06.01.08

INSTRUCTION BULLETIN

& MAINTENANCE MANUAL

FOR CTD MODEL

D20R

CTD MODEL NO:_____

CTD SERIAL NO:_____

MANUFACTURE DATE:_____

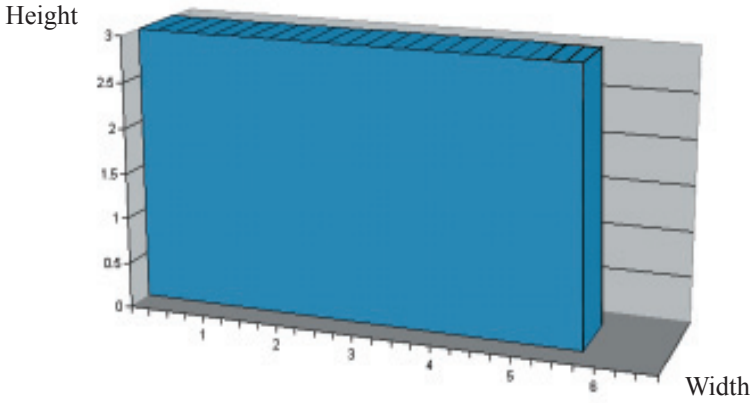
DISTRIBUTOR PURCHASED THROUGH:

(IF ANY)_____

CTD MACHINES
2300 East 11th Street
Los Angeles, CA 90021-2817
Tel (213) 689-4455 FAX (213) 689-1255
World Wide Web: http://www.ctdsaw.com
e-mail: ctdsaw@ctdsaw.com

Machine Requirements:

MODEL NO:_____ SERIAL NO:_____



Height	Width
3” (63mm)	4-1/2” (146mm) *
3” (76mm)	5-1/2” (127mm)**

* with Rabbet Measuring System

** with Rabbet Measuring System removed

Electrical Requirements: Based on two motors per machine

Motor Size	Required Amperage	Breaker Needed
1 H.P. 1 Phase 110 Volt	30 amps	40 amp
1 H.P. 1 Phase 230 Volt	15 amps	20 amp
1-1/2 H.P. 1 Phase 230 Volt	20 amps	30 amp
1-1/2 H.P. 3 Phase 230 Volt	9.2 amps	20 amp
1-1/2 H.P. 3 Phase 460 Volt	4.6 amps	20 amp

Dust Collection Requirements: 1200 CFM for four 2”outlets

Cutting Tool Requirements: Heavy, rigid plate 12” blades: .100 to .110 plate

Installation and Set Up:

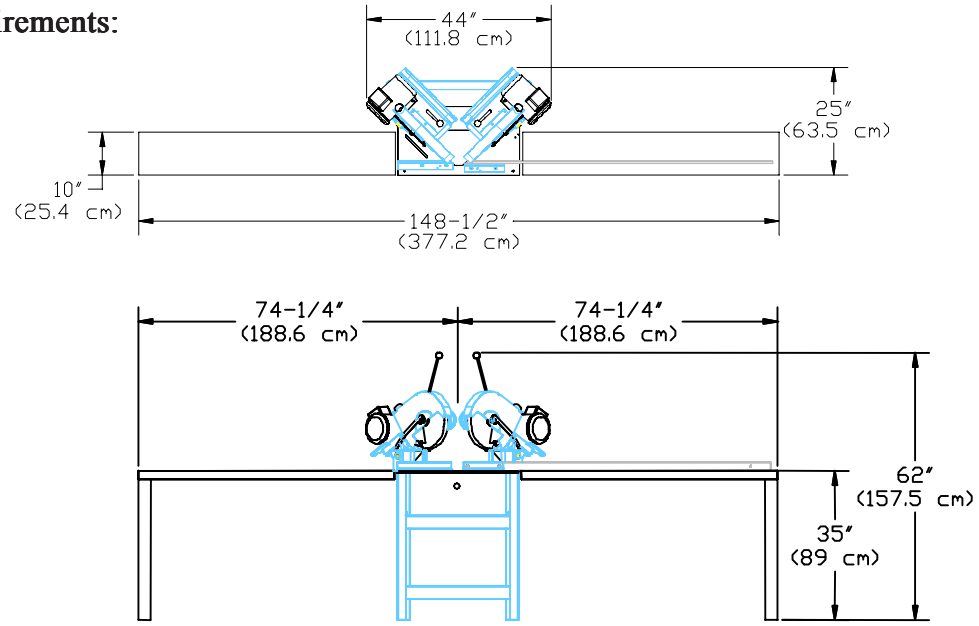
CTD Model D20R 12" Single-Double Mitre Saw:

The CTD saw you have purchased is designed to cut wood, aluminum, and plastic, with of course, the proper blade and conditions. For the material you are cutting, please refer to the cutting instructions for each material type. The D20R uses a NEMA 56 Frame 1 H.P., 3450 RPM, 60 HZ TEFC motor. CTD uses a speed-up drive so that the blade will run at approximately 11,400 SFPM on a 12" blade.

IMPORTANT: Before operating saw, please be sure to read the "**SAFETY INSTRUCTIONS TO THE OPERATOR**" (on Page No. 11).

Note: The floor stand must be shimmed, leveled and bolted to the floor or framed in to eliminate vibration. Use holes provided in bottom of floor stand. All machines have been completely assembled at the factory, then disassembled for shipment.

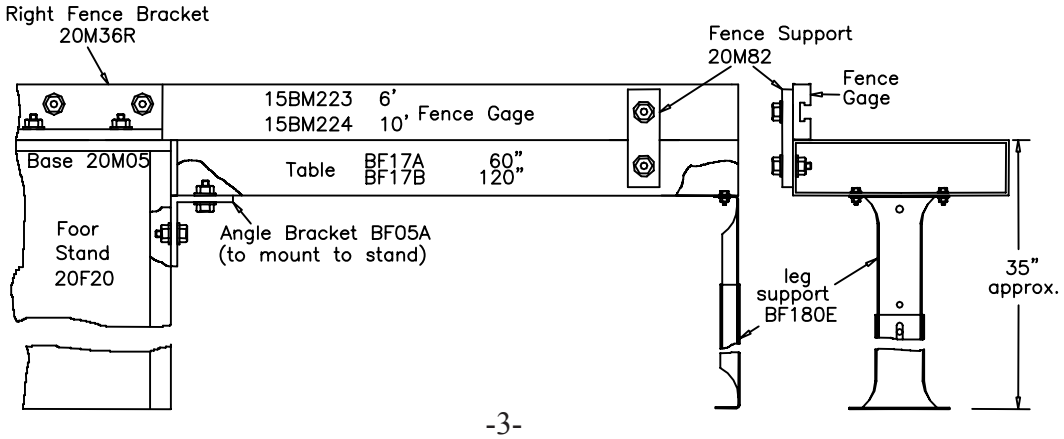
Space Requirements:



Assembly of Tables to Floor Stand:

1. Assemble leg to table with 3/8-16 bolts and nuts provided. Turn table upside down and attach leg to table with leg rising vertically. *Note*: The hole in the table (when mounted properly) should be toward the front of the table and far away from the blade to attach Fence Support Angle, P/N 15F82(see Diagram "A").
2. Attach Table, P/N BF17 to machine floor stand on Angle Bracket, P/N BF05A. Use 3/8-16 bolts and nuts provided on angle bracket.

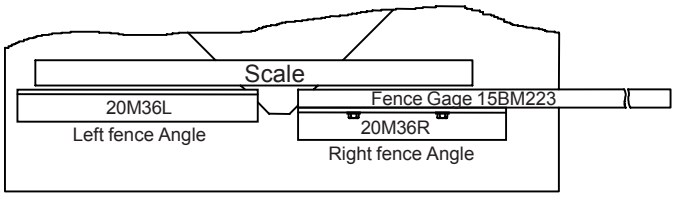
Diagram "A"



Attaching Rabbet Measuring System to Machine:

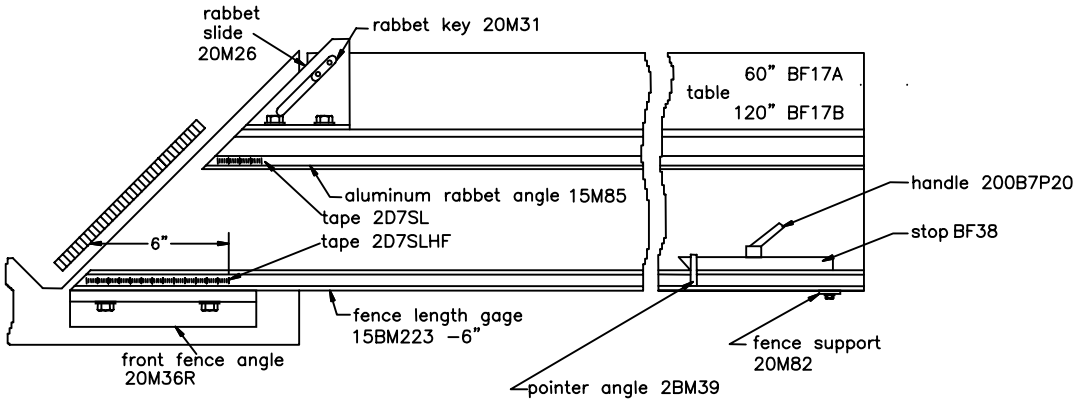
1. Place long measuring gage on table with measuring tape facing up. Bolt through Front Fence Angle, P/N 20M36R with 3/8-16 bolts provided. Adjust gage so measurement rule is correctly set (see Diagram "G");
   A. With scale or ruler touching the side of the tips of the blade, measure a distance away from the blade. Be sure the ruler and the tape on the fence gage read the same.
   B. Adjust fence, left to right as necessary.
   C. Both fences, left and right, must be in perfect alignment. Use a long *straight edge* for this purpose.
      1. Place a two foot steel scale flat on table base. Butt edge forward against fences. Touch each outside corner of scale. If one side pulls away from fence, then long fence is not in alignment with left fence (see Diagram "F").

