



# GE Motors & Industrial Systems

## DC MAGNET-OPERATED TWO-SHOE BRAKES

### IC9528 AND IC5488

*These instructions do not purport to cover all details or variations in equipment, nor to provide every possible contingency to be met during installation, operation, and maintenance. If further information is desired or if particular problems arise that are not covered sufficiently for the purchaser's purpose, the matter should be referred to GE Motors & Industrial Systems.*

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### WARNING

**Before any adjustments, servicing, parts replacement or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, the POWER SUPPLY MUST BE DISCONNECTED.**

### SAFETY SYMBOL LEGEND

### WARNING

Indicates a procedure, practice, condition, or statement that, if not strictly observed, could result in personal injury or death.

### DESCRIPTION

The IC9528 and IC5488 brakes are spring-set, power-released magnetic brakes intended to operate on the shafts of dc or ac motors. Each brake incorporates a dc magnet which, when energized, over-comes spring pressure to release the brake.

Table 1 shows brake ratings. Figure 1 shows a cutaway view of a typical magnet brake

### INSTALLATION

The brake can be mounted either on the floor or on the motor (necessary bracket must be provided).

To locate the height of the bedplate for the brake, refer to dimension "J" in Table 4. This indicates the necessary height of brake wheel above bottom of brake base. When setting the bedplate, add 1/8 inch to dimension "J" to allow for shimming.

To locate the brake mounting holes, refer to Figure 2. For dimensions "A" and "B" in that drawing, see Table 4. Dimension "Z" is found by using the motor outline together with the brake wheel dimension. See Figure 7 and Table 4 for additional instructions.

Brake wheels that are furnished completely machined by General Electric Company (GE) are balanced before shipment. If any machining is done on the brake wheel, it should be balanced before further use.

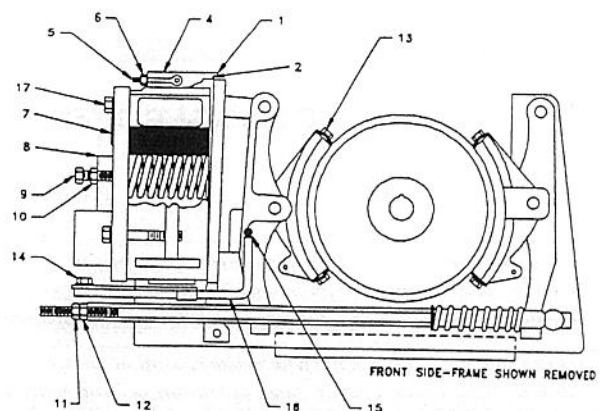
**MOUNTING THE WHEEL**

Assemble the brake wheel to the motor shaft before setting the brake in position. For straight bore wheels, press the wheel on the shaft to the point where the recessed hub face is aligned with the end of the motor shaft. For taper bore wheels, place the wheel on the motor shaft and fasten in place with the nut and locking device furnished with the motor.

Table 1. Torque Ratings

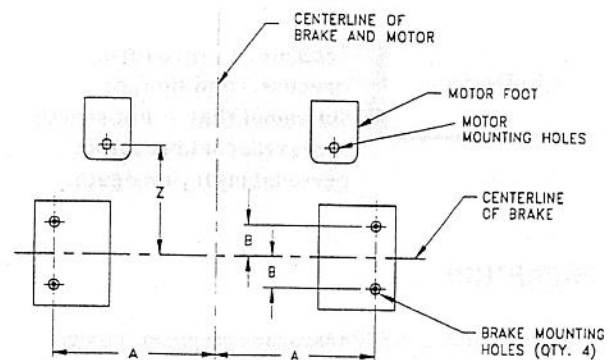
Brake IC9528 or IC5488	Torque Rating in Lb-ft				
	Series-wound		Shunt-wound		
	30-min	60-min	60-min	Continuous	
				*	**
-A & -D100	100	65	100	100	75
-A & -D101	200	130	200	200	150
-A & -D102	550	365	550	550	400
-A & -D103	1000	650	1000	1000	750
-A104	2000	1200	2000	2000	1500
-A105	4000	2600	4000	4000	3000
-C & -E100	115	75	115	115	85
-C & -E101	235	165	235	235	175
-C & -E102	630	420	630	630	460
-C & -E103	1150	770	1150	1150	850
-C104	2650	1750	2650	2650	1900
-C105	4800	3200	4800	4800	3500

