 bar)



MAIN PORT SIZES (P₁ & P₂):*

3/8" SAE	1/4" BSPPL	1/4" NPTF
1/2" SAE	3/8" BSPPL	3/8" NPTF
3/4" SAE	1/2" BSPPL	1/2" NPTF
	3/4" BSPPL	3/4" NPTF
	1" BSPPL	1" NPTF



Specifications

Model	Weight		Rated Flow		Maximum Sequence Pressure		Rated System Pressure		Comments
	Lbs	Kg	gpm	l/min.	psi	bar	psi	bar	
1SD11	1.9	.9	40	155	2000	140	3000	210	Direct acting (D.A.) cartridge in body

Features

Provides compact, efficient means for isolating subcircuit "B" from subcircuit "A" in hydraulic system. Permits work to be completed on circuit "A" before work on circuit "B" begins as shown in typical application circuit.

Long-life with hardened steel working parts.

Selectively matched honed assemblies give accurate performance.

Available with or without built-in reverse flow checks.

Use

Direct acting models are best suited for fairly constant flow and sequenced pressures of 300 psi (21 bar) or lower.

Pilot operated models are best suited for higher flows which may vary widely and sequenced pressures above 300 psi (21 bar).

All sequence valves are designed to:

1. Provide ordered or sequenced series of operations as in a clamp and drill circuit.
2. Serve as a relief valve where oil viscosity or restrictions in the downstream line would cause excessive back

pressure. The separate spring chamber drain makes the sequence valve insensitive to this back pressure.

Operation

Direct Acting. As in the direct acting guided piston relief, spring force holds the piston closed. When inlet pressure exceeds the valve setting, the piston moves back allowing flow to secondary circuit (sequenced line).

Pilot Operated. As in the pilot operated relief when the setting of the valve is exceeded the pilot section opens. This pilot flow causes a pressure imbalance across the main section which opens allowing flow to secondary circuit (sequenced line).

Unloading. Operation is similar to the pilot operated relief except that, when the main spool opens it exposes a secondary pilot flow path, which automatically vents the main section. Once the valve opens at the set pressure, it then vents the circuit to 50-200 psi (3.5-14 bar).

Materials

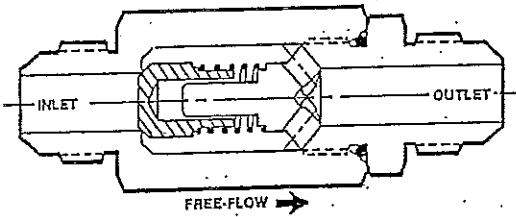
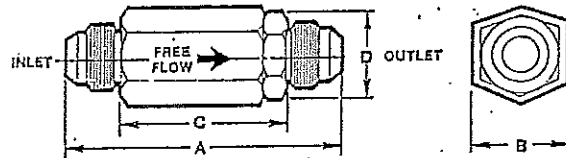
Housings — Aluminum and steel
Internal working parts — Hardened steel
Check components — Hardened steel poppet or ball seating on high strength aluminum body
Body — High strength aluminum

D) Check Valve

Poppet Style
External Thread

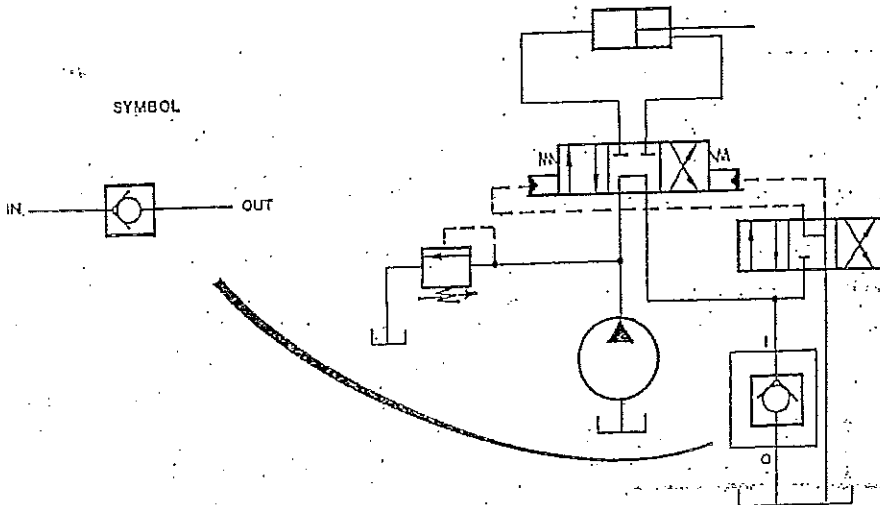
To 5000 psi (350 bar)

3CM13 To 18 gpm (70 l/min)

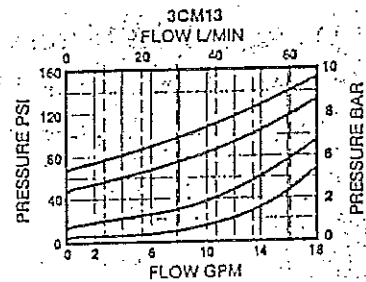


	3CM11	3CM12	3CM13	3CM14	3CM15	3CM16
	ln	mm	ln	mm	ln	mm
A	2.88	73	3.25	83	3.75	95
B	.75	19	1.0	25	1.13	29
C	1.75	44	1.94	49	2.25	57
D	.69	17	.88	22	1.0	25

TYPICAL CIRCUIT



PRESSURE DROP CURVES



Specifications

Model	Weight		Rated Flow		Working Pressure		Crack Pressure psi (bar)	Body Material
	Lbs	Kg	gpm	l/min	psi	bar		
3CM13	10 oz.	.28	18	70	5000	350	3 (2), 15 (1), 45 (3), 65 (4.5)	Steel

Features

Long life with all steel construction.

Dirt tolerant with no close fits. Poppet nose is spherically ground insuring tight reseal and allowing the loose guide design feature.

Low pressure drop through valve.

Hardened and precision ground poppet assures good sealing.

Use

To allow free-flow in one direction and blocked flow in the reverse direction.

The standard check valve can be applied to any hydraulic circuit. In-line check valves are commonly used throughout the industry to isolate portions of circuits and prevent free-flow or bleed out of circuits. In some cases they are used as low pressure relief valves or to supply pilot pressure to other portions of the circuits.

Operation

Inlet pressure required to overcome light spring force is very low. Poppet moves back on guide allowing flow through valve.

As flow rate increases through valve, poppet moves back against spring. Low spring rate keeps pressure-rise at a minimum.

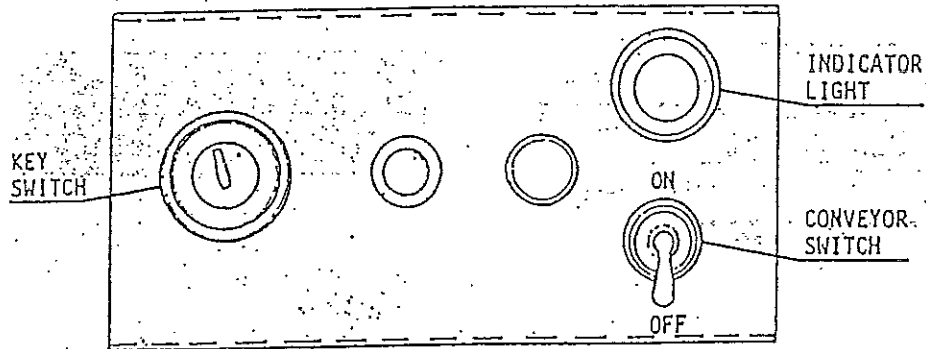
Poppet is guided internally with an absence of close sliding fits. Direction of flow continually provides self-cleaning with this design.

Materials

Body — Steel
Internal parts — Hardened steel
Seats — Buna-N or Viton A

E) Cab Control Panel (T70)

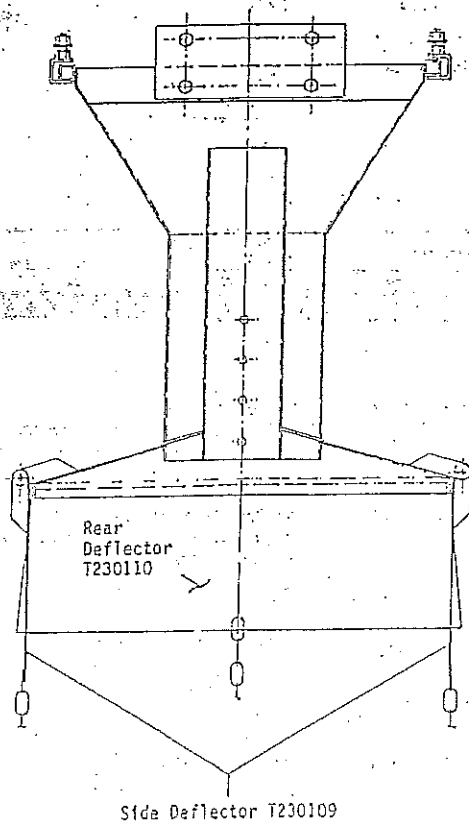
1. Turn key to ON position, and start engine.
2. Flip conveyor switch to ON position (indicator lights) to engage.



F) Chute Deflectors

1. Adjust deflectors for spread pattern. The lower the flaps—the tighter the spread pattern.

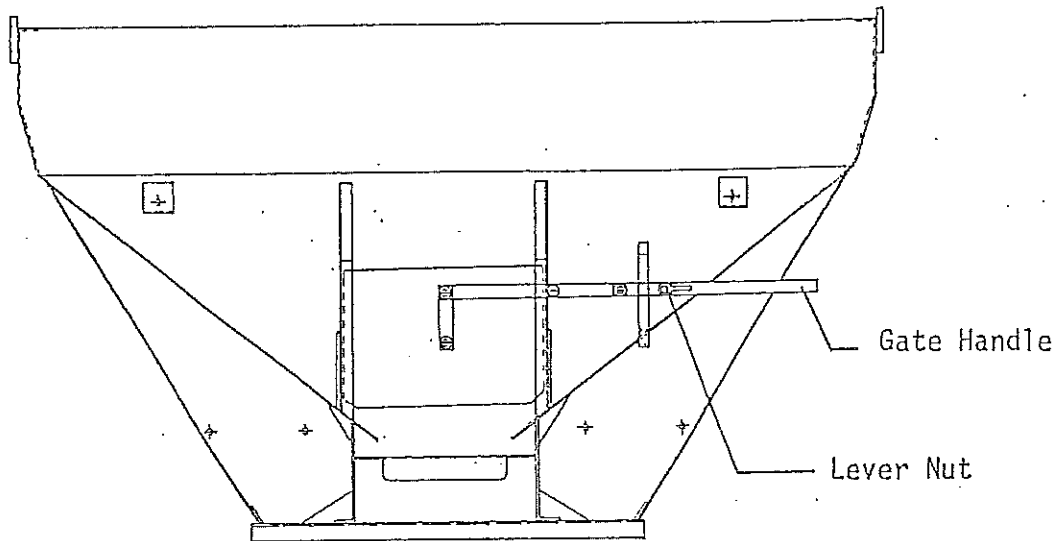
NOTE: Never adjust flaps while spinner disc is engaged.