Diagram "F"



   D. Attach fence support angle to fence and table.
2. Place aluminum angle with slide over key. (Rabbet Angle Assembly, P/N 20E85 is comprised of Slide, P/N 20M26 & Rabbet Angle, P/N 15M85.)
   A. Move angle forward to front fence and square up.
   B. When rabbet angle is square against front fence, both measurement rules should read the same. This may be visually deceiving. Use a 90° square to check.
   C. Adjust rabbet angle on slide as necessary by loosening 1/4-20 bolts on rabbet slide.
3. How to use Rabbet Gage:
   A. Feed stick length with 45° mitre past right blade.
   B. Slide aluminum angle under rabbet of wood moulding to desired dimension.
   C. Move outside stop and clamp to that point and lock.
   D. Slide rabbet angle back and cut.

Diagram "G"



Blade Installation:

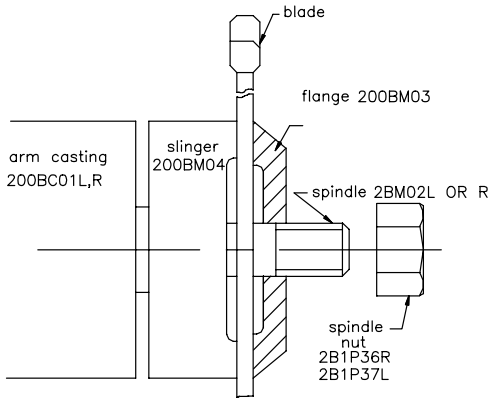
Before setting blades on spindle, *always shut off or disconnect power supply*. With motor **OFF** and **Power Disconnected**, rotate Lower Blade Guard (p/n 200A270) up into Main Blade Guard (p/n 200A26L or R). Slide link puller (p/n 200M320) off puller screw and bushing through large hole on slot. Remove four machine nuts on Blade Guard Cover (p/n 200F250L or R). The entire Lower Blade Guard Cover Assembly (200E250L or R) comes off as one piece, exposing spindle nut and flange.(Refer to Diagram "D" on Page No. 5.)

1. Remove Spindle Nut, P/N 2B1P36 or 2B1P37 and Outer Flange, P/N 200BM03. If necessary, hold blade in hand with rag or lower blade into a piece of wood. Push down with a 15/16" wrench.

2. Place blade on spindle with tips pointing down. Make sure Slinger (inner flange), P/N 200BM04 and blade surface are ***clean*** before putting blade on spindle. This is a critical surface and is ground within .0005 flatness. Any debris or dust will wear this surface. Wipe both surfaces (blade and slinger) with a clean rag.
   A. The blade must **ALWAYS** rotate to the rear of the machine on the underside of the blade (see Diagram "D"). ***Always check rotation before cutting a piece of material.***
3. Replace Outer Flange, P/N 200BM03 and nut as before and tighten (refer to Diagram "C"). Pull up with 15/16" wrench. Do not over-tighten. Snugging the blade is all that is necessary.

If blades were purchased from CTD, your machine has been set with your blades. If not, blade diameters may vary. Check to see if the blade contacts the base in the down position. If repositioning is necessary, adjust down stop bolt located under Arm casting, P/N 200BC01L or R.

Diagram "C"



*These machines are general purpose in their design, therefore the **user** should attach any additional guarding to the blade guard or table base if the cutting application causes **unsafe blade exposure***

This label is attached to the blade guard. ***Never put hand or fingers near or under the moving blade****. Use a piece of wood to remove short pieces from saw.*

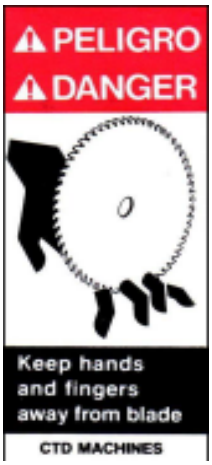
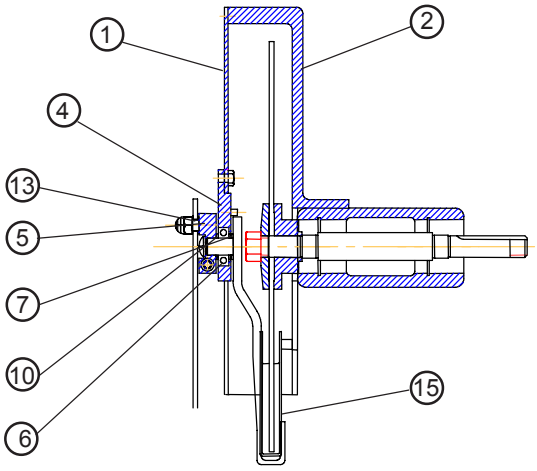
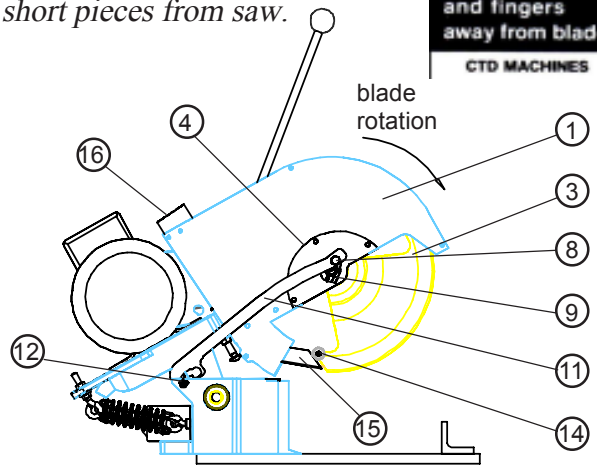


Diagram "D"

See exploded views of Blade Guard on pages 17 & 18





1.	200F250R/L	12" N.S. Blade Guard Cover
2.	200A26R/L	12" Main Blade Guard, Rt. Or Lt.
3.	200A270	Lower Rotating Blade Guard- ½" pin
4.	200M265R/L	Bearing Housing Blade Guard Assy.
5.	200E261	Pawl and Pin Assy.
6.	2B2P09	Rotation Bearing for Housing
7.	2BM13	Spacer Washers (2) for Pin
8.	200B1P267	5/16 x1/4" Shoulder Bolt
9.	200B1P268	External Tooth Lock Washer
10.	200B1P269	Teflon Spacer Washer (outside)
11.	200M320	N.S. Blade Guard Link/Puller
12.	200B7P35	Rear Bushing for Link/Puller
13.	200B7P36	Front Bushing for Link/Puller
14.	200B2P30	Roller Bearing Lower Blade Guard
15.	200M36R/L	Rear Blade Guard Channel Rt. or Lt.
16.	200M35	Top Dust Tube Main Blade Guard

Blade Guard:

The blade and belt drive are enclosed. When the saw arm is lowered, the lower blade guard rotates up into the main blade guard. The blade continues through the work as the lower blade guard rotates up. ***NEVER remove any blade guard part, exposing the blade***. It is important that the finger guards, P/N 20F180 are adjusted and positioned around the material to give maximum protection to the operator.

Electrical Installation:

The CTD D20R Series Cut-Off Saws use two 1 H.P. single phase 3450 RPM, 60 HZ TEFC (totally enclosed fan cooled) motors on a NEMA 56Z Frame. CTD uses a speed up drive so that the blade will run at approximately 3700 RPM. The motors are turned "ON" and "OFF" using the manual overload starter located on top of each motor.

Electrical installation should be performed by a qualified and certified electrician. It is highly recommended that a *lock-out* or *disconnect switch* be located close to the machine between your main electrical panel and the machine. This disconnect switch is used to shut off power to the machine and should be used whenever the blades are changed, or at any time the machine is serviced and the blade is exposed. A Manual Overload Starter has been provided as a standard feature. The starter protects the motor from overheating and will not allow the motor to restart itself after power outages or undervoltage situations.

Electrical Installation of Power to Starter by a Qualified Electrician:

All wiring to the motor has been completed and tested at the factory several times. The voltage has been clearly tagged. *DO NOT CONNECT ANY VOLTAGE THAT IS **DIFFERENT** THAN THE TAGGED VOLTAGE, AS THIS MAY CAUSE SEVERE DAMAGE AND DANGER.* Consult the factory if any changes are needed.

Single Phase Motors:

Connect leads to L1 (line 1) and L2 for single phase motors. (See Wiring Diagram for Single Phase Motors below.) Green ground wire must be grounded to enclosure. If using type "SO" wire and plug, use a romex connector through starter box and a grounded plug. *Be sure to check rotation.* The blade must rotate down and to the rear on the underside of the blade (see Diagram "D" on Page No. 5).

Three Phase Motors:

Connect incoming power line leads to L1 (line 1), L2 and L3. (See Wiring Diagram for Three Phase Motors below). Green ground wire must be grounded to enclosure. *Be sure to check rotation* as polarities may be different. The blade must rotate down and to the rear on the underside of the blade (see Diagram "D" on Page No. 5).

If a change in rotation is necessary for single phase motors, exchange the #5 and the #8 wires in the wiring stack. If a cahnge is necessary for three phase motors, reverse any two of the incoming power wires. *Example: If the blades are running backwards and incoming wires are connected White L1, Black L2, Red L3, switch the Black wire with the Red so that Black is connected to L3 and Red is connected to L2. This will change the motor to rotate properly.*

Motor Load Amperes Per Motor

MOTOR SIZE	110 VOLT	208 VOLT	220 VOLT	440 VOLT
1 H.P. 1 Phase	15 amps	N/A	7.5 amps	N/A
1-1/2 H.P. 1 Phase	20 amps	N/A	10 amps	N/A
1-1/2 H.P. 3 phase	N/A	N/A	4.6 amps	2.3 amps
2 H.P. 3 Phase	N/A	5.7amps	N/A	N/A

Motor Wiring Chart

	Single Phase Terminal			Connect		Three Phase Terminal			Connect	Connect	Connect
	T1	T2	T3	Leads		T1	T2	T3	Leads	Leads	Leads
115 Volt	1,3,5	2,4,8	--		230 Volt	3&9	2&8	1&7	4,5,6	---	---
230 Volt	1	4&8		2,5,3	460 Volt	1	2	3	6&9	5&8	7&4

Safety Instructions to the Operator and Responsibilities of Employer:

It is the responsibility of the Employer to maintain the saw and provide training to employees so as to comply with the requirements of ANSI Standard 01.1 for safety.