\* With shorting contactor  
 \*\* Without shorting contactor



- 1. Indicating point
- 2. Indicating point
- 3. Armature indicator
- 4. Gap indicator
- 5. Manual release bolt
- 6. Locknut
- 7. Torque gage (not included on some models)
- 8. Spring block
- 9. Torque adjusting screw
- 10. Locknut
- 11. Locknut
- 12. Magnet gap adjuster
- 13. Lining bolts
- 14. Shoe-clearance clamping bolt
- 15. Pivot in yoke arm screw
- 16. Adjustable pivot
- 17. Backplate bolt

Figure 1. Cutaway View of Magnetic Brake



For A and B dimensions, refer to Table 4.

Figure 2. Top View of Bedplate Showing Location of Brake Mounting with Respect to Motor Mounting Holes

## MOUNTING THE BRAKE

The brake can be located either on the floor or on a motor bracket by using the alignment holes (see Figure 7). Before tightening the brake mounting bolts, locate the brake vertically and horizontally within 0.12 inches of the shaft centerline. Then set the brake with the linings clamped firmly on the wheel to ensure that the brake is mounted at right angles to the shaft on which the wheel is mounted.

Using shims, adjust height so that a straight edge connecting the two alignment holes in the frame (see Figure 7) passes through the center line of the motor shaft. Position the brake so that a plumb bob dropped from the center line of the motor shaft is in line with the aligning hole in the base of the brake. The shoe clearance clamping bolt and the manual release nut must be released to set the brake.

## BRAKE LINING WEAR-IN PROCEDURES

Before operating the equipment, the brake linings must be worn in so that at least 85% of the lining surface is in contact with the brake wheel. The brakes can be worn in either by operating the brake with equipment under no load and making emergency stops or by adjusting the manual release nut so the brake linings are lightly dragging against the rotating brake wheel. Care must be taken to limit brake wheel temperature to 100 °C during this period. After inspecting the linings to assure 85% contact, the brake should be operated under light load prior to using the equipment at its rated load.

### NOTE

When inspecting brake linings, mark the linings so that they can be replaced in the same position as they were prior to removal.

Check the brake magnet gap periodically to ensure that the brake is adjusted and set to deliver the desired torque. After lining wear-in is accomplished, the wheel and linings should be decontaminated by applying a mild acetic acid solution (vinegar) to the wheel while rotating the wheel slowly with the brake linings dragging lightly against the rotating wheel.

## MAGNET GAP ADJUSTMENT

After mounting the brake, loosen the manual release mechanism by loosening the locknut (Figure 1, item 6) on the manual release bolt (5), and swing the manual release bolt to normal position over the back of the magnet. Check the position of the released armature on the gap indicator (4). Magnet gap is correct when the inner face of the armature indicator (3) lines up with the outer face of indicating point (2).

To adjust armature gap, loosen shoe-clearance clamping bolt (14) and locknut (11). Turn magnet-gap adjuster (12) clockwise or counterclockwise as required. Tighten locknut (11) and shoe-clearance clamping bolt (14) after adjustment. (See page 6 for self-adjusting option.)

## TORQUE ADJUSTMENT

Set the brake spring for the torque required by the application. Typically the torque should be approximately equal to the motor full-load torque. (A torque gage (Figure 1, item 7) was provided with the earlier models of the brake.) Table 2 contains a supplementary list of adjustment values that can be used for setting the torque bolt by use of a measurement scale.

To set the brake spring for a given torque value, turn the torque adjusting screw (9) in or out until the distance from the head of the screw to the spring block (8) is that indicated on the gage (if provided) or in Table 2. Tighten the torque adjusting screw locknut (10) after adjustment.