G) Gate Handle

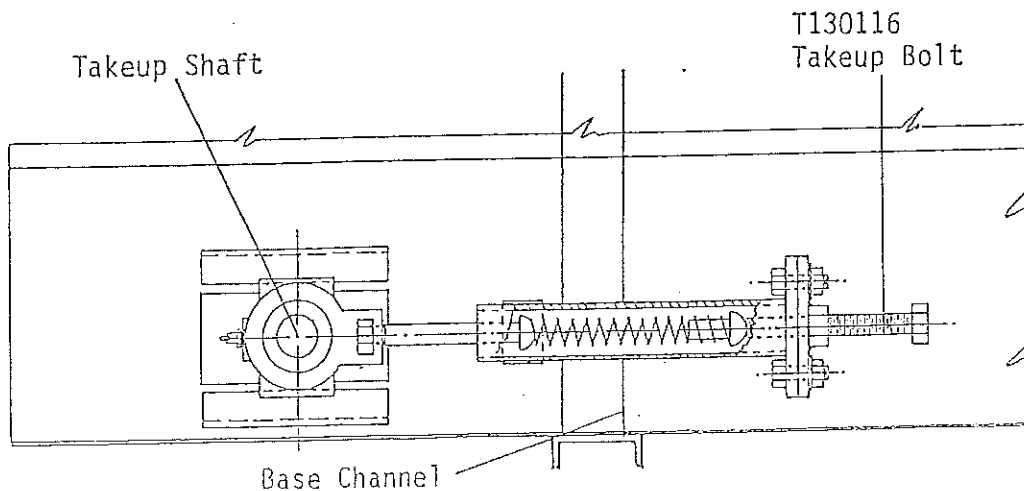
1. Loosen lever nut.
2. Adjust gate to desired level. (Adjusting down opens the gate).
3. Tighten lever nut.

NOTE: The adjustment of the gate is in proportion to the speed of the conveyor and spinner concerning material disbursement.
Test Runs often help in determining settings.



H) Conveyor Chain Tensioning

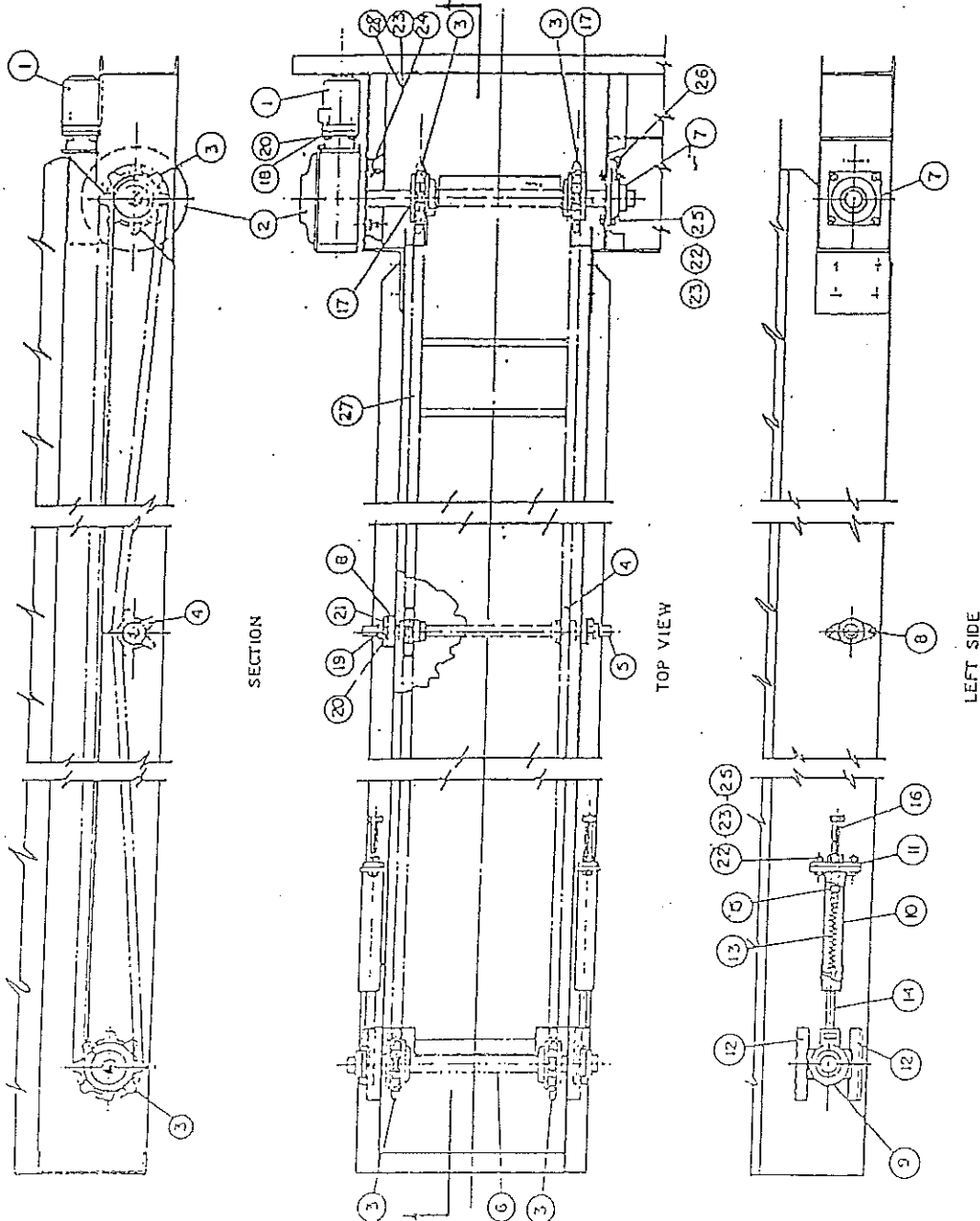
1. Tighten both takeup bolts equally until chain slack is gone and chain does not ride on any of the base channels.
2. Check to make sure takeup shaft is not cocked.



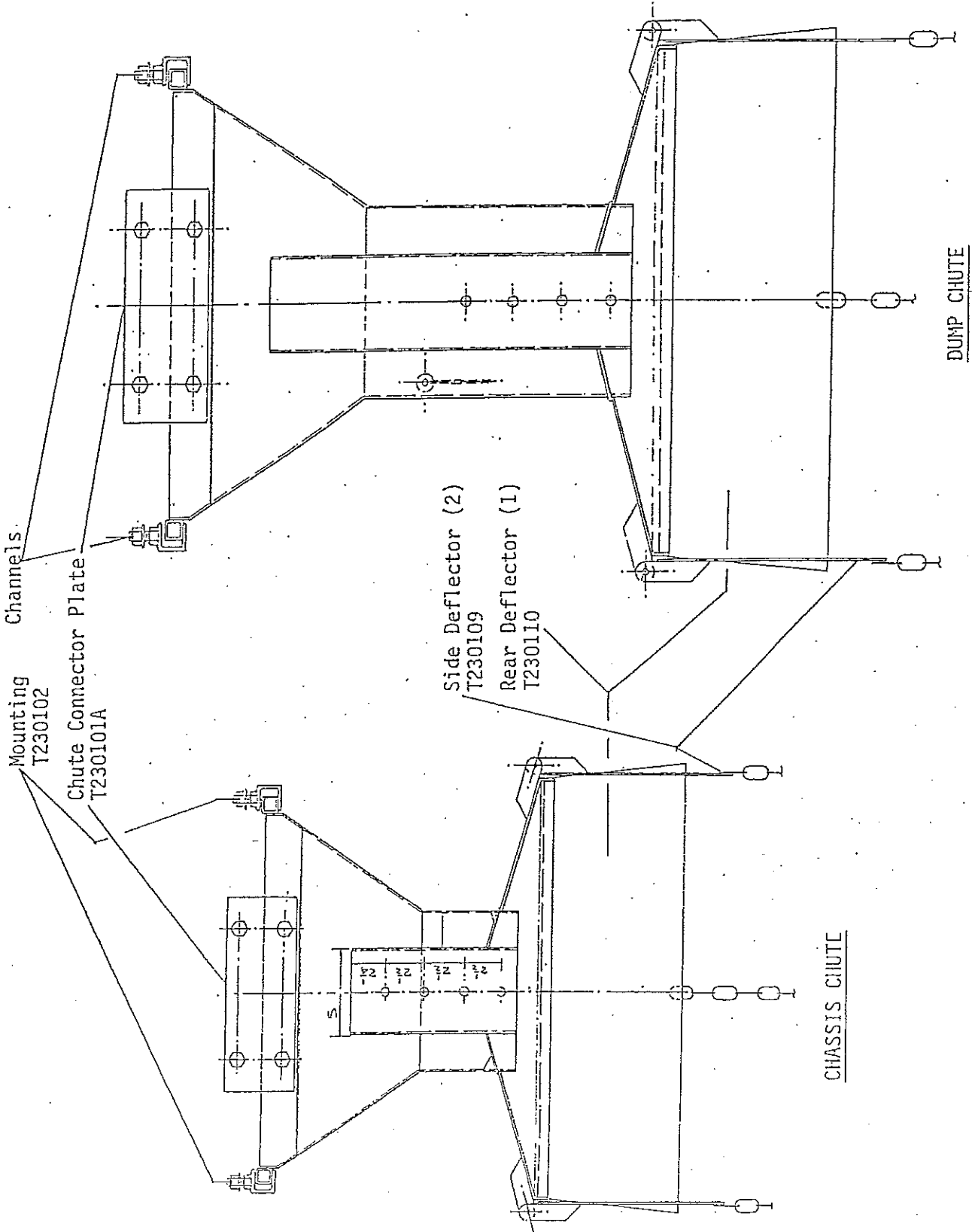
(4) CONVEYOR ASSEMBLY DIAGRAM

TORREL CONVEYOR ASSEMBLY

NO.	PART NO.	QTY	DESCRIPTION
1	T130101	1	Char-Lyn Motor 'C'
2	T130102-18	1	Durst Gear Box (18" Conveyor)
	T130102-24		Durst-Gear Box (24" Conveyor)
3	T130103	4	8-Tooth Sprocket
4	T130104	2	5-Tooth Sprocket
5	T130105-18	1	Idler Shaft 1 x 22 (18" Con.)
	T130105-24		Idler Shaft 1 x 28 (24" Con.)
6	T130106-18	1	Takeup Shaft 1 1/2 x 24 (18" Con.)
	T130106-24		Takeup Shaft 1 1/2 x 30 (24" Con.)
7	T130107	1	4-Bolt Bearing
8	T130108	2	Idler Bearing
9	T130109	2	Takeup Bearing
10	T130110	2	Takeup Assembly
11	T130111	2	Takeup Plate Assembly
12	T130112	4	Takeup Angles
13	T130113	2	Takeup Springs
14	T130114	2	Takeup Rivet 5" Lg
15	T130115	2	Rivet 1 5/8" Lg
16	T130116	2	Takeup Bolt 3/4-10 x 6" Lg
17	T130117	2	Key 3/8 Sq. x 3" Lg
18		4	3/8-16 x 3/4 III Bolt
19		4	3/8-16 x 1 1/4 Carriage Bolt
20		4	3/8 Lockwasher
21		4	3/8-16 Ilex Nut
22		8	1/2-13 Ilex Nut
23		12	1/2 Lockwasher
24	T130124	4	1/2-20-13 x 2" Stud
25		8	1/2-13 x 1 1/2 III Bolt
26	T130126	1	Grease Fitting
27	T140100	1	Conveyor Chain 18" (10' Hopper)
	T140101		Conveyor Chain 18" (12' Hopper)
	T140102		Conveyor Chain 24" (10' Hopper)
	T140103		Conveyor Chain 24" (12' Hopper)
28		4	1/2-20 Ilex Nut