1. *KNOW YOUR CTD SAW.* Read this instruction manual carefully. Learn the operation, application, and limitations, as well as the specific potential hazards peculiar to this machine.
2. Avoid accidental starting. Make sure switch is **OFF** before plugging in power cord. A Magnetic Starter can be provided to give the operator added protection.
3. Always use a plug equipped with a ground.
4. Always keep blade guard in place. Do not wire-up or chain-up, so that blade is exposed.
5. Be sure all unnecessary tools are removed from machine before turning on power.
6. Use safety goggles. Also use a face or dust mask if operation is dusty.
7. Support work. To maintain control of work at all times, it is necessary that material be level with cutting surface.
8. Wear proper apparel. Do not wear loose clothing or jewelry. Do not wear a tie or gloves. These items can get caught in the moving parts of the machine.
9. Do not over-reach. Keep your proper footing and balance at all times.
10. Maintain your machine in top condition. Use proper blades. Clean machine weekly for proper maintenance.
11. Keep work area clean. Cluttered areas, benches and slippery floors invite accidents.
12. Avoid dangerous environments. Keep work area well illuminated.
13. Wear ear protection if exposed to long periods of very noisy shop operations.
14. Keep visitors away. All visitors should be kept a safe distance from work area.
15. Do not force the machine. The saw will do a better job and be safer to operate at the speed for which it was designed. Forcing the saw can be very hazardous to the operator.
16. Use recommended accessories. Use of other accessories may be hazardous. Use this instruction manual or consult CTD for the proper accessories available.
17. Do not drown the blade using a steady stream of coolant when cutting non-ferrous materials. only spray the work to cool it.
18. Be sure to use the proper blade for the particular material to be cut.
19. Disconnect power cord before adjusting, servicing, and before changing belts, or for installing accessories.
20. Safety is a combination of operator *COMMON SENSE* and *ALERTNESS* at all times when the machine is being used.
21. ***WARNING!!!*** *DO NOT ALLOW FAMILIARITY (GAINED FROM FREQUENT USE OF YOUR SAW) TO DULL YOUR AWARENESS!! ALWAYS REMEMBER THAT A CARELESS FRACTION OF A SECOND IS SUFFICIENT TO INFLICT SEVERE INJURY!!*

How to operate the D20R:

Before operating the machine, please read the "SAFETY INSTRUCTIONS TO THE OPERATOR". Other important information and features need to be learned before operating the machine.

Rotation:

Both blades must rotate to the rear of the machine on the underside of the blades (see Diagram "D" on Page No. 5).

Blade Guard:

It is important that the Finger Guards, P/N 20F180 are adjusted to completely cover the blade. The finger-guards, attached to the finger guard support should be positioned around the material to give maximum operator protection. When the saw arm is lowered, the lower blade guard rotates up into the main blade guard. The blade continues through the work as the lower blade guard rotates up. ***NEVER remove any blade guard part, exposing the blade.***

This label is attached to the blade guards. ***NEVER PUT HANDS OR FINGERS NEAR OR UNDER THE MOVING BLADE!!***

Use a piece of wood to remove short pieces from saw.

Cutting: (see Diagram "J" & "K")

The D20R Fixed Single Double Mitre Saw operates by making one 45° cut at a time. To make the first cut on a stick length:

1. Feed the material to the centerline of the machine so that ***ONLY*** the *left blade* makes a trim cut. Hold material with left hand, or adjustable clamp and pull down saw with right hand. Be careful not to overfeed beyond the centerline of the machine, as you will be wasting material.
2. After making the trim cut, feed the material (now with a 45° mitre cut) to the stop at the desired length. If using a Rabbet Gage, slide angle under rabbet of moulding and move moulding to desired dimension. Move outside stop to same position and lock (see Diagram "K").
3. Hold material with right hand against stop and pull down saw with left hand. Remove cut-off piece. Feed back to left blade and repeat procedure from Number 1.

Diagram "J"

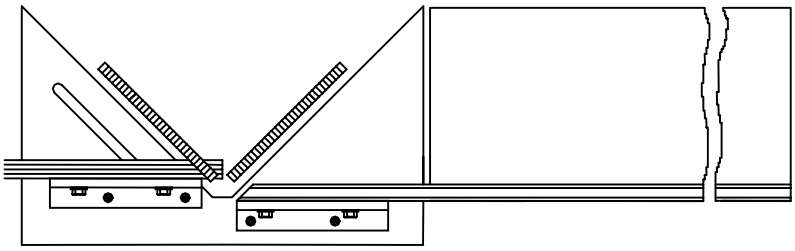
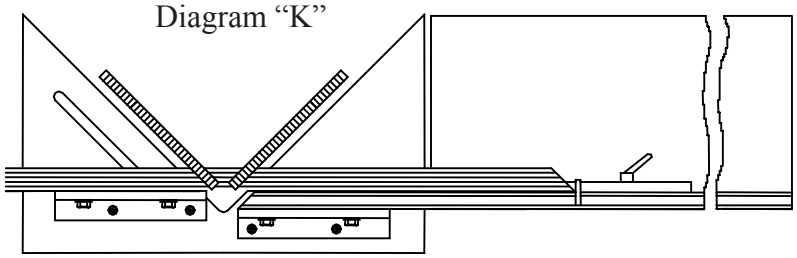


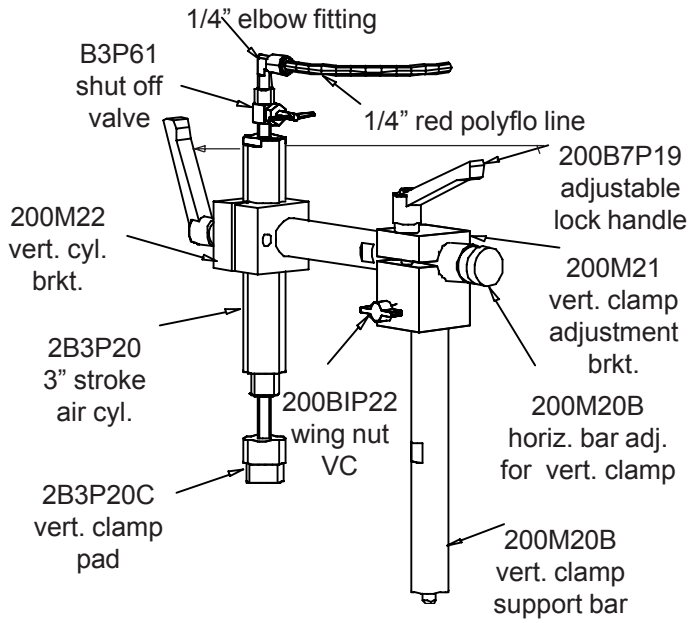
Diagram "K"



Hand Operated Machines and Cutting Speed:
The blade is rotating at approximately 3700 RPM. When moving the blade through the material, the blade must ***NEVER*** be allowed to dwell in the work. If fine finishes are required:
1. Use a sharp blade. **Do Not Force the Cutting Action,** causing the motor to stall.
2. Use a ***constant, even pressure*** when cutting through material.

Spring Return:
Each sawhead is equipped with a drawbar return spring. The function of the spring is to return the sawhead to the rest position upon release of the handle. **Do not adjust the spring pressure.** If the spring breaks, **Replace It Immediately!** *Make sure spring is attached properly (see Diagram "D" on Page No. 5) and* **Never use a hand operated machine without the return spring in place.**

Clamping and Work Slippage:
The work must never be allowed to move or vibrate as it is being cut. When the work is positioned against a stop, it must be clamped either by hand holding or by pneumatic air clamps. Never allow unclamped work between the blade and the stop, as the blade can grab the material and throw it—thereby causing damage to the blade, the machine, and possibly harming the operator. CTD offers Vertical Clamps as an optional accessory. Vertical Clamps hold the material down, against the table base. The clamps are actuated at the same time as the saw heads by pulling down the sawhead. Check your material for squareness, using a 90° square. Material that is out of square will move when it is cut, thereby causing irregular mitres. See "IRREGULAR MITRES", Page No.12 Additional tooling may be needed. Consult factory for information.



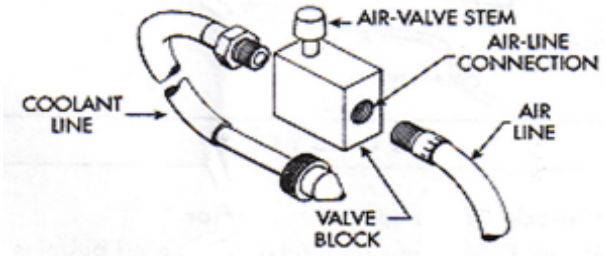
Cutting Wood:
While wood is generally soft and simpler to cut than aluminum, it requires that the material be held in place as the blades pass through the material. CTD suggests using a Carbide Blade with an Alternate Top Bevel (ATB) for lighter wood sections and picture frame mouldings. This type of blade gives the finest of finishes. No *ONE* blade will cut all material perfectly. High laquers or mica mouldings require a special modified blade for best results. Consult factory. *Never use a* ***wood*** *blade to cut* ***aluminum,*** as it will chip and fracture the carbide tips of the blade.

Cutting Plastic:
Plastic can be cut as easily as wood on the D20R. However, because of its elastic properties, the material can deflect as the blades pass through. Therefore it is important to clamp the material as close as possible to the blade and support it by use of fixtures. Additional tooling may be required. Special blades are required for cutting polystyrene. Consult the factory for the best blades.

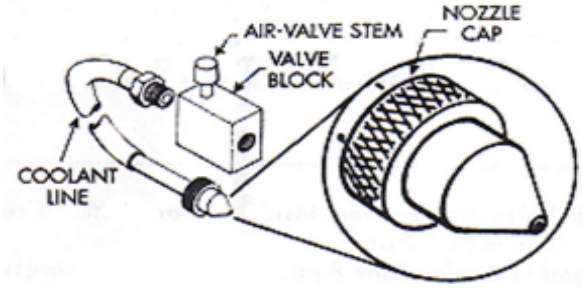
Cutting Aluminum:
As with cutting any material, it is important that aluminum be clamped properly. Precision blades are required for accurate cutting. CTD suggests and uses a Triple Chip Grind on all its non-ferrous Carbide Blades. When cutting aluminum, or other non-ferrous materials, it is essential that the blades be lubricated with a Sawblade Lubrication System or other blade lubricating system for the finest finish. See **Sawblade Lubrication System** below for more details. A wax stick can also be used to lubricate the blades.