If the full-load torque of a motor is not known it can be determined from the following formula:

$$\text{Torque}(lb - ft.) = \frac{5250 \times hp}{FL\text{speed}(rpm)}$$

Braking torque as calculated by the above method is based upon linings being "worn-in" sufficiently to obtain at least 85% surface contact with the brake drum.

## EQUALIZING SHOE CLEARANCE

Equal clearances between shoes and wheel are obtained by an adjustable pivot arm (Figure 1, item 16), which is repositioned each time adjustment for magnet gap is made. (See page 6 for self-adjusting option.)

Table 2. Torque Adjustment, IC9528 and IC5488 Brakes

Torque Lb-ft	Spring Setting Inches	Torque Lb-ft	Spring Setting Inches	Torque Lb-ft	Spring Setting Inches	Torque Lb-ft	Spring Setting Inches	Torque Lb-ft	Spring Setting Inches	Torque Lb-ft	Spring Setting Inches
-A & -D100		-A & -D101		-A & -D102		-A & -D103		-A104		-A105	
100	15/16	200	15/16	550	1-3/32	1000	1-21/32	2000	2	4000	2-15/32
75	1-1/8	150	1-1/8	400	1-11/32	750	1-7/8	1500	2-3/16	3000	2-21/32
65	1-7/32	130	1-7/32	365	1-13/32	650	1-15/16	1300	2-9/32	2600	2-3/4
50	1-11/32	100	1-11/32	300	1-1/2	500	2-1/16	1000	2-13/32	2000	2-27/32
40	1-7/16	75	1-7/16	275	1-9/16	375	2-5/32	750	2-1/2	1500	2-15/16
25	1-9/16	50	1-9/16	200	1-11/16	250	2-9/32	500	2-5/8	1000	3-1/32
-C & -E100		-C & -E101		-C & -E102		-C & -E103		-C104		-C105	
115	15/16	235	15/16	630	1-3/32	1150	1-21/32	2650	1-7/8	4800	2-7/16
85	1-5/32	175	1-1/8	460	1-11/32	850	1-7/8	1900	2-5/32	3500	2-21/32
75	1-7/32	165	1-5/32	420	1-13/32	770	1-15/16	1750	12-3/16	3200	2-23/32
65	1-5/16	125	1-5/16	320	1-9/16	575	2-3/32	1300	2-3/8	2500	2-27/32
50	1-7/16	100	1-7/16	250	1-11/16	460	2-3/16	1000	2-1/2	2000	2-15/16
30	1-11/16	60	1-5/8	160	1-7/8	300	2-11/32	600	2-21/32	1250	3-1/16

**CONNECTIONS**

*Shunt-wound brakes* require the use of a separately mounted series resistor. The resistor is furnished with the brake when the brake is specified and purchased separately. The resistor is furnished as part of the control panel when the brake and control panel are purchased together. Do not place a separate resistor in the brake circuit if a resistor is provided with a panel.

For 115- to 250-volt systems, the resistor is supplied with taps for 115, 125, 230, and 250 volts. For systems with higher voltages, the resistor furnished is designed to suit the voltage.

The brake nameplate shows the current rating of the coil and the resistance value of the separately mounted resistor. Coil leads are located in a conduit box at the magnet end of the brake.

Shunt-wound brakes will release at 80% of voltage and will operate satisfactorily at 110% of rated voltage.

*Series-wound brakes* are connected in series with the motor as indicated on the wiring diagram of the controller used. Series-wound brakes will release at 40% of rated current or less and will be set at 10% or less.

**MAINTENANCE**

**Lining Wear Adjustment**

Check the gap indicator (Figure 1, item 4) for lining wear periodically. If the edge of the armature indicator (3) lies between the indicating points (2 and 1) on the gap indicator, no adjustment is required. If the edge of the armature indicator (3) extends beyond indicating point (1), the magnet gap is too great and may result in slow release or no release.