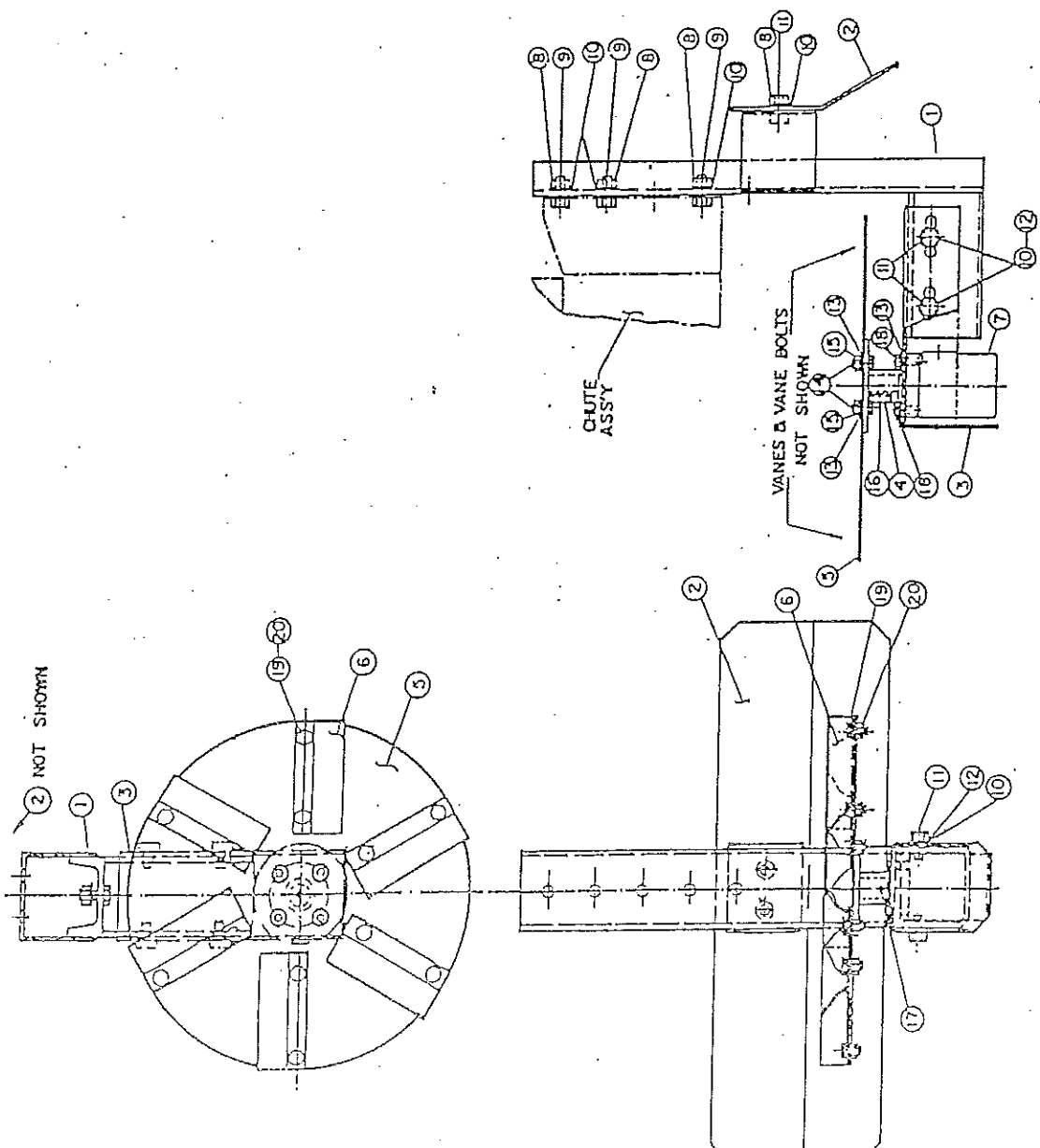
(5) CHUTE DIAGRAM



(6) SINGLE SPINNER ASSEMBLY DIAGRAM

TORWEL - SINGLE SPINNER ASSEMBLY
T220100

NO.	PART NO.	QTY	DESCRIPTION
1	T220101	1	Spinner Adjusting Bracket
2	T220102	1	Deflector Plate
3	T220103	1	Motor Bracket
4	T220104	1	Flanged Hub
5	T220105	1	Spinner Disc
6	T220106	6	Spinner Vanes
7	T220107	1	Char-Lyn Motor 'A'
8		5	1/2-13 Hex Nut
9		3	1/2-13 x 1 1/2 HH Bolt
10		9	1/2 Flatwasher
11		6	1/2-13 x 1 HH Bolt
12		4	1/2 Lockwasher
13		8	3/8 Lockwasher
14		4	3/8-16 x 1 HH Bolt
15		4	3/8-16 Hex Nut
16	T220116	1	No. 91 Woodruff Key (Inc. with Motor)
17	T220117	1	1/4-20-1/4 Socket Set Screw
18		4	3/8-16 x 3/4 HH Bolt
19		12	3/8-16 x 3/4 HH Bolt
20		12	3/8-16 Hex Nut