Combination Blades:
Any combination blade is basically an aluminum cutting blade. Significant blade life in between sharpenings will be lost if a blade is used for cutting both aluminum and wood. The amount of production for either wood or aluminum should be the determining factor in the assessment of the particular blade type to be used. Please consult factory.

Sawblade Lubrication System:
The Sawblade Lubrication System is used when cutting aluminum or other non-ferrous materials. This system normally uses a Water Soluble Oil mixture of *10 parts water to one part oil.* The system operates by syphoning the lubrication up the line to the spray nozzle. Any air leak will cause inconsistent fluid flow to the spray nozzle.
BE SURE your fluid is free from chips and other debris. A fluid container supplied with the machine contains a One-Way Check Valve, Part No. B3P96 at the end of the clear fluid line. This check valve helps to hold the lubrication in the line, however after a couple of minutes the lubrication or oil will back-flow into the container. Priming of the system may be necessary if the machine has been standing without use. The system may be shut off by closing the toggle valve next to the vacuum pump. The fluid must be clean or the Vacuum Pump will clog.



1. Connect air-line hose to valve block on Coolant Tank.
2. Recommended air pressures: Higher preferred 60 to 125 psi



1. Open Air-Valve approximately one full turn.
2. Close Nozzle Cap until snug at end of Coolant Line, then open Nozzle Cap about 1/4 turn until a fine pin-point spray develops.
3. Once spray is coming out of nozzle final adjustment can be made by turning either or both the Air-Valve knob & Nozzle Cap.
4. The best method of testing the mist spray is to direct the spray into the palm of your hand, and when the spray is frigid cold, it has been properly adjusted.

CTD Bio Lubrication System:

The CTD biodegradable lubrication system operates by pulse spraying a minute amount of biodegradable lubricant directly on to the saw tooth of the blade in time-measured increments. The majority of the lubricant then dissipates with the heat of the cutting action. Chips coming off the blade are hot and dry, and are more easily collected (see specific instructions included with system).

Scrap:

The D20R operates by making one 45° mitre at a time. A "V" shaped piece is removed and falls into the dust scrap drawer. Empty the drawer at the end of the day. A 4" dust outlet can be provided as an optional accessory. Dust Collectors are also available for an additional charge.

Preventative Maintenance:

The D20R is a relatively easy machine to operate and maintain. Below is a weekly check list of general maintenance items. The best preventative maintenance advise is to *CLEAN THE MACHINE DAILY,* especially around the pivot points on the machine.

Lubrication and Adjustments of Bearings:

NO LUBRICATION OR ADJUSTMENTS ARE REQUIRED. All CTD cut-off saws are assembled using sealed, prelubricated ball bearings. The spindle and pivot assemblies are constructed using preloaded belleville springs. These springs eliminate the need for adjustments of bearings and also greatly increase the life of these bearings.

General Maintenance Check List:

Always disconnect electrical power and air supply.

1. Keep machine clean—especially around pivot bracket and pivot bearings.
2. Blow off and clean pivot shaft and spindle areas.
3. Remove any scrap pieces and dust build up from inside floor stand cabinet.
4. Check monthly:
    A. For excessive belt wear.
    B. Make sure motor pulley set screws are tight.

Repair and Service:

Always use CTD factory authorized replacement parts and consult factory before making any repairs or adjustments which may be unclear.

Fence Alignment and 45° Angle Adjustment of Blades:

All D20R's are preset at the factory for perfect 45° double mitre cuts. If any adjustments are necessary:

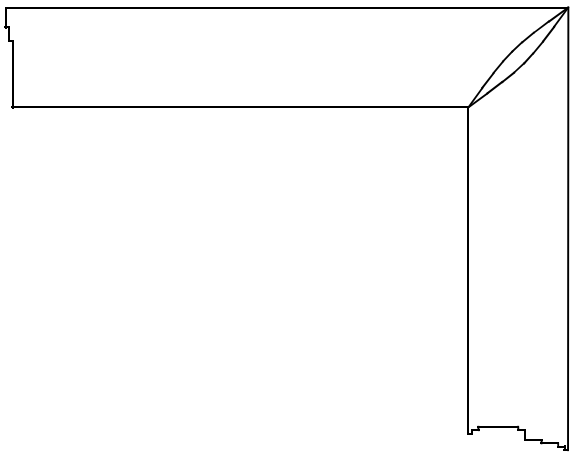
1. Check alignment of front fences—left to right as shown in Diagram "F" on Page No. 4). Use a two foot steel scale or quality precision straight edge and lay flat on table base. Butt edge against fence bracket and long measuring gage. Touch the outside corner of the straight edge. If one side of the straight edge pulls away from the fence, then the long fence gage is not in alignment with the Left Fence Bracket, P/N 20M36L.
2. Loosen 3/8-16 lock nut on Right Fence Bracket, P/N 20M36R and Fence Support Angle, P/N 20M82. Clean all surfaces of dirt or dust, and re-assemble as before.
3 Re-align right fence to left fence with your straight edge. Once you are sure both fences are in alignment, you now have a reference point to check your 45° mitre.

Consult factory before making any adjustments to the pivot bracket. If adjustment to the 45° mitre settings are necessary, you will need a precision draftsman's triangle. Check the 45° mitre by placing the triangle against the left fence and in between the gullets or teeth of a Carbide Blade. Touch the triangle against the steel plate of the blade—not against the tips.
If an adjustment is necessary:

A. Loosen the three lock down nuts for the pivot bracket, using 9/16 wrench (see Diagram "D")
B. Adjust angle and tighten three lock down bolts for the pivot bracket.

Irregular Mitres:

Irregular mitre cuts are almost always caused by out-of square material. Check your material with a 90° square and a straight edge. Material that has a high spot on the bottom will move or roll forward as it is being cut (even with pneumatic hold down clamps), thereby causing the blade to cut more on the inside of the moulding than the outside. Another cause of irregular mitre cuts is too thin a plate thickness on blades. Blade plate thickness should be .090 to .100 on 10" blades, and .095 to .110 on 12" blades. Blades will find the easiest avenue to cut through material, and sometimes the blade plate will distort when cutting heavier sections. The drawing below is an example of a cut when blade plate is too thin for the material being cut.



D20R Spindle Assembly and Bearing Installation Instructions:

It is suggested that replacement spindle assemblies be purchased from CTD before disassembling. Old spindles can be returned for bearing replacement and slinger refacing for a nominal fee. The D20R spindle assembly provides for a "slip-fit" between the outer races of the bearing and the housing or arm casting, and a "press-fit" between the inner race and the spindle. Great care must be taken with ball bearings or the life of the bearings will be reduced. Disconnect power and air supply to the machine.

To remove the spindle assembly:

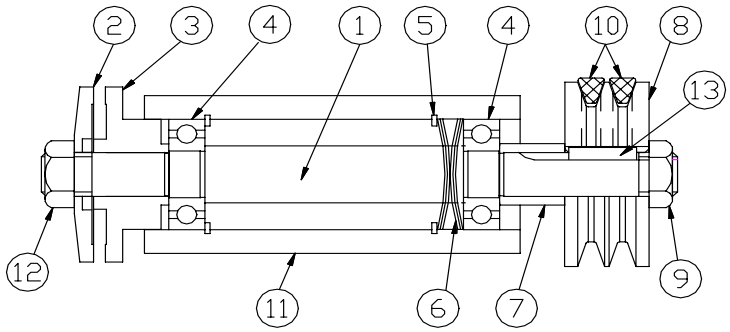
A. Remove belts:
   1. Twist belt inside out by hand while rotating forward over spindle pulley.
   2. Once belt is inside out, pull belt off while rotating around pulleys.
   3. Repeat the same procedure for second belt. (Repeat Step No. 1 & 2.)

   An alternative method is to loosen the motor.
B. Remove Spindle Pulley Nut #9 by holding pulley or slinger. Loosen set screws in pulley.
C. Remove Pulley #8, Pulley Key #13, and Spindle Spacer #7. Place Pulley Nut #9 back onto spindle to protect threads.
D. With a soft hammer or rubber mallet, gently drive spindle towards blade side. Take care to protect pivot bearings by holding arm casting on blade side to overcome effects of hammer blows.
E. Remove Pulley Nut #9, again.
F. Spindle assembly, consisting of Spindle #1, Slinger #3, and Blade Bearing #4 will come out of housing. Outside bearing will slip out of housing. If a replacement spindle assembly was purchased, go to item "L".
G. If bearing on the blade side must be replaced, an arbor press must be used to disassemble the bearing and the slinger from the spindle. Great care must be used in disassembling, or the spindle will be scored or stripped by the slinger. Before pressing apart, scribe a line on the face of the spindle and the slinger so that they will be re-assembled in exactly the same position in relation to each other. Use an arbor press or pulley puller.
H. Press off slinger and bearing from spindle.
I. Press new bearing on to spindle, making sure spindle is square to the bore.
J. Replace slinger, as above, making sure scored lines match.
K. The face of the slinger must be checked to make sure the face (next to the blade) is running true. If it is not running true, it should be refaced. Slinger should indicate < .001. To reface:
   1. Partially assemble pulley bearing on spindle.
   2. Hold outer races of both bearings gently in a vise.
   3. Use the side of a surface grinder wheel to dress the face of the slinger by rotating spindle in bearings slowly against the direction of the grinding wheel.
L. Clean bearing hole and slip new spindle assembly into arm casting up to snap ring. From the opposite side of the arm, make sure that belleville springs #6 are assembled in housing as shown in Diagram on Page No.18.
M. To re-assemble spindle assembly, slide outside bearing #4 onto the spindle as far as it will go, being careful that bearing goes into housing square.
N. Slide pulley onto shaft with pulley key and spacer.
O. Hold slinger or spindle nut. Replace jam nut on spindle threads and slowly tighten pulley jam nut. This will push bearing onto shaft. Tighten thoroughly.
P. To replace belts, reverse procedure under section "A" above. If motor was moved, the centerline of the motor shaft and spindle must be parallel. Both pulleys must be in line or belts will not wear evenly. This should be checked by placing a straight edge across both pulleys. Tighten motor.
Q. Belt tension is of critical importance. To obtain proper tension, press down on top of belts with moderate amount of pressure. Belts should deflect approximately 1/4".
R. Tighten set screw in both pulleys. To check assembly after tightening belts, apply pressure in the direction of the blade on the pulley nut. A slight spring pressure should be felt. If spindle does not spring back, the belts may be too tight.