To correct for lining wear, loosen the shoe-clearance clamping bolt (14). Then loosen locknut (11) and turn the magnet-gap adjuster (12) clockwise until the edge of the armature indicator (3) lines up with indicating point (2) on the gap indicator (4). Re-tighten locknut (11) and shoe-clearance clamping bolt (14).

Figure 3 shows the lining wear adjustment points for a magnet-up, wall-mounted brake. For this type of brake:

**Wear on both shoes** - No adjustment is required if the edge of the armature indicator (9) lies between the gap indicator (10) and indicating point (11). If edge (9) extends beyond indicating point (11), loosen locknut (3), and turn magnet-gap adjuster (4) clockwise until edge of armature indicator (9) lines up with gap indicator (10). Tighten locknut (3).

**Equalization of shoe and wheel clearance** - With the brake de-energized, the gap between the adjusting nut (2) and backstop (8) should be between  $\frac{1}{16}$  and  $\frac{3}{32}$  inches. This provides approximate equal clearance between both shoes and wheel.

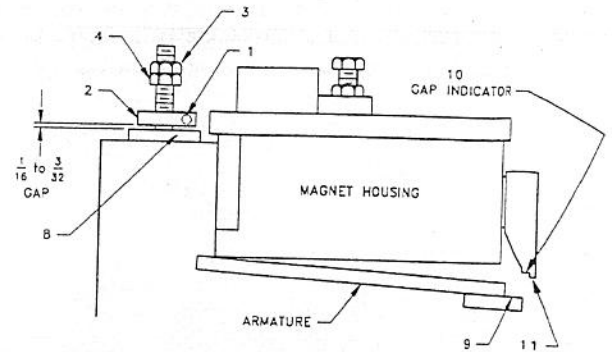
If, due to uneven wear, the equalizing gap has increased or decreased, it should be restored to  $\frac{3}{32}$  inches by loosening locking bolt (1) and turning adjusting nut (2) clockwise or counterclockwise to bring the edge of the armature indicator (9) even with the gap indicator (10).

### Manual Release

To release the brake manually, loosen the locknut (Figure 1, item 6) on the manual release bolt and swing the bolt  $180^\circ$  to engage the slot in the armature. Tighten locknut to draw brake shoes clear of the brake wheel.

### Shoe Lining Replacement

To remove worn linings, release the brake manually as described above and remove lining bolts (Figure 1, item 13) and clamps at the top of each shoe. Using a screwdriver, slide the shoes upward around the brake wheel.



- |                  |                        |                       |
|------------------|------------------------|-----------------------|
| 1. Locking bolt  | 4. Magnet-gap adjuster | 9. Armature indicator |
| 2. Adjusting nut | 8. Backstop            | 10. Gap indicator     |
| 3. Locknut       |                        | 11. Indicating point  |

Figure 3. Lining Wear Adjustment for Magnet-up, Wall-mounted Brakes

As additional clearance is required for the insertion of new linings, turn the magnet-gap adjuster (12) counterclockwise until the opposite end yoke reaches its stop. Continue turning until the rear shoe clears the wheel sufficiently to permit the new linings to be slid into position. Clamp the linings into place and adjust the gap to specified setting.

### Coil Replacement

To replace coil, proceed as follows:

1. Loosen torque adjusting screw (Figure 1, item 9) and remove spring block (8), spring seat located behind spring block, and spring.
2. Remove conduit box and disconnect power leads from terminal leads.
3. Remove four bolts located at each corner of the backplate and remove the magnet assembly from the magnet housing.
4. Remove magnet core (Figure 4, item 2) and spring washer (1) from magnet housing by removing two nuts on opposite side of backplate.
5. Slide new coil into the core, ensuring that spring washer (1) is inserted between the lip of the core and the coil.

6. Assemble backplate onto the core, aligning the core and coil correctly using the two studs on the core and the locating boss on the coil. Check to insure brass shim was re-installed between core and backplate.