(7) TWIN SPINNER ASSEMBLY DIAGRAM

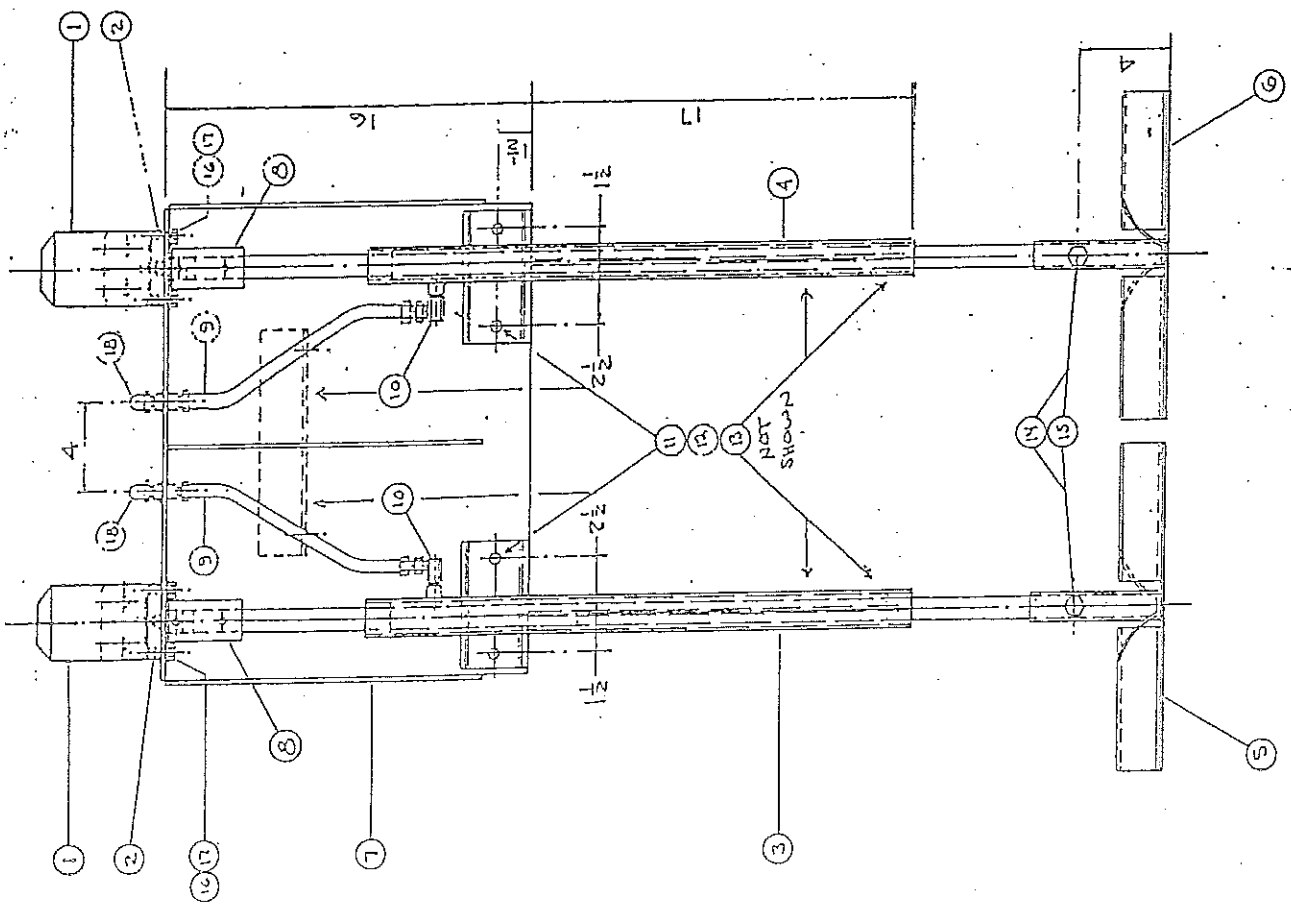
TORWEL - TWIN SPINNER ASSEMBLY
T220200

NO. PART NO. QTY DESCRIPTION

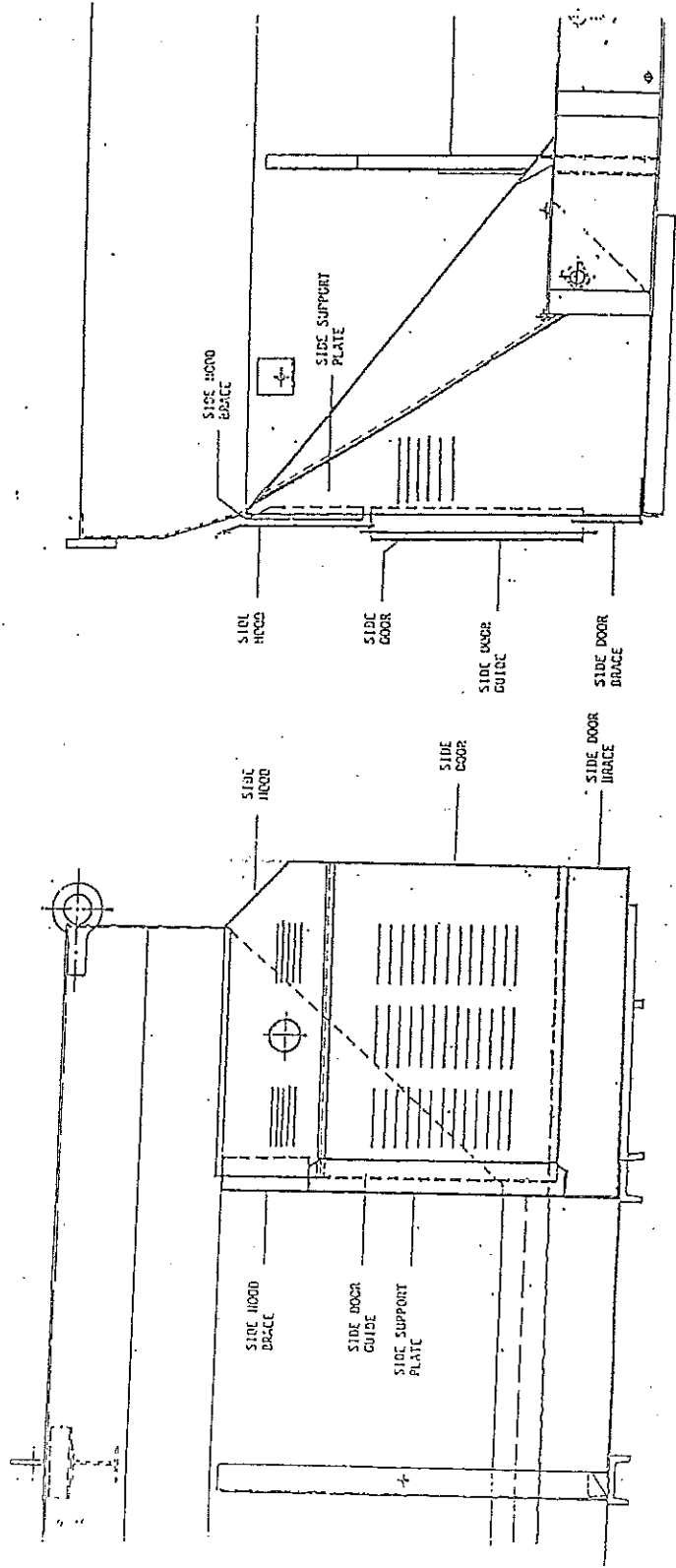
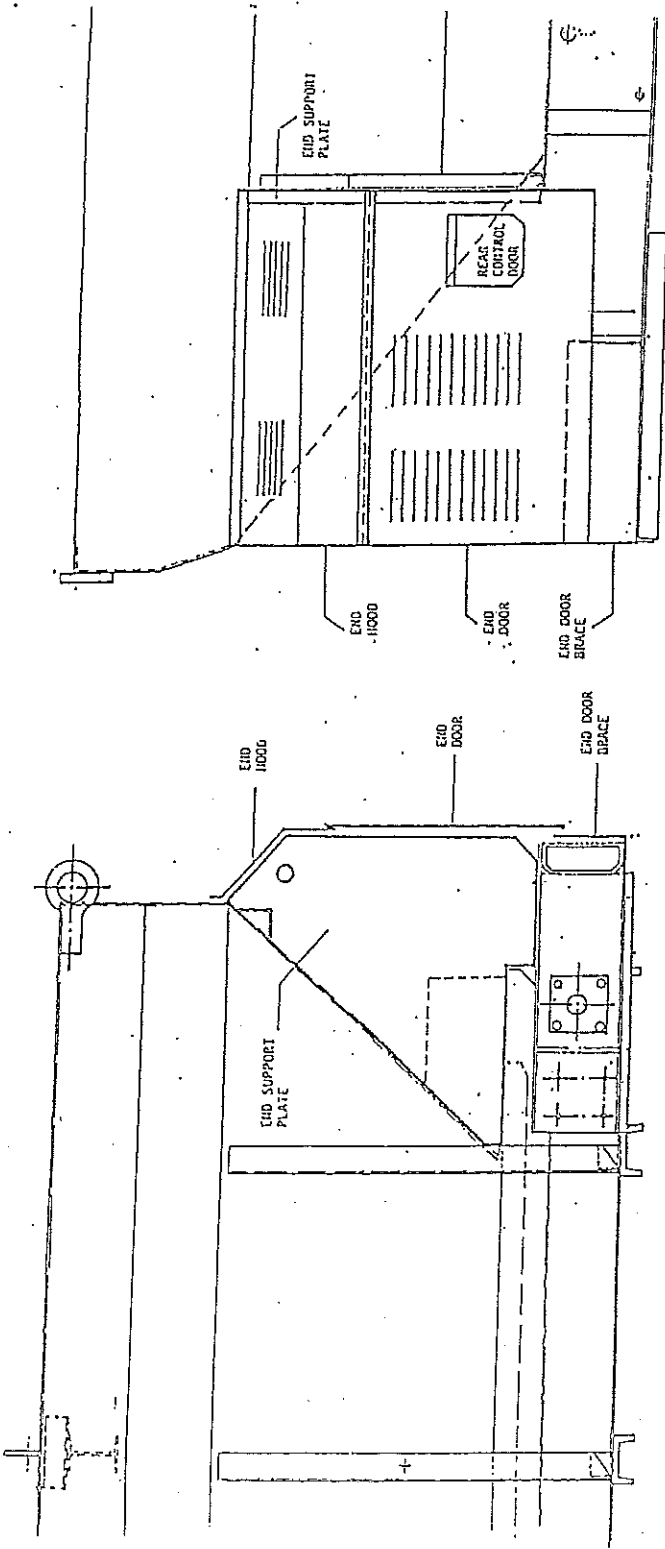
1	T220201	2	Char-Lyn Motor 'A' Motor Mounting Base (Inc. with Motor)
2	T220202		
3	T220203LH	1	LH Shaft Assembly (#)
4	T220203RH	1	RH Shaft Assembly (#)
5	T220205	1	LH Spinner Disc
6	T220206	1	RH Spinner Disc
7	T220207	1	Box Assembly
8	T220204	2	Coupling
9	T220209	2	Hose
10	T220210	2	1/8 x 90° Grease Fitting
11		10	1/2-13 x 1 1/2 HH Bolt
12		10	1/2-13 Hex Nut
13		10	1/2 Flatwasher
14		2	3/8-16 x 2 HH Bolt (*)
15		2	3/8-16 Hex Nut (*)
16		8	3/8-16 x 3/4 HH Bolt
17		8	3/8 Flatwasher
18	T220210	2	1/8 x 90° Grease Fitting

(*) Denotes Customer Supplied

(#) Chassis Mount Shaft - 42" Dump Mount Shaft - 52"



(3) ENGINE ENCLOSURE DIAGRAM



TORWEL - ENGINE ENCLOSURE

HR - Hot Roll Steel
SS - Stainless Steel
AL - Aluminum

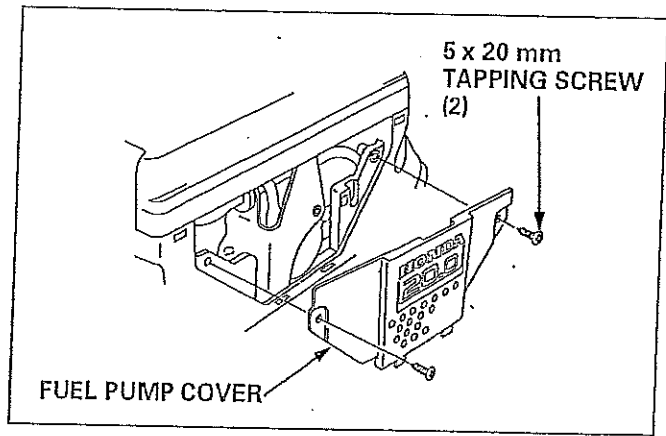
<u>DESCRIPTION</u>	<u>SPREADER</u>	<u>PART NO.</u>
Engine Enclosure (Complete)	18" HR	T170100
	24" HR	T170300
	18" SS	T170100SS
	24" SS	T170300SS
End Hood	18" HR	T170100-1
	24" HR	T170300-1
	18" SS	T170100-1AL
	24" SS	T170300-1AL
Side Hood	18" HR	T170100-2
	24" HR	T170300-2
	18" SS	T170100-2AL
	24" SS	T170300-2AL
End Support Plate	18" HR	T170100-3
	24" HR	T170300-3
	18" SS	T170100-3SS
	24" SS	T170300-3SS
Side Support Plate	18" HR	T170100-4
	24" HR	T170300-4
	18" SS	T170100-4SS
	24" SS	T170300-4SS
End Door	18" HR	T170100-5
	24" HR	T170300-5
	18" SS	T170100-5AL
	24" SS	T170300-5AL
Side Door	18" HR	T170100-6
	24" HR	T170300-6
	18" SS	T170100-6AL
	24" SS	T170300-6AL
End Door Brace	18" / 24" HR	T170100-7
	18" / 24" SS	T170100-7SS
Side Door Brace	18" HR	T170100-8
	24" HR	T170300-8
	18" SS	T170100-8SS
	24" SS	T170300-8SS
Side Hood Brace	18" / 24" HR	T170100-9
	18" / 24" SS	T170100-9SS
Side Door Guide	18" / 24" HR	T170100-10
	18" / 24" SS	T170100-10SS

7. CARBURETOR

• Adjustment

Throttle stop screw:

- 1) Remove the two 5 x 20 mm tapping screws and the fuel pump cover.
- 2) Start the engine and allow it to warm up to normal operating temperature.
- 3) With the engine idling, turn the throttle stop screw to obtain the standard idle speed.



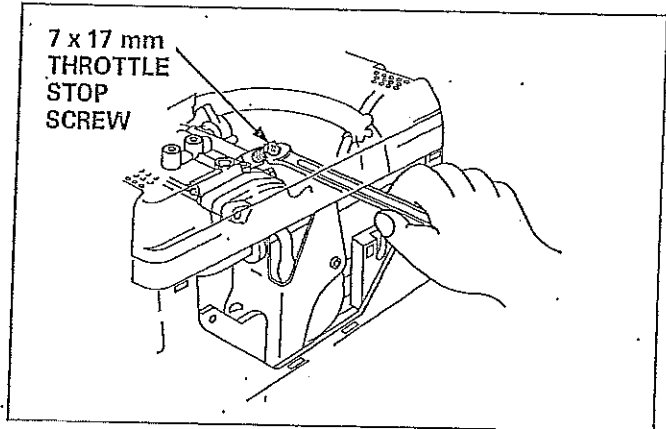
Standard idle speed	1,400 ± 150 rpm
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Pilot screw:

The pilot screw is fitted with a limiter cap that prevents excessive enrichment of the air-fuel mixture in order to comply with emissions regulations.

Do not attempt to remove the limiter cap for pilot screw adjustment. The limiter cap cannot be removed without breaking the pilot screw.

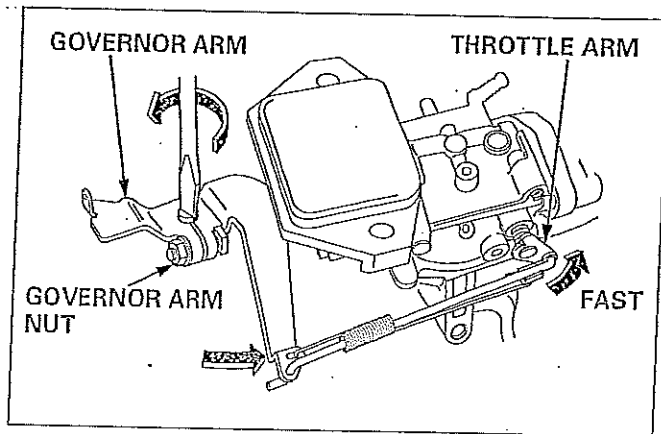
Pilot screw adjustment must be performed only when it is disassembled (P. 7-4).



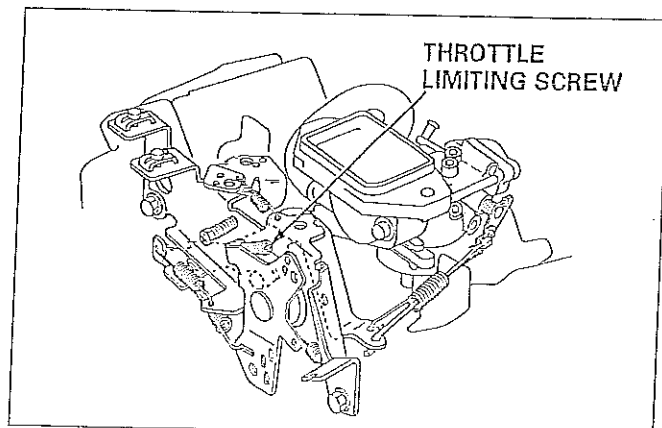
8. GOVERNOR

• Adjustment

- 1) Remove the air cleaner case (P. 4-1).
- 2) Loosen the governor arm nut.
- 3) Check the throttle arm is positioned in the FAST position.
- 4) Tighten the governor arm nut while turning the governor arm shaft counterclockwise fully.
- 5) Move the governor arm to the slow position and check that the throttle arm contacts the throttle stop screw.
- 3) Install the air cleaner case. Start the engine and allow it to warm up to normal operating temperature. Move the control lever to run the engine at the standard maximum speed, and adjust the throttle limiting screw so the control lever cannot be moved past that point.