D20R SPINDLE ASSEMBLY

No.	Description	Part No.	No.	Description	Part No.
1.	Spindle, Left Hand Side@	2BM02R	10.	3V335 Drive Belt,	2B4P25
	Spindle, Right Hand Side@	2BM02L		(2 required)	
2.	Flange	200BM03	11.	D20 Arm, Left	200BC01R
3.	Slinger	200BM04		D20 Arm, Right	200BC01L
4.	Bearing (2 required)	2B2P05	12.	Spindle Nut, Right Thread	2B1P36
5.	Snap Rings (2 required)	2B2P06		Spindle Nut, Left Thread	2B1P37
6.	Preload Belleville Springs (4 required)	2B2P07	13.	Pulley Key	2BM23
7.	Spindle Spacer	2BM05	14.	Spindle Assembly, Left*	200BE21L
8.	Spindle Pulley	2B4P23		Spindle Assembly, Right*	200BE21R
9.	Pulley Jam Nut, Left	151P16L	*consists of Items No. 1 - 9 with precision ground Slinger		
	Pulley Jam Nut, Right	151P16R			

@Side is defined by looking at the machine from the front

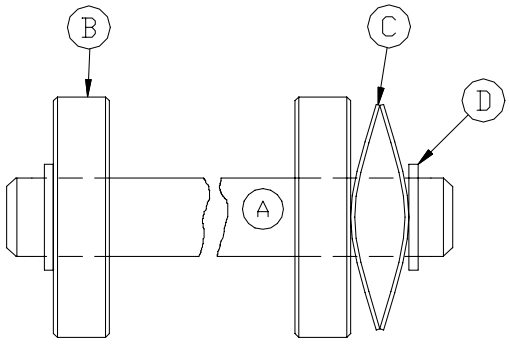


D20R SERIES PIVOT SHAFT ASSEMBLY

Assemble preload springs back-to-back as shown.

Pivot Shaft Parts	Part No.
A. Pivot Shaft	P/N 3BM08
B. Pivot Bearing**	P/N 2B2P05
C. Pivot Belleville Spring**	P/N 3B2P10
D. Pivot Snap Ring**	P/N 3B2P11

**2 required



Motor Warranty:

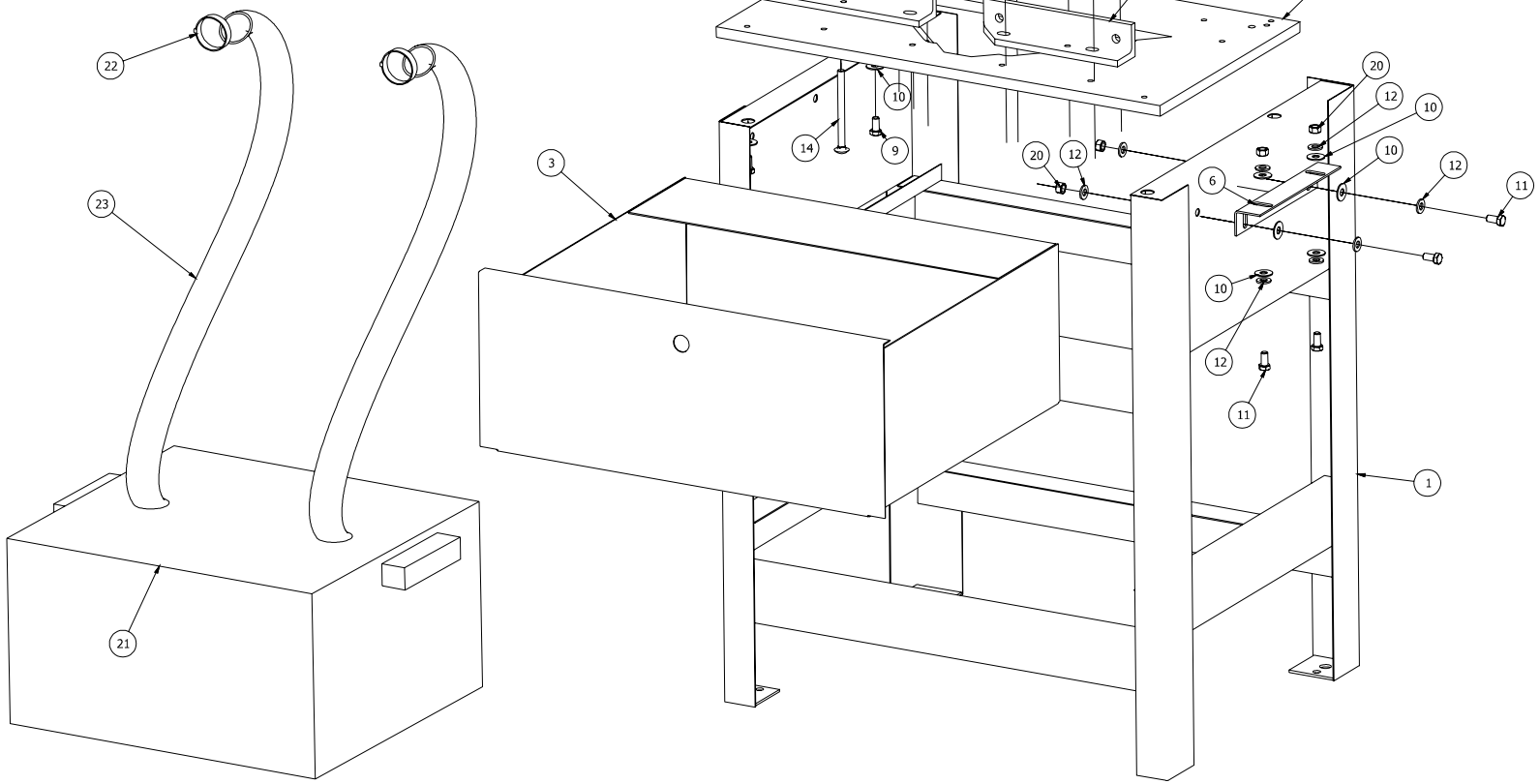
Motors which fail during the warranty period of one (1) year must be returned to an authorized Baldor Service Representative for examination to determine whether the failure was caused by manufacturing. In the event a replacement is required before factory examination, a motor will be sold at the list price. If the factory authorizes replacement, CTD will credit customer's account for the replacement cost. All motors are shipped F.O.B. CTD, Los Angeles, CA. Plant.

Guarantee:

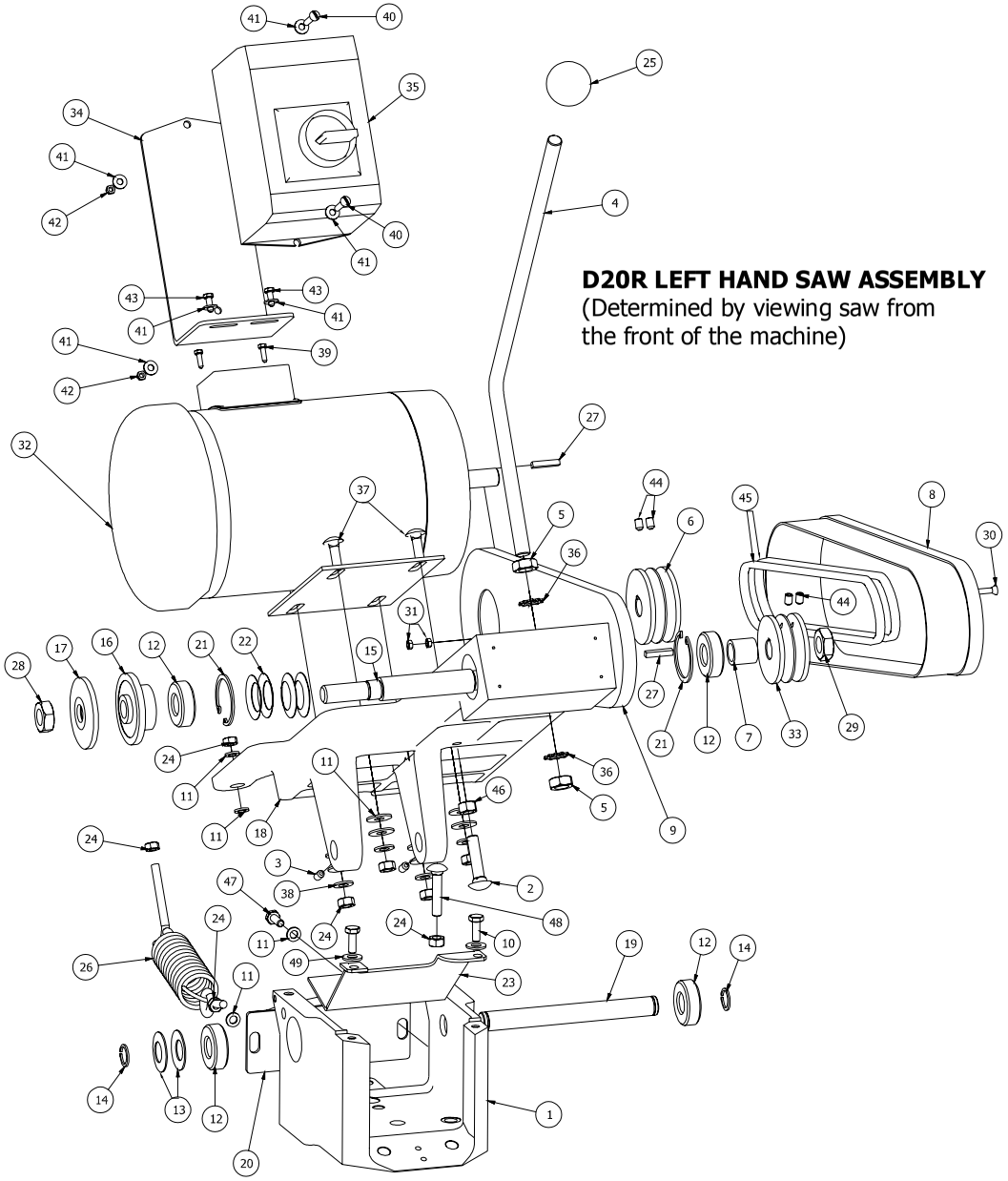
CTD warrants that their cut-off machines and accessories are free from defect of material, workmanship, and title, and are of the kind of quality indicated and described in applicable specifications. The foregoing warranty is exclusive and in lieu of all other warranties, whether written or oral. CTD's obligation under the foregoing warranty is limited to the repair or replacement (at CTD's option) of the part which is defective in materials or workmanship for a period of one (1) year from the date of shipment to the original purchaser. CTD's liability to the purchaser, whether for warranties, negligence, or otherwise, shall not in any way include consequential damages, or costs of removing or re-installing the products. All parts and machines are shipped F.O.B. CTD, Los Angeles, CA. Plant.