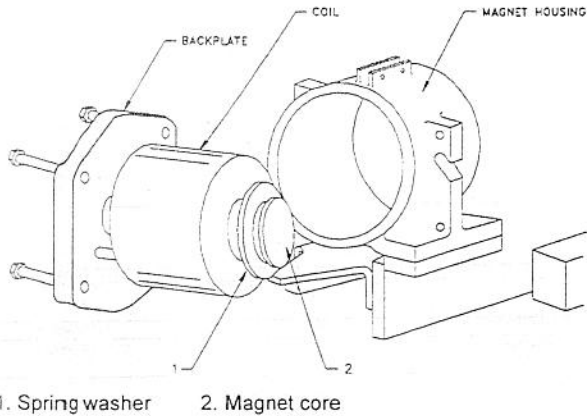


Figure 4. Coil Removal

7. Bolt the magnet assembly onto the magnet housing, and reassemble spring, spring seat, spring block (Figure 1, item 8) and torque adjusting screw (9).
8. Set the torque and magnet gap as described earlier.

**Magnet Housing Removal**

The magnet housing seldom has to be removed. For a coil failure, only the backplate need be removed, as described earlier.

If it does become necessary to remove the magnet housing, first take out the main spring by loosening the torque adjusting screw (Figure 1, item 9) and removing the spring block (8).

To release the magnet housing, remove the four mounting screws that secure the housing to the frame. The complete magnet housing can then be lifted off.

During reassembly, take care to align the magnet housing properly. With the magnet in place, pull the armature up manually by using the manual release bolt (5) until the face of the armature comes in contact with the core in the magnet. Then align the magnet frame on the base so that there is an equal clearance of 5 to 40 mils between the inside face of the armature and the end of the magnet housing. Bolt the frame in place. Fine-threaded bolts are provided to fasten the housing in place. These should be thoroughly tightened to hold the housing securely.

After reassembly, check the location of the magnet gap indicator as shown in Figure 5. With the armature closed, locate the worn magnet gap edge with respect to the armature. If the magnet gap indicator cannot be adjusted to the worn gap dimensions shown in Table 3 due to different tolerances inherent in the new magnet assembly parts, it may be necessary to knock out the drive screw and, after adjusting, to redrill and repin. Maintain the 5 to 40 mils clearance between armature face and housing.

After a final check that the worn gap dimensions in Table 3 can be obtained, reinstall main spring and adjust armature gap as described earlier.

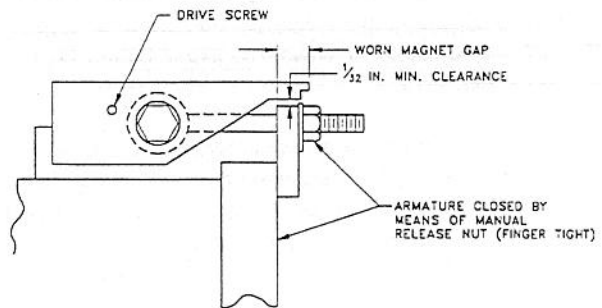


Figure 5. Worn Gap Allowance

Table 3. Worn Gap Allowance

IC9528 or IC5488 Brakes A, C, D, & E	Dimensions in Inches (See Figure 5)
-100	11/32
-101	11/32
-102	11/32
-103	11/32
-104	3/8
-105	3/8

## Magnet Gap Cleaning

If shoe clearance around the wheel becomes reduced or if the shoes drag, remove the ring-shaped shield over the armature and check for accumulation of dirt between armature and core. Blow out accumulated dirt with dry, compressed air. If this is not possible, loosen the magnetic-gap adjuster (Figure 1, item 12) to create enough clearance to insert a hacksaw blade or similar tool and scrape the core and armature clean. Readjust the gap to specified dimensions.

## Wheel Removal

To remove the wheel, release the brake manually as described earlier. The wheel can then be pulled from the motor shaft, or the wheel and motor can be lifted vertically. As the wheel is moved upward, the shoes will pivot and allow the wheel to be lifted clear. After replacing the wheel, loosen the manual release and adjust the magnet gap to the specified dimensions.

## Lubrication

As all moving pins operate in sintered bronze bearings, no lubrication is necessary.