Maximum speed	See P. 6-2
---------------	------------



SET ENGINE RPM @ 2700 RPM

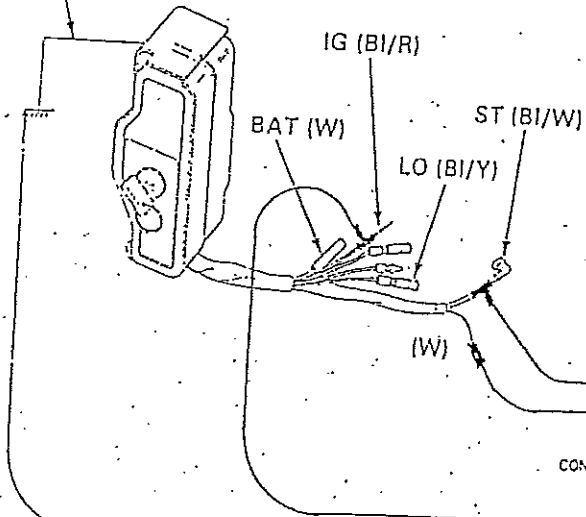
TORWEL

ELECTRIC DIAGRAM

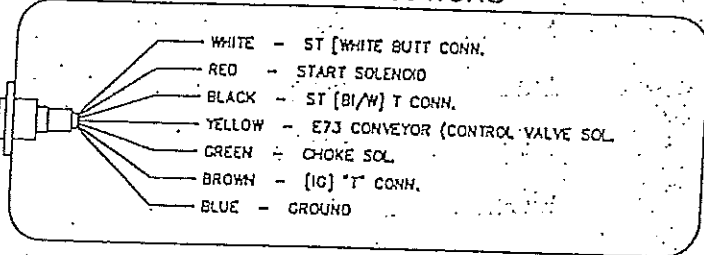
7 WAY PLASTIC HOUSING, 18 HP HONDA
WITH REAR SOLENOID CONTROL VALVE

SET ENGINE RPM @ 2700 RPM

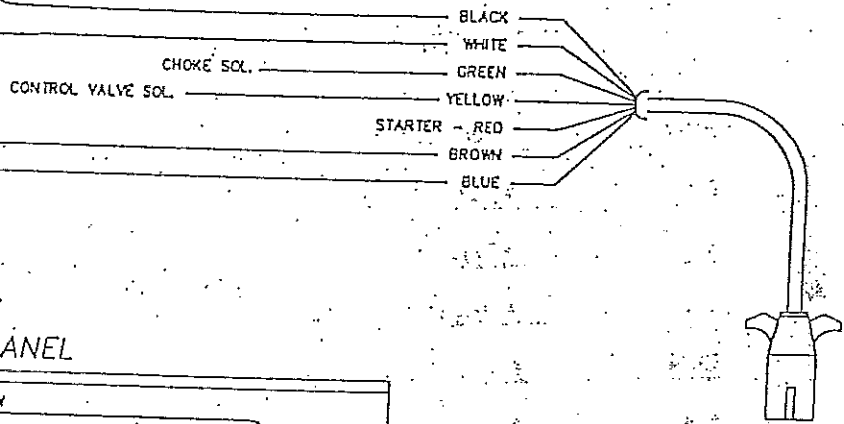
GROUND



CAB CONNECTIONS

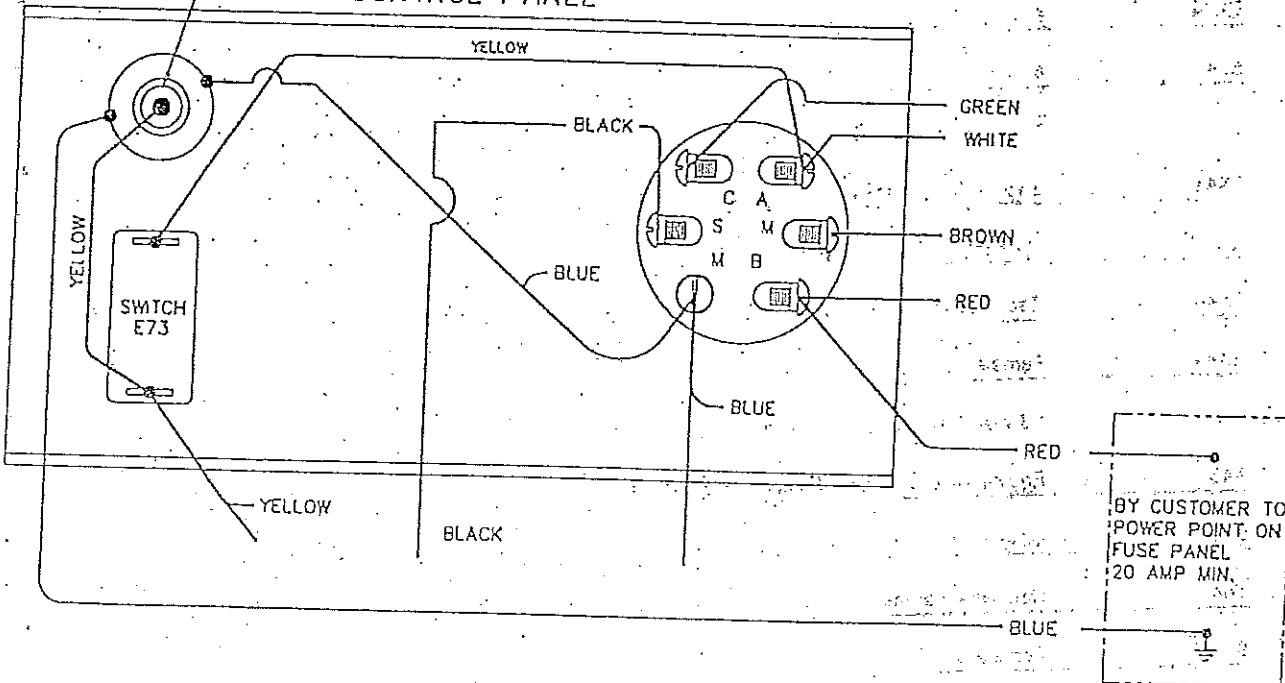


SANDER CONNECTIONS



INDICATOR LIGHT

REAR VIEW OF CONTROL PANEL



- A - ACCESSORY
- B - BATTERY
- C - CHOKE (Electric)
- M - MAGNETO
- S - START (Solenoid)

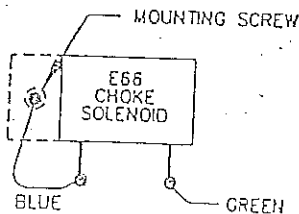


FIG-011

JORWEL PARTS LIST / 2001

Part Number	Part Description
T07 ELECTRICAL ASSEMBLY	
E42	Battery
E42A	Battery Box
E42A-1	Strap
E42B	Battery Cable - 6 Ga x 31"
T42B	Battery Cable - 6 Ga x 42"
E42C	Starter Cable - 10 Ga x 14"
E67	Starter Solenoid
L45-147HC	Harness Cable - 7 Way (Per Ft)
L45-149HC	Harness Cable - 9 Way (Per Ft)
T70	Control Panel (Complete - Includes #)
E70-1	# Control Panel Plate
E72	# Indicator Light
E73	# Toggle Switch
E73-1	# Toggle Face Plate
EX74	# Mag Starter Switch w/ Self Choke (Plastic)
E74-1	# Inline Fuse
	* 7 Way Harness Components (Plastic Housing)
TX43	Engine Wire Harness - 7 Way x 20 Ft w/ Male Plug (Plastic)
EX43-1	Male Plug - 7 Pole (Plastic)
TX44	Cab Wire Harness - 7 Way x 10 Ft w/ Female Socket (Plastic)
EX44-1	Female Socket - 7 Pole (Plastic)
	* 6 Way Harness Components (Steel Housing)
T43	Engine Wire Harness - 6 Way x 20 Ft w/ Male Plug (Steel)
E43-1	Male Plug - 6 Pole (Steel)
T44	Cab Wire Harness - 6 Way x 10 Ft w/ Female Socket (Steel)
E44-1	Female Socket - 6 Pole (Steel)
E74	Mag Starter Switch (Steel)
T74H	Honda Starter Switch (Wis #95413)

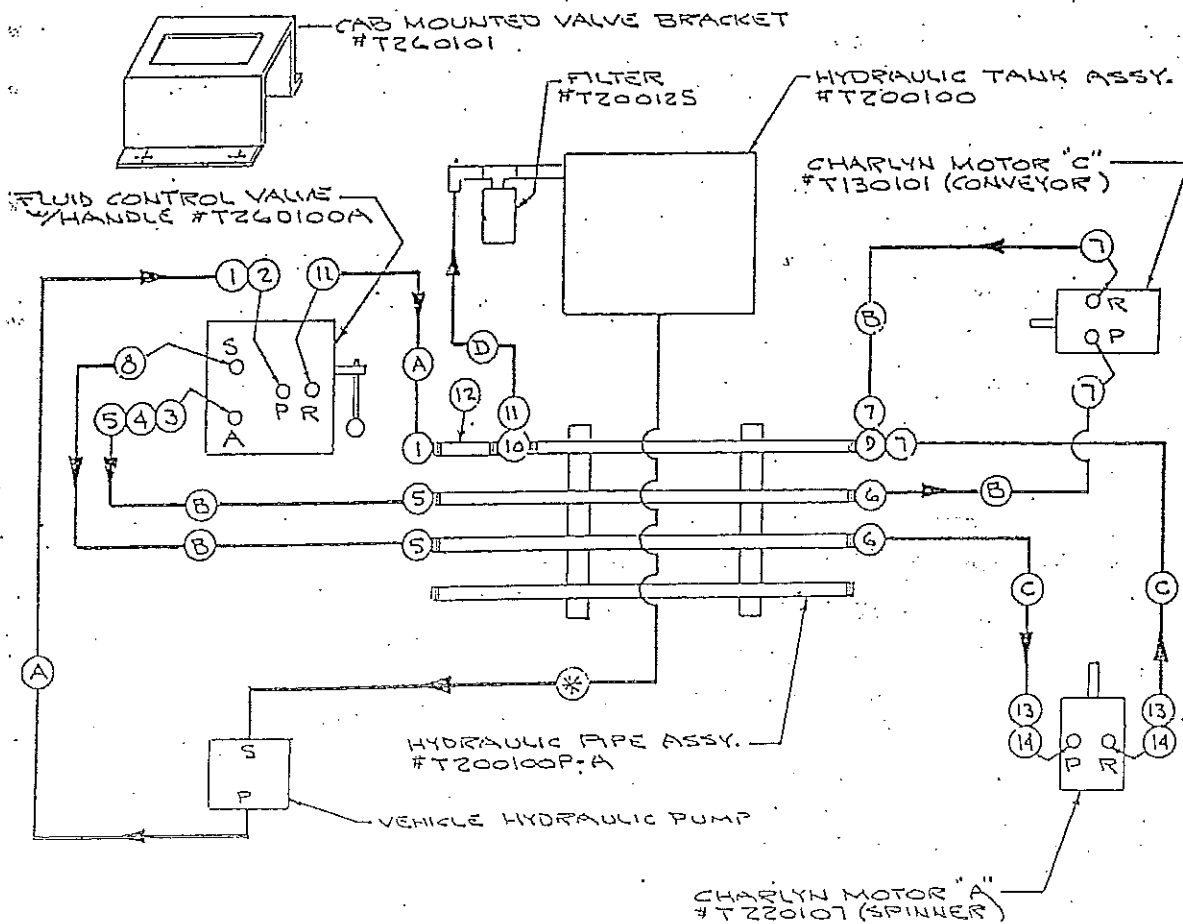
(11A)