FLOOR STAND & BASE ASSEMBLY

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	20F20	Stand Assy
2	1	20M05	Mounting Base
3	1	20F20-10	Drawer
4	1	20M36R	Front Fence Angle (Right)
5	1	20M36L	Front Fence Angle (Left)
6	1	BF05A	Ext. Table Angle Bracket
7	1	20M16	Left Clamp
9	4	3/8-16 x 3/4 Hex Bolt	3/8-16 x 3/4 Hex Bolt
10	20	3/8 Flat Washer	3/8 Flat Washer
11	10	3/8-16 x 1 Hex Bolt	3/8-16 x 1 Hex Bolt
12	8	3/8 SAE Washer	3/8 SAE Washer
13	16	1/4 Flat Washer	1/4 Flat Washer
14	1	3/8-16 x 4.5 Carriage Bolt	3/8-16 x 4.5 Carriage Bolt
15	1	3/8-16 Wing Nut	3/8-16 Wing Nut
16	1	20F150L	Finger Guard Support, Left
17	16	20F180	Finger Guard Strips
18	16	1/4-20 Wing Nut	1/4-20 Wing Nut
19	1	20F150R	Finger Guard Support, Right
20	4	3/8-16 Hex Nut	3/8-16 Hex Nut
21	1	20B7P22	Dust Container
22	2	B7P22	2" Hose Clamp
23	2	B7P20	2" PVC Flex Hose
24	2	20M60	Chip Breaker
25	6	10-32 x 3/8 UNF Flat Head Socket Screw	10-32 x 3/8 UNF Flat Head Socket Screw



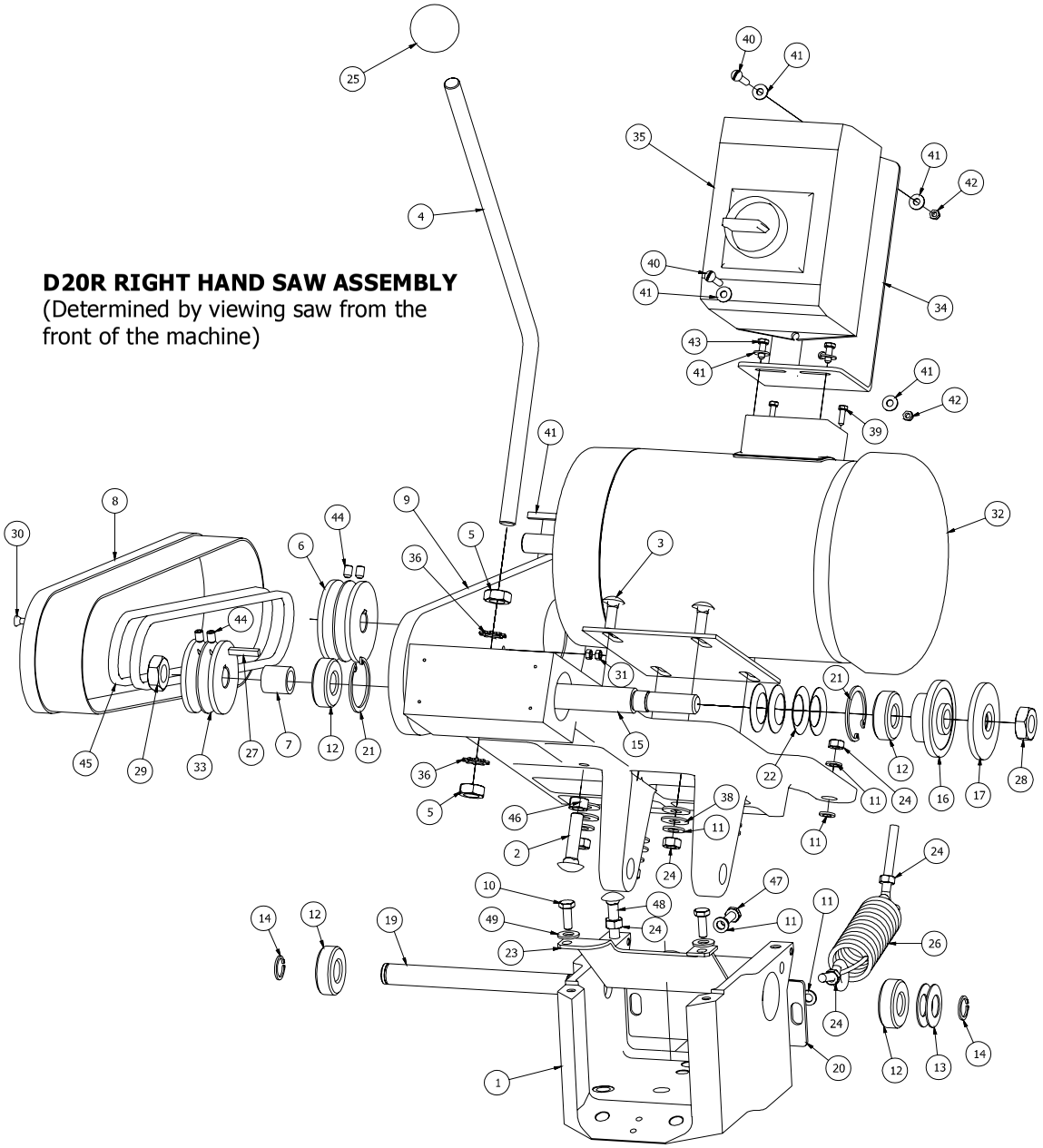
Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	200DC21M	200S Pivot Bracket
2	1	3/8-16 x 1.5 Carriage Bolt	Down Stop Bolt
3	2	1/4-20 x 1/2 Set Screw	Arm/Pivot Lock
4	1	2BM18	Pull Down Handle
5	2	1/2-13 Hex Nut	Handle Lock Nut
6	1	2B4P24	Motor Pulley
7	1	2BM05	Spindle Spacer
8	1	2BF31R	Belt Guard Cover, Right
9	1	2BF29R	Belt Guard Backing Plate, Right
10	2	1/4-20 x 3/4 Hex Bolt	1/4-20 x 3/4 Hex Bolt
11	12	5/16 Washer	5/16 Washer
12	4	2B2P05	Spindle / Pivot Bearing
13	2	3B2P10	Pivot Belleville Spring
14	2	3B2P11	Pivot Snap Ring
15	1	2BM02R	200S Spindle, Right
16	1	200BM04	200S Slinger
17	1	200BM03	200S Flange
18	1	200BC01R	200S Arm, Right
19	1	3BM08	Pivot Shaft
20	1	200F45A	2" Dust Outlet
21	2	2B2P06	Snap Ring Spindle
22	4	2B2P07	Preload Belleville Spring Washer
23	1	200F22	Dust Deflector
24	8	5/16-20 Hex Nut	5/16-20 Hex Nut
25	1	2B7P17	Hand Knob, Handle
26	1	200B7P16E	Return Spring Assy.
27	2	2BM23	Pulley/Spindle/Motor Key
28	1	2B1P37	Spindle Nut, Left Thread
29	1	151P16R	Pulley Jam Nut, Right
30	1	10-32 x 2.5 Slotted Flat Head Mach. Screw	Belt Guard Bolt
31	2	10-32 Hex Nut	Belt Guard Lock Nuts
32	1	2B6S01	Motor 1 HP 1 Phase
33	1	2B4P23	Spindle Pulley
34	1	200BF96	Manual Overload Starter Bracket
35	1	Manual Overload Starter	Manual Overload starter
36	2	1/2 Tooth Lock Washer	Handle Lock Washer
37	4	5/16-18 x 3/4 Carriage Bolt	Motor Mount Bolt
38	4	5/16 SAE Washer	5/16 SAE Washer
39	2	10-32 x 1/2 Hex Bolt	10-32 x 1/2 Hex Bolt
40	2	10-32 x 3/4 Slotted Rd. Head Mach. Screw	10-32 x 3/4 Slotted Rd. Head Mach. Screw
41	6	10 Washer	10 Washer
42	2	10-32 Hex Nut	10-32 Hex Nut
43	2	10-32 x 1/2 Hex Bolt	10-32 x 1/2 Hex Bolt
44	4	1/4-20 x 3/8 Set Screw	1/4-20 Set Screw for Motor/Spindle Pulley
45	2	2B4P25	3V335 Drive Belt
46	1	3/8-16 Hex Nut	3/8-16 Hex Nut
47	1	5/16-18 x 1/2 Hex Bolt	5/16-18 x 1/2 Hex Bolt
48	1	5/16-18 x 1.5 Carriage Bolt	Up Stop Bolt
49	2	1/4 Washer	1/4 Washer



D20R LEFT HAND SAW ASSEMBLY
(Determined by viewing saw from the front of the machine)