## RENEWAL PARTS

Order renewal parts from the nearest GE Sales Office or authorized GE distributor. Give the complete nameplate catalog number of the brake and describe in detail the part required. Publication GEF-4022G contains renewal parts information for the IC9528 brake, but can also be used for the IC5488 brake.

## SELF-ADJUSTING OPTIONS

### Magnet Gap Adjustment

After mounting the brake, loosen the manual release mechanism by loosening the nut (Figure 6, item 6) on the bolt (5), and swing it to normal position over the back of the magnet. Check the position of the released armature on the gap indicator (4). Magnet gap is correct when the inner face of the armature lug (3) is between the maximum and minimum gap step on the gap indicator (4).

To adjust armature gap at installation, rotate the ratchet wheel clockwise or counterclockwise as required. Thereafter the automatic adjuster will maintain proper magnet gap.

### Equalizing Shoe Clearance

Equal clearances between the shoes and wheel are automatically maintained by controlled sliding of the pivot arm (Figure 6, item 7). A spring (8) provides frictional restraint that is overcome as the brake sets, resulting in shoe centering relative to the wheel.

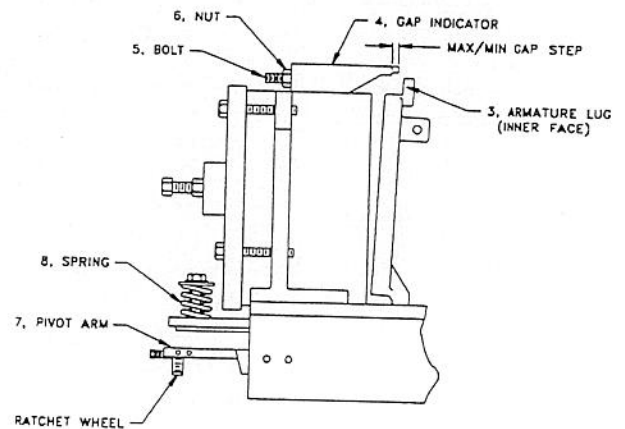


Figure 6. Magnet Gap Adjustment

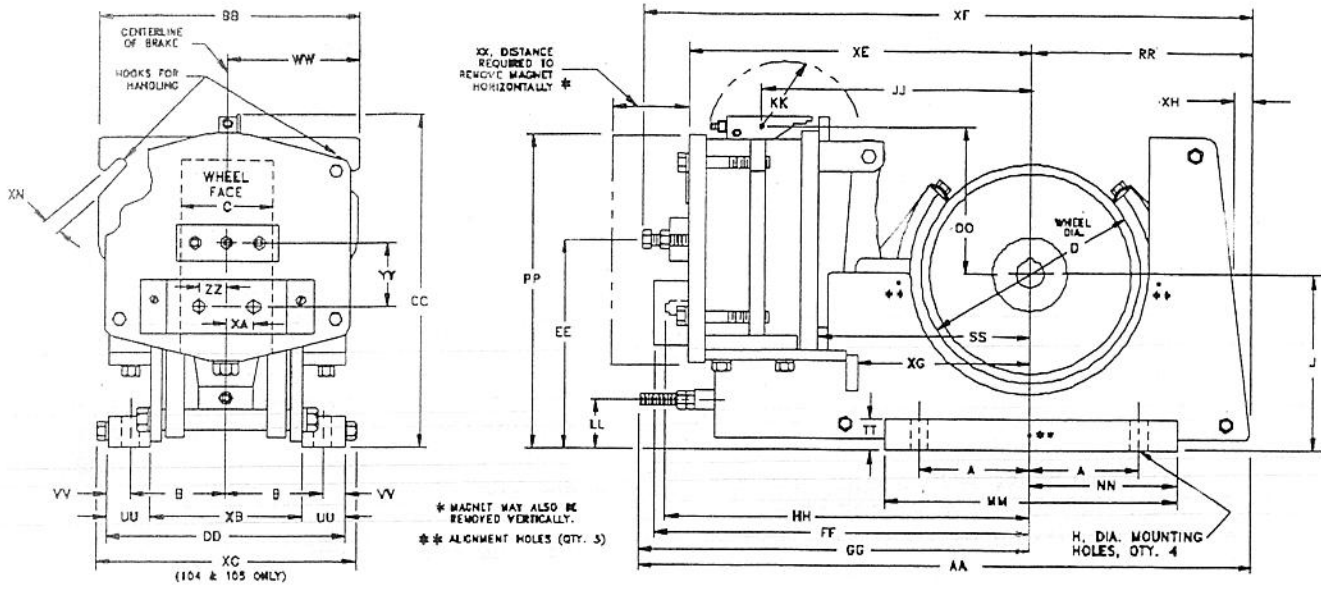


Figure 7. Dc Spring-set, Two Shoe Brakes



Table 4. Dc Spring-set, Two Shoe Brake Dimensions

IC9528 or IC5488 Brakes	Approx. Net Wt. in Lb.		Dimensions in Inches							
	Brake	Wheel	A	B	C	D	H	J	AA	BB
100	175	20	3-1/4	2-7/8	3-1/4	8	11/16	7	27-9/16	10