FITTINGS

- 1- 3/4-ST. F Fitting (2)
- 2- 3/4 x 2 Space Nipple
- 3- 1/2-3/4 Reducer Bushing
- 4- 1/2 Close Nipple
- 5- 1/2-ST. F Fitting
- 6- 1/2-45° F Fitting (2)
- 7- 1/2-45° M Fitting (4)
- 8- 1/2-ST. M Fitting (2)
- 9- 3/4 x 1/2 x 1/2 Tee
- 10- 3/4 Tee
- 11- 3/4-ST. M Fitting
- 12- 3/4 Pipe x 24" LG
- 13- 1/2-90° F Fitting
- 14- 1/2 Pipe x 11" LG

HOSES

- A- 3/4 x 96" (2)
- B- 1/2 x 96" (4)
- C- 1/2 x 72" (2)
- D- 3/4 x 26"
- *- Denotes Customer Supplied



TORNEL HYDRAULIC HOSE & FITTING DIAGRAM (PCS)
PTO POWERED / CAB CONTROL / SINGLE SPINNER

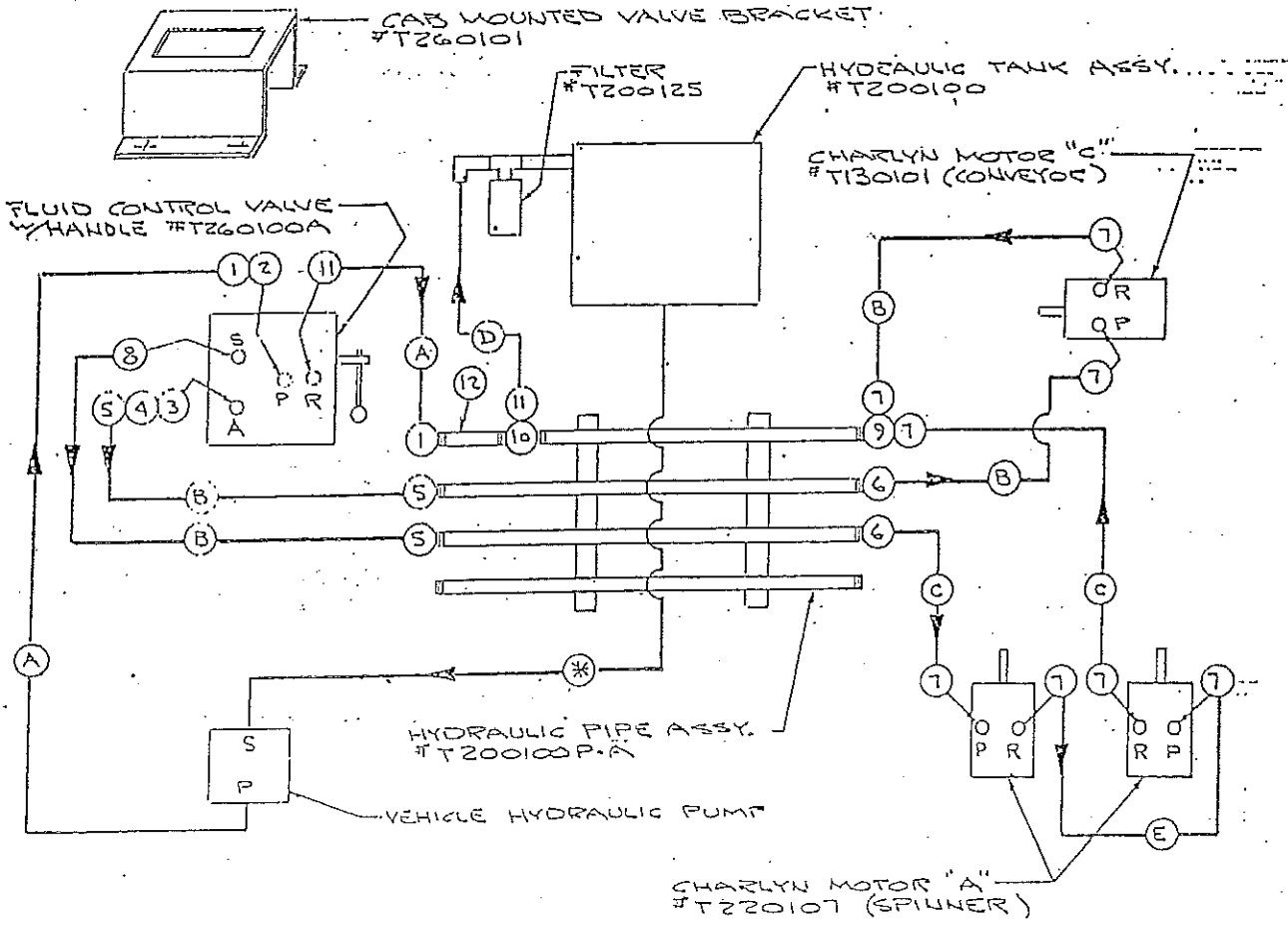
(11B)

FITTINGS

- 1- 3/4-ST. F Fitting (2)
- 2- 3/4 x 2 Space Nipple
- 3- 1/2-3/4 Reducer Bushing
- 4- 1/2 Close Nipple
- 5- 1/2-ST. F Fitting (3)
- 6- 1/2-45° F Fitting (2)
- 7- 1/2-45° M Fitting (8)
- 8- 1/2-ST. M Fitting
- 9- 3/4 x 1/2 x 1/2 Tee
- 10- 3/4 Tee
- 11- 3/4-ST. M Fitting (2)
- 12- 3/4 Pipe x 24" LG

HOSES

- A- 3/4 x 96" (2)
- B- 1/2 x 96" (4)
- C- 1/2 x 72" (2)
- D- 3/4 x 26"
- E- 1/2 x 20"
- *- Denotes Customer Supplied



TORWEL HYDRAULIC HOSE & FITTING DIAGRAM (PCT)
PTO POWERED / CAB CONTROL / TWIN SPINNER

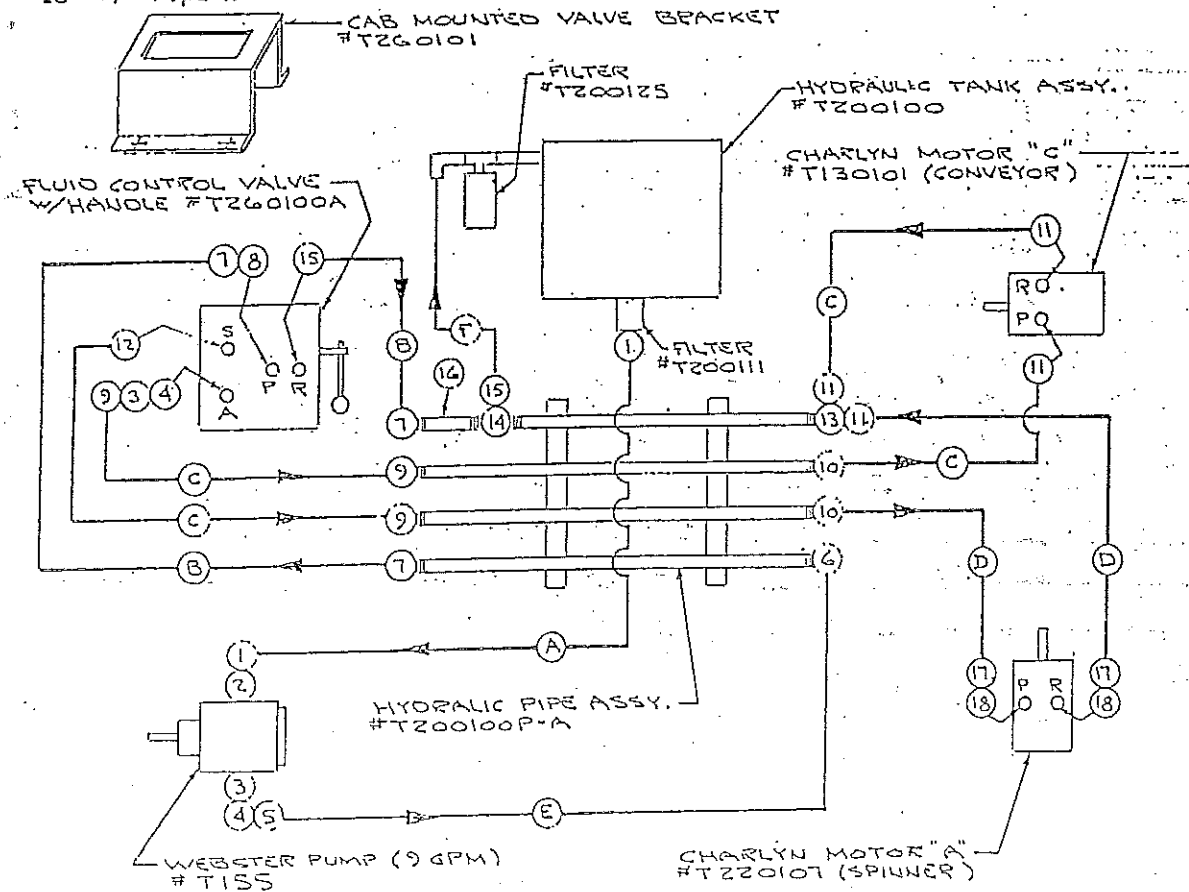
(12A)

FITTINGS

- 1- 1" Combination Nipple
- 2- 1-90° Street Elbow
- 3- 1/2 Close Nipple (2)
- 4- 1/2-3/4 Reducer Bushing (2)
- 5- 3/4-90° F Fitting
- 6- 3/4-45° F Fitting
- 7- 3/4-ST. F Fitting (3)
- 8- 3/4 x 2 Space Nipple
- 9- 1/2-ST. F Fitting (3)
- 10- 1/2-45° F Fitting (2)
- 11- 1/2-45° M Fitting (4)
- 12- 1/2-ST. M Fitting
- 13- 3/4 x 1/2 x 1/2 Tee
- 14- 3/4 Tee
- 15- 3/4-ST. M Fitting (2)
- 16- 3/4 Pipe x 24" LG.
- 17- 1/2-90° F Fitting (2)
- 18- 1/2 Pipe x 11" LG

HOSES

- A- 1" x 78" Suction Hose
- B- 3/4 x 96" (2)
- C- 1/2 x 96" (4)
- D- 1/2 x 72" (2)
- E- 3/4 x 48"
- F- 3/4 x 26"