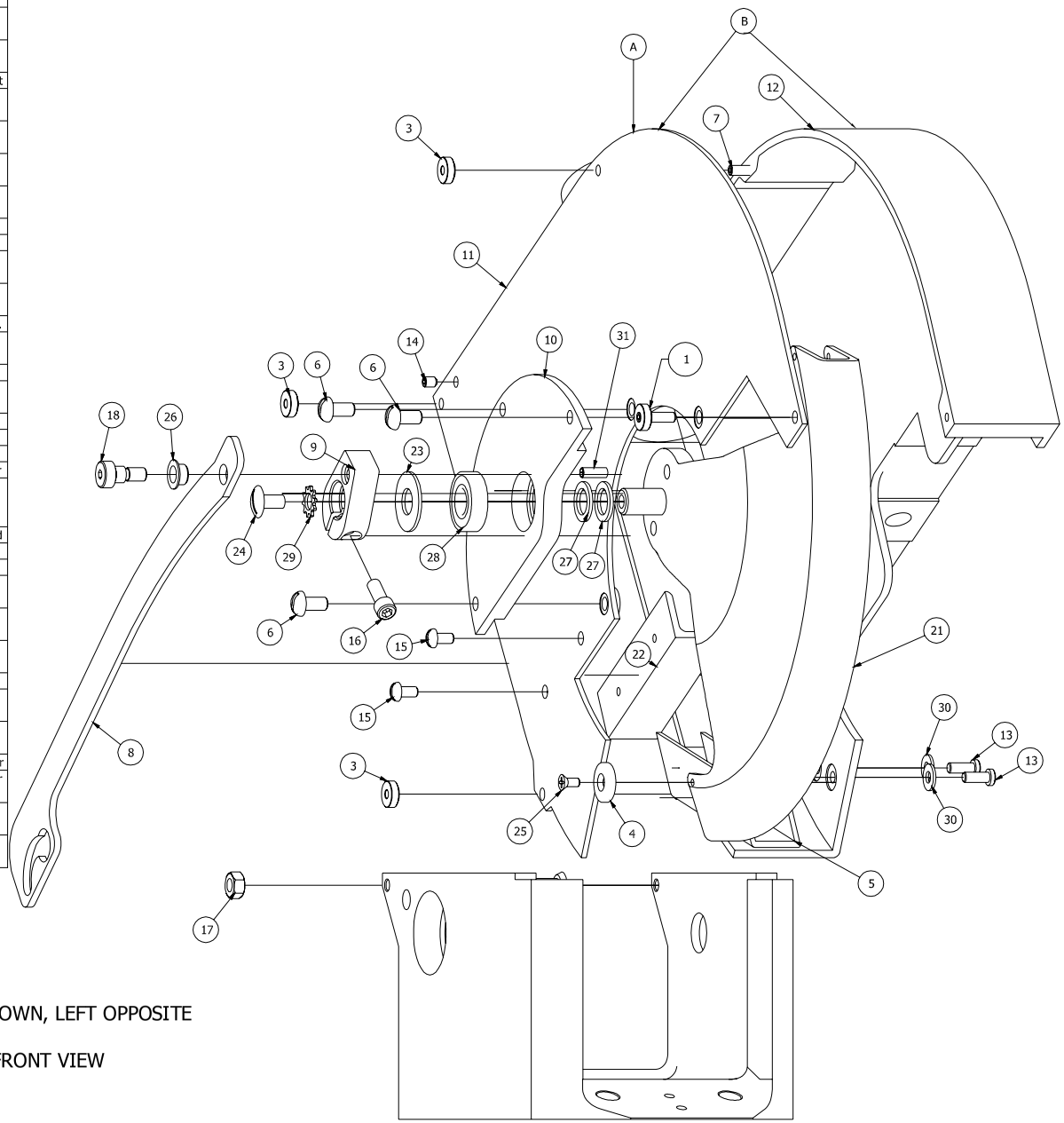
Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	200DC21M	200S Pivot Bracket
2	1	3/8-16 x 1.5 Carriage Bolt	Down Stop Bolt
3	2	1/4-20 x 1/2 Set Screw	Arm/Pivot Lock
4	1	2BM18	Pull Down Handle
5	2	1/2-13 Hex Nut	Handle Lock Nut
6	1	2B4P24	Motor Pulley
7	1	2BM05	Spindle Spacer
8	1	2BF31L	Belt Guard Cover, Left
9	1	2BF29L	Belt Guard Cover, Left
10	2	1/4-20 x 3/4 Hex Bolt	1/4-20 x 3/4 Hex Bolt
11	8	5/16 Washer	5/16 Washer
12	4	2B2P05	Spindle / Pivot Bearing
13	2	3B2P10	Pivot Belleville Spring
14	2	3B2P11	Pivot Snap Ring
15	1	2BM02L	200S Spindle, Left
16	1	200BM04	200S Slinger
17	1	200BM03	200S Flange
18	1	200BC01L	200S Arm, Left
19	1	3BM08	Pivot Shaft
20	1	200 F45A	2" Dust Outlet
21	2	2B2P06	Snap Ring Spindle
22	4	2B2P07	Preload Belleville Spring Washer
23	1	200F22	Dust Deflector
24	8	5/16-20 Hex Nut	5/16-20 Hex Nut
25	1	2B7P17	Hand Knob, Handle
26	1	200B7P16E	Return Spring Assy.
27	2	2BM233	Pulley/Spindle/Motor Key
28	1	2B1P37	Spindle Nut, Right Thread
29	1	151P16L	Pulley Jam Nut, Left
30	1	10-32 x 2.5 Slotted Flat Head Mach. Screw	Belt Guard Screw
31	2	10-32 Hex Nut	Belt Guard Lock Nuts
32	1	2B6S01	Motor 1 HP, 1Phase
33	1	2B4P23	Spindle Pulley
34	1	200BF96	Manual Overload Starter Bracket
35	1	Manual Overload Starter	Manual Overload Starter
36	2	1/2 Tooth Lock Washer	Handle Lock Washer
37	4	5/16-18 x 3/4 Carriage Bolt	Motor Mount Bolt
38	8	5/16 SAE Washer	5/16 SAE Washer
39	2	10-32 x 1/2 Hex Bolt	10-32 x 1/2 Hex Bolt
40	2	10-32 x 3/4 Slotted Rd. Head Mach. Screw	10-32 x 3/4 Slotted Rd. Head Mach. Screw
41	6	10 Washer	10 Washer
42	2	10-32 Hex Nut	10-32 Hex Nut
43	2	10-32 x 1/2 Hex Bolt	10-32 x 1/2 Hex Bolt
44	4	1/4-20 x 3/8 Set Screw	1/4-20 Set Screw for Motor/Spindle Pulley
45	2	2B4P25	3V335 Drive Belt
46	1	3/8-16 Hex Nut	3/8-16 Hex Nut
47	1	5/16-18 x 1/2 Hex Bolt	5/16-18 x 1/2 Hex Bolt
48	1	5/16-18 x 1.5 Carriage Bolt	Up Stop Bolt
49	2	1/4 Washer	1/4 Washer

D20R RIGHT HAND SAW ASSEMBLY
(Determined by viewing saw from the front of the machine)



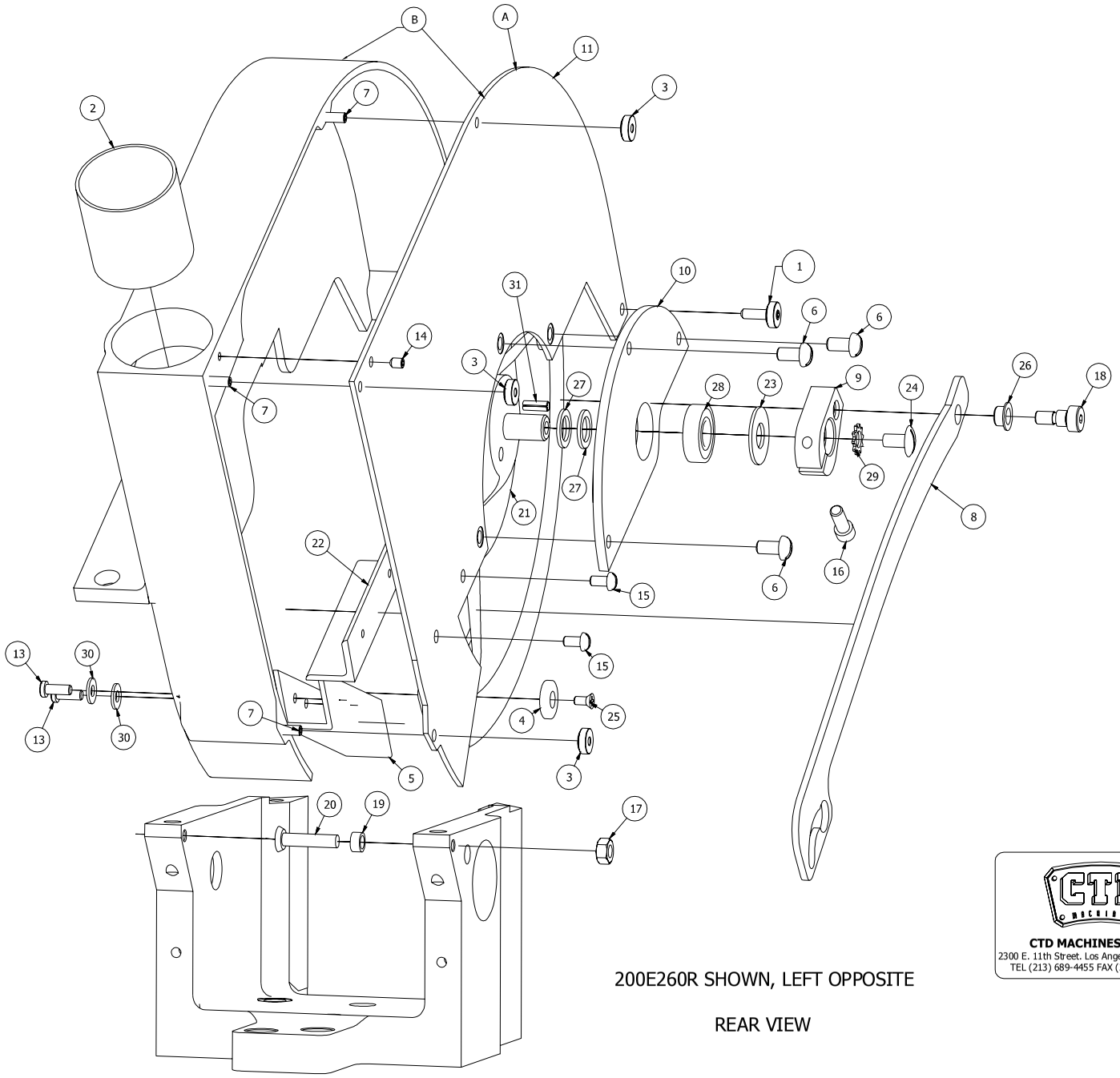
Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	200B1P25A	Blade Guard Cover Knob W/Stud
2	1	200M35	Top Dust Tube Main Blade Guard
3	3	200B1P25	Blade Guard Cover Lock Nut
4	1	200B2P30	Roller Bearing Lower Blade Guard
5	1	200M36R/L	Rear Blade Guard Channel, Rt. or Lt.
6	3	SCRW RHMS 1/4-20 UNC x 1/2	Bearing Housing Bolt
7	3	Set screw 10-32 UNF x 3/4	Blade Guard Cover Locating Studs
8	1	200M320	Blade Guard Link/Puller
9	1	200M261	Rotating Pawl
10	1	200M265R/L	Bearing Housing Blade Guard Assy, Rt. or Lt.
11	1	200F250R/L	Blade Guard Cover, Rt. or Lt.
12	1	200A26R/L	Main Blade Guard, Rt. or Lt.
13	2	SHCS 10-32 UNF x 1/2	Screw Rear Blade Guard Channel
14	1	10-32 UNF x 1/4 Set Screw	Dust Tube Lock Screw
15	2	SCRW RHMS 10-32 UNF x 3/4	Material Deflector Screw
16	1	SCRW 1/4-20 x 5/8 SHCS	Lock screw Pawl
17	1	1/4-20 Hex Nut	Lock Nut Rear Puller Bolt
18	1	5/16-20 x 1/4 Shoulder Bolt	Pawl Shoulder Bolt
19	1	200B7P35	Rear Bushing for Link/Puller
20	1	Flat Head Phil. Undercut Mach. Screw, Plated 1/4-20 x 1	Rear Link Puller Srew
21	1	200A270	Lower Rotating Blade Guard
22	1	200M26	Material Deflector Angle
23	1	200B1P269	Teflon Space Washer
24	1	Truss Head Conb. Mach Screw, Plated 1/4-20 x 3/8"	Pawl & Lower Blade Guard Lock Screw
25	1	8-32 x 3/8" Flat Head Phil. F Thread-Cutting Screw	Roller Bearing Screw
26	1	200B7P36	Front Bushing for Link/Puller
27	2	2BM13	Space Washers for Pin
28	1	2B2P09	Rotation Bearing for Housing
29	1	200B1P268	External Tooth Lock Washer
30	2	10/32 Flat Washer	Rear Channel Screw Washer
31	1	3/16 x 1/2 Zinc Plated Roll Pin	Rotating Blade Guard Upper Stop Pin
A	1	200E250R/L	Lower B.G. Cover Assy, Lt. or Rt. 4,6,8-11,15-30
B	1	200E260R/L	Blade Guard Assy, Lt. or Rt. 1-30

CTD MACHINES, INC.
2300 E. 11th Street. Los Angeles, CA 90021-2817
TEL (213) 689-4455 FAX (213) 689-1255



200E260R SHOWN, LEFT OPPOSITE

FRONT VIEW



200E260R SHOWN, LEFT OPPOSITE

REAR VIEW

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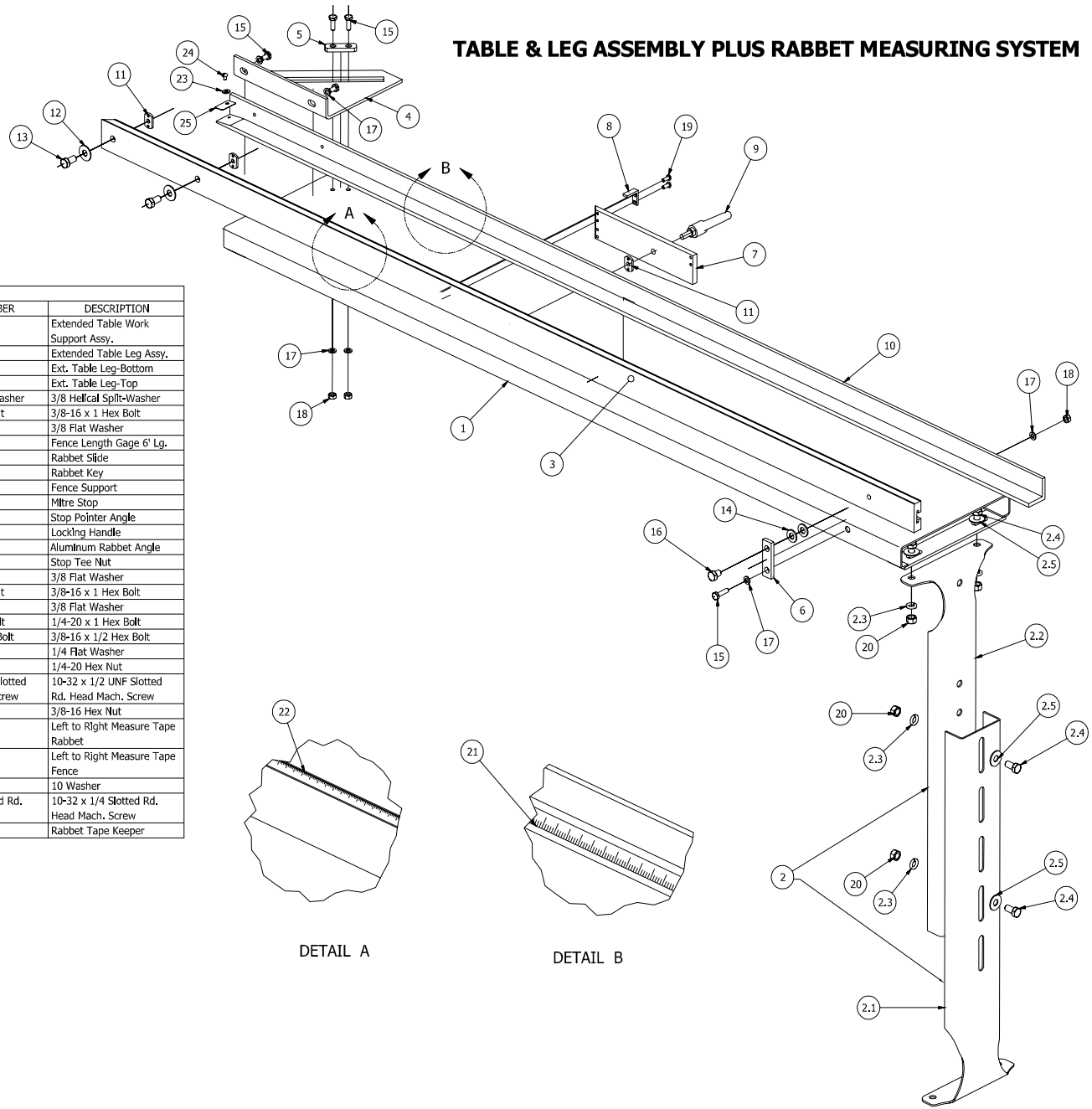
TABLE & LEG ASSEMBLY PLUS RABBET MEASURING SYSTEM



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	BF17	Extended Table Work Support Assy.
2	1	BF180E	Extended Table Leg Assy.
2.1	1	BF180	Ext. Table Leg-Bottom
2.2	1	BF181	Ext. Table Leg-Top
2.3	2	3/8 Helical Split-Washer	3/8 Helical Split-Washer
2.4	4	3/8-16 x 1 Hex Bolt	3/8-16 x 1 Hex Bolt
2.5	6	3/8 Flat Washer	3/8 Flat Washer
3	1	15BM223	Fence Length Gage 6' Lg.
4	1	20M26	Rabbet Slide
5	1	20M31	Rabbet Key
6	1	20M82	Fence Support
7	1	BF38	Mitre Stop
8	1	2BM39	Stop Pointer Angle
9	1	200B7P20	Locking Handle
10	1	15M85A	Aluminum Rabbet Angle
11	3	B1P51618	Stop Tee Nut
12	2	3/8 Flat Washer	3/8 Flat Washer
13	2	3/8-16 x 1 Hex Bolt	3/8-16 x 1 Hex Bolt
14	2	3/8 Flat Washer	3/8 Flat Washer
15	5	1/4-20 x 1 Hex Bolt	1/4-20 x 1 Hex Bolt
16	1	3/8-16 x 1/2 Hex Bolt	3/8-16 x 1/2 Hex Bolt
17	6	1/4 Flat Washer	1/4 Flat Washer
18	3	1/4-20 Hex Nut	1/4-20 Hex Nut
19	2	10-32 x 1/2 UNF Slotted Rd. Head Mach. Screw	10-32 x 1/2 UNF Slotted Rd. Head Mach. Screw
20	4	3/8-16 Hex Nut	3/8-16 Hex Nut
21	1	2D7SL	Left to Right Measure Tape Rabbet
22	1	2D7SLHF	Left to Right Measure Tape Fence
23	1	10 Washer	10 Washer
24	1	10-32 x 1/4 Slotted Rd. Head Mach. Screw	10-32 x 1/4 Slotted Rd. Head Mach. Screw
25	1	15M85B	Rabbet Tape Keeper

CTD MACHINES

2300 E. 11th Street Los Angeles, CA 90021-2817

Tele (213) 689-4455 FAX (213) 689-1255

World Wide Web: http://www.ctdsaw.com

e-mail: ctdsaw@ctdsaw.com