TORWEL HYDRAULIC HOSE & FITTING DIAGRAM (ECS)
ENGINE POWERED / CAB CONTROL / SINGLE SPINNER

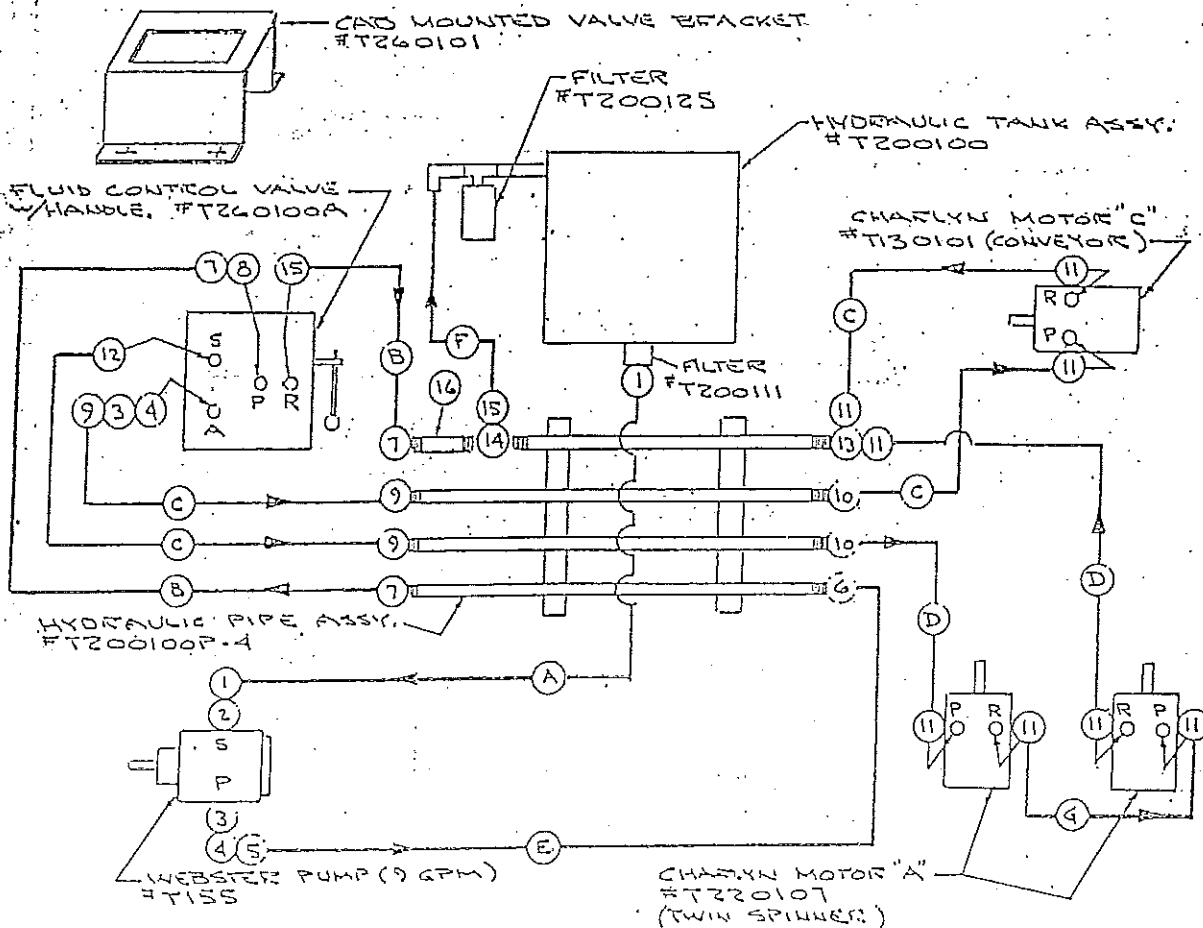
(12B)

FITTINGS

- 1- 1" Combination Nipple (2)
- 2- 1-90° Street Elbow
- 3- 1/2 Close Nipple (2)
- 4- 1/2-3/4 Reducer Bushing (2)
- 5- 3/4-90° F Fitting
- 6- 3/4-45° F Fitting
- 7- 3/4-ST. F Fitting (3)
- 8- 3/4 x 2 Space Nipple
- 9- 1/2-ST. F Fitting (3)
- 10- 1/2-45° F Fitting (2)
- 11- 1/2-45° M Fitting (8)
- 12- 1/2-ST. M Fitting
- 13- 3/4 x 1/2 x 1/2 Tee
- 14- 3/4 Tee
- 15- 3/4-ST. M Fitting (2)
- 16- 3/4 Pipe x 24" LG

HOSES

- A- 1" x 78" Suction Hose
- B- 3/4 x 96" (2)
- C- 1/2 x 96" (4)
- D- 1/2 x 72" (2)
- E- 3/4 x 48"
- F- 3/4 x 26"



TORWEL HYDRAULIC HOSE & FITTING DIAGRAM (ECT)
ENGINE POWERED / CAB CONTROL / TWIN SPINNER

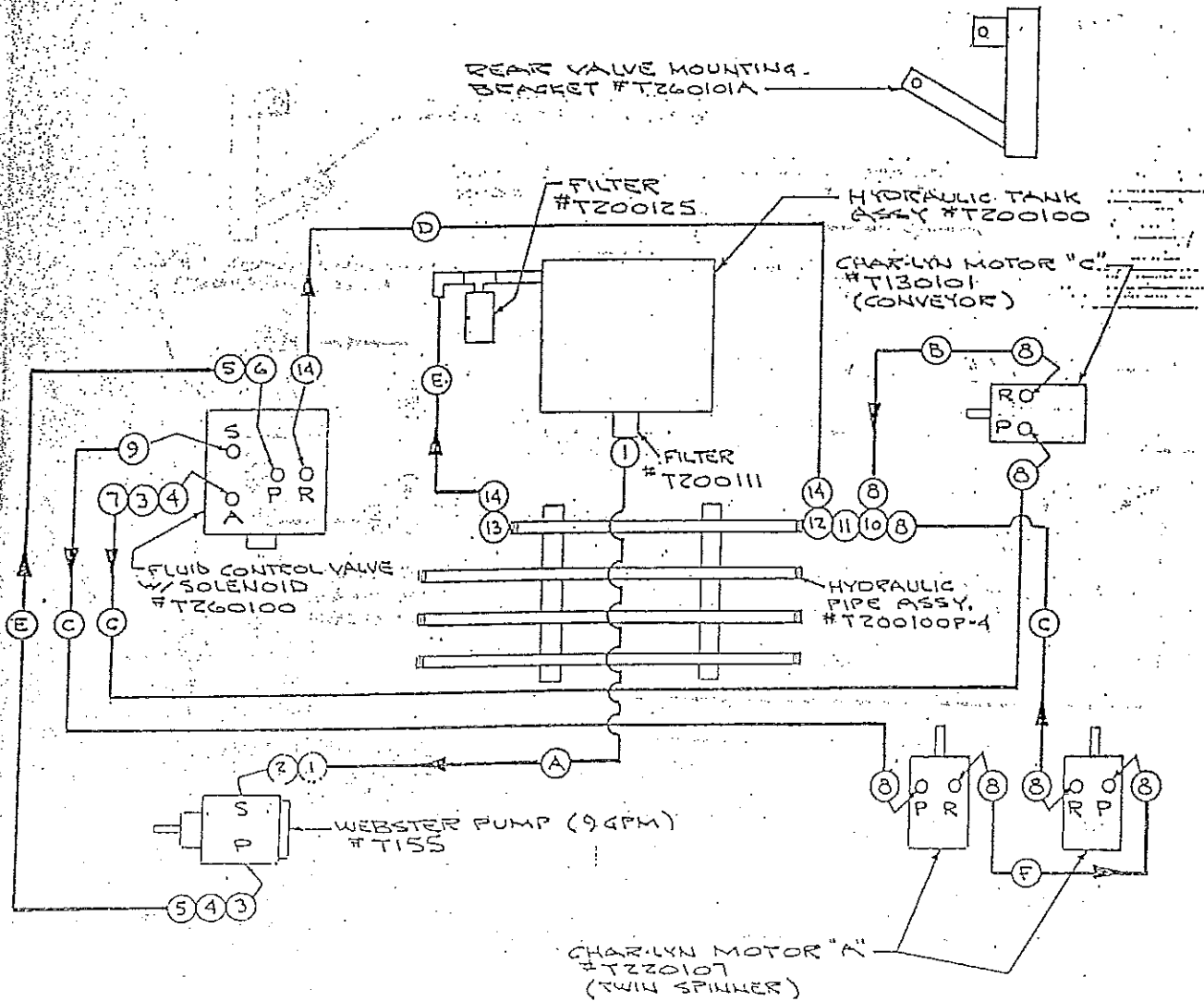
(13B)

FITTINGS

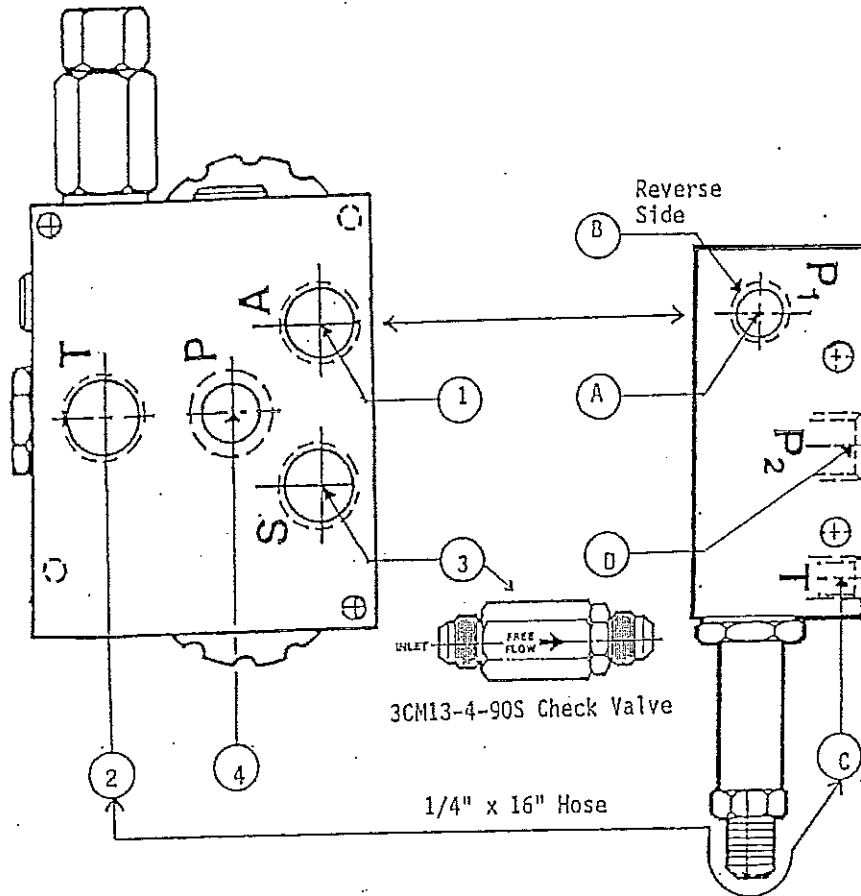
- 1- 1" Combination Nipple (2)
- 2- 1-90° Street Elbow
- 3- 1/2 Close Nipple (2)
- 4- 1/2-3/4 Reducer Bushing (2)
- 5- 3/4-90° F Fitting (2)
- 6- 3/4 x 3 1/2 Space Nipple
- 7- 1/2-90° F Fitting
- 8- 1/2-45° M Fitting (8)
- 9- 1/2-ST. M Fitting
- 10- 3/4 x 1/2 x 1/2 Tee
- 11- 3/4 Close Nipple
- 12- 3/4 Tee
- 13- 3/4 Elbow
- 14- 3/4-ST. M Fitting (3)

HOSES

- A- 1" x 78" Suction Hose
- B- 1/2 x 96"
- C- 1/2 x 72" (3)
- D- 3/4 x 42"
- E- 3/4 x 26" (2)
- F- 1/2 x 20"



TORWEL HYDRAULIC HOSE & FITTING DIAGRAM (ERT)
ENGINE POWERED / REAR CONTROL / TWIN SPINNER



- 1) 3/4 Street Elbow
3/4 Close Nipple
-Connects to Port 'A'
on Sequence Valve
- 2) 3/4 Close Nipple.
3/4 Tee
3/4-1/4 Reducer
3/4-ST M Fitting
-Connects to Port 'C'
on Sequence Valve
(1/4" x 16" Hose)
-Connects to 3/4 Return
Pipe
(3/4" x 48" Hose)
- 3) 3CM13-4-90S Check Valve (*)
1/2-ST F Fitting
-Connects to Spinner Motor
(1/2" x 72" Hose)
- 4) 3/4 x 3 1/2" Space Nipple
3/4 Steel Coupler
3/4-90° M Fitting
-Connects to Hydraulic Pump
(3/4" x 26" Hose)

- A) Connects to 3/4 Close Nipple
off Port '1' on Valve
- B) 3/4 Hex Plug
- C) 1/4-90° M Fitting
-Connects to 1/4" Hose
off Port '2' on Valve
- D) 3/4-1/2 Reducer
1/2-90° M Fitting
-Connects to Conveyor Motor
(1/2" x 72" Hose)

NOTE: The Sequence Valve may be adjusted by loosening the locknut and turning the adjustment bolt. Adjusting 'IN' (clockwise) should stop any conveyor movement with the system in the 'OFF' position, and the engine running.

(*) The Check Valve is connected so that the Free Flow (Arrow) is directed away from the Fluid Control Valve.

(15) TROUBLESHOOTING

<u>Problem</u>	<u>Probable Cause</u>	<u>Remedy</u>
Engine will not start (Engine units only)	Harness cables not connected	Check that both T43 and T44 harness plugs are connected
	Wiring to control panel not connected properly	Check all wire connections to panel (refer to wiring diagram T44)
Engine will not shut off (Engine units only)	Ignition switch on control panel not grounded	Check for proper grounding of wire from "G" terminal of ignition switch
	Spreader not grounded to vehicle	Check that holddowns are making good contact with vehicle
Not enough or too much material spread from spinner disc	Gate not adjusted properly	Adjust gate handle/ and valve settings according to requirements
	Conveyor and/or Spinner control on valve not adjusted properly	'Test Runs' often help
Pump not delivering oil	Pump driven too slowly	Increase speed to recommended RPH's
Conveyor / Spinner rotates in wrong direction	Hydraulic hoses not connected properly	Refer to Hydraulic Schematics for correct hose & fitting connections
Pump Noisy	Sludge and Dirt in system	Clean system thoroughly
	Air in hydraulic system	Bleed system at highest point. Tighten all connections in hydraulic lines
Excessive oil temperature	Pump overloaded, by restrictions in lines	Check system for foreign material in lines
What lubricant to use in hydraulic system		#10 Or #20 Light Weight Hydraulic Oil is Preferable

Refer to Wisconsin Engine 'Owners Manual' for most questions concerning engine operation and procedures.

Refer to Torwel 'Owners Manual' for most questions concerning spreader operation and procedures.

(16) LUBRICATION

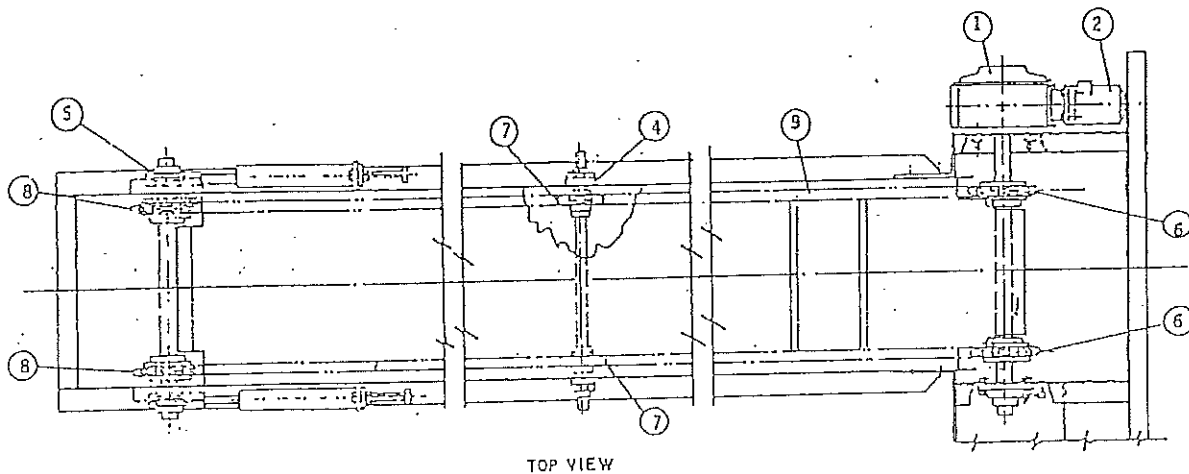
	<u>Lube Type</u>	<u>Interval</u>
1) Gear Box (1)	90 WT	Check Level Monthly
2) Hydraulic Motor (1)	Not Needed	Check Mounting Bolts Regularly
3) 4-Bolt Bearing (1)	Bearing Grease	25 Hours or Monthly
4) Idler Bearing (2)	Bearing Grease	25 Hours or Monthly
5) Takeup Bearing (2)	Bearing Grease	25 Hours or Monthly

SERVICE

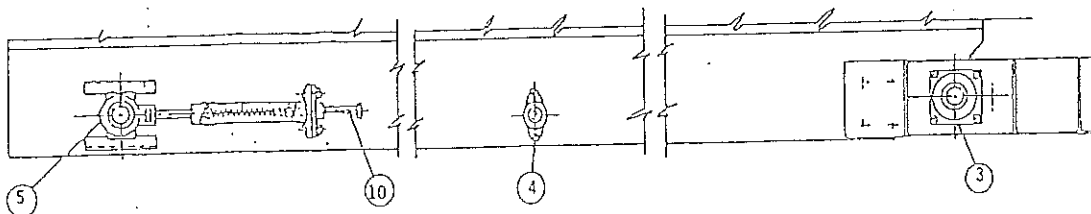
6) 8-Tooth Drive Sprocket (2)	Lubricate Yearly (used Engine oil is Acceptable)
7) 5-Tooth Idler Sprocket (2)	Lubricate Yearly (used Engine oil is Acceptable)
8) 8-Tooth Takeup Sprocket (2)	Lubricate Yearly (used Engine oil is Acceptable)
9) Conveyor Chain	Lubricate Yearly (used Engine oil is Acceptable)
10) Takeup Bolt	Lube & Adjust Regularly (use Anti-Seize lube if available)

WISCONSIN ENGINE SERVICE

Engine Oil	Change every 50 Hours or Yearly
Air Cleaner	Change with Engine Oil
Fuel Strainer	Check Monthly
Spark Plugs (.030 Gap)	Check or Change Yearly

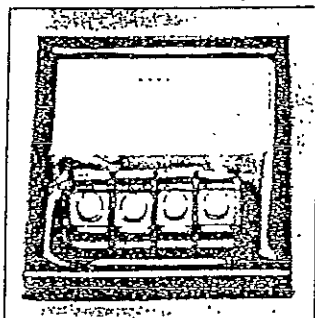


TOP VIEW

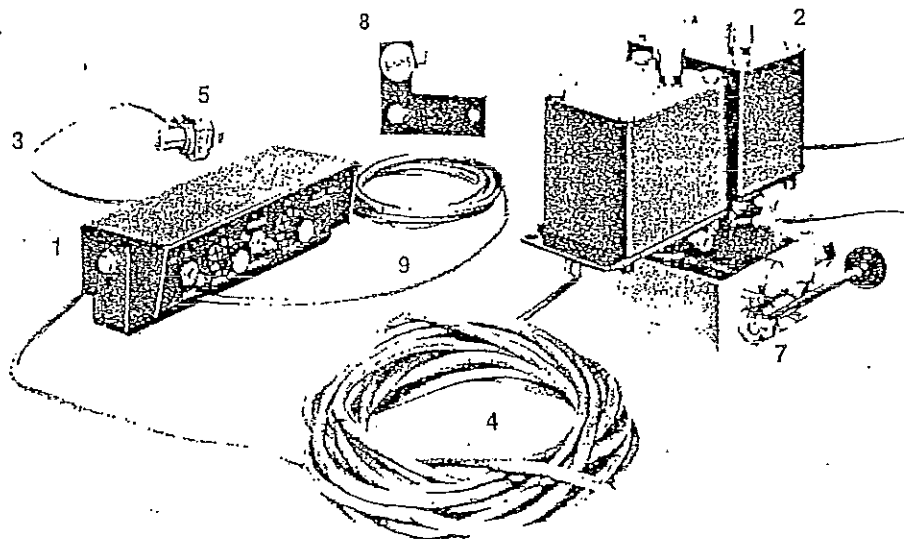


LEFT SIDE

(17) Hydra Tach (GSC-600 Series)



6



HYDRATACH.

- | | |
|----------------------------|-------------------------------------|
| 1. CONTROL BOX | 6. ELECTRONIC SPEEDOMETER INTERFACE |
| 2. ACTUATORS | 7. VALVE |
| 3. COVERED 3-WIRE CORD | 8. AUGER FEEDBACK TRANSMITTER |
| 4. COVERED 5-WIRE CABLE | 9. 2-WIRE POWER CORD |
| 5. SPEEDOMETER TRANSMITTER | |

Hydra Tach is an uncomplicated, accurate spreader controller for salt, sand or fertilizer trucks. Rely on Hydra Tach for precision delivery of granular materials at any speed, under any conditions. The automatic ground-speed related control of the hydraulic flow valve assures accuracy unmatched by manual flow controls. Better control over spread rate reduces the risk of environmental damage. Hydra Tach improves the safety of plowing and spreading operations by freeing the driver from the distraction of manually adjusting spreader hydraulic flow. In-cab control box and in-cab or remote actuators give Hydra Tach un-

beatable flexibility. And, by using a minimum of connections and components, Hydra Tach saves valuable time on installation.

The Hydra Tach control box warning indicators alert drivers to problems such as excessive ground speed or jamming of exterior components due to snow and ice build up. Manual override allows driver to adjust the spreader valve by hand in the event of electrical failure, saving downtime and allowing completion of clearing operations. Closed loop models are designed to revert to open loop in the event of auger sensor failure.

HYDRA TACH FEATURES:

- Open loop or closed loop system
- Reliable solid state design
- Ten position spread rate
- Dash-mounted control box
- Built-in calibration signal
- Blast switch
- Manual override
- Electronic speedometer interface
- Two-year warranty
- Elimination of in-cab hydraulics
- Remote or in-cab actuator mountings

(18) WARRANTY

TORWEL INDUSTRIES warrants each new machine manufactured and sold by it, as well as such accessories and parts of its manufacture, to be free from defects in material and workmanship under normal use and service.

This warranty is limited to one (1) year from date of sale.

The extent of its obligation under this warranty is limited to repairing or replacing at its factory (or at locations of authorized Dealers) any parts which, upon examination, shall be found to have been defective.

This warranty is in lieu of all other warranties, expressed, implied, or statutory, and of all other obligations or liabilities on its part, there being no implied warranty with respect to said articles, whether of suitability or otherwise. Unless agreed to in writing, TORWEL INDUSTRIES reserves the right to change its specifications without notice.

TORWEL INDUSTRIES neither assumes nor authorizes any person to assume for it, any other liability in connection with the sale of said machine or accessories thereto.

It is further understood that parts or assemblies included as part of any complete machine, such as engines, motors, etc., which are not manufactured by TORWEL INDUSTRIES, are not covered by this warranty, but are covered by such warranty and as prescribed by the respective manufacturers thereof.

This warranty shall not apply to any piece of equipment or accessory which shall have been repaired or altered in any way outside of the TORWEL INDUSTRIES factory, or at an Authorized Dealers', nor to any machine or accessory which has been subjected to misuse, negligence, or accident, nor for one loaded beyond its normal load capacity.

LIABILITY FOR DELAYS

No liability shall attach to manufacturer for direct, indirect, or consequential damages or expenses due to loss, damage, detention or delay in delivery of products resulting from acts or delays beyond its control.

REPAIR PROCEDURE

To assure prompt handling of claims, any part failure or malfunction should be reported to the Company's Claim Department within 14 days. If requested by the Company, parts should be returned directly to the Company, prepaid, for warranty processing.