101	240	35	4	3-1/8	3-3/4	10	11/16	8-3/8	35-5/16	11-1/2
102	390	75	5-3/4	4-1/2	5-3/4	13	13/16	9-7/8	38	13-1/2
103	600	140	7-1/2	5-3/8	6-3/4	16	1-1/16	12-1/8	47-1/8	16-1/2
104	950	245	9-1/4	6-1/2	8-3/4	19	1-1/16	13-1/4	52-1/2	18
105	1965	415	11-3/4	8	11-1/4	23	1-5/16	15-7/8	59-1/8	19-3/4

IC9528 or IC5488 Brakes	Dimensions in Inches									
	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM
100	14-7/8	7-1/2	8-3/4	17-25/32	19-5/16	15-7/16	9-3/16	3-3/4	2-5/16	21-13/16
101	17-3/8	7-3/4	10-3/8	20-13/32	22-1/8	18-1/16	11-11/16	3-3/4	2-9/16	14
102	19-9/16	11	11-5/8	23-19/32	25-3/4	21-1/4	13-9/16	4-1/2	2-1/2	15-1/2
103	23-15/16	13-1/4	14-5/8	28-11/16	31-1/4	25-9/16	17-5/16	4-1/2	3-1/8	21
104	26-7/8	16-1/4	16	33-3/16	34-9/16	29-1/16	19-7/8	6-1/2	2-1/2	30
105	31-5/8	19-1/8	19-7/8	36-5/16	36-7/8	32-3/16	22-3/4	6-1/2	3-3/16	36-5/16

(This table is continued on the next page.)

Table 4. Dc Spring-set, Two Shoe Brake Dimensions - Continued

IC9528 or IC5488 Brakes	Approx. Net Wt. in Lb.		Dimensions in Inches								
	Brake	Wheel	NN	OO	PP	RR	SS	TT	UU	VV	WW
100	175	20	8-1/4	7-1/8	13-3/8	8-1/4	6-15/16	1/4	1-3/4	7/8	5
101	240	35	7	8-1/4	15-7/8	10-3/16	9-5/16	1-1/2	1-1/2	3/4	5-3/4
102	390	75	7-3/4	8-7/8	18-1/8	12-1/4	11-3/8	1-1/2	2	1	6-3/4
103	600	140	10-1/2	11	22-1/2	15-7/8	14-9/16	2-1/2	2-1/2	1-1/4	8-1/4
104	950	245	12-1/16	12-1/2	24-11/16	17-15/16	16-7/16	3	3	1-5/8	9
105	1965	415	16-13/16	14-7/16	29-7/16	22-1/4	19-1/6	4	3	1-9/16	9-7/8

IC9528 or IC5488 Brakes	Dimensions in Inches										
	XX	YY	ZZ	XA	XB	XC	XE	XF	XG	XH	XN
100	6	2-5/8	1-1/2	1	4	5-3/8	14-7/16	25-1/2	----	1	1/2
101	6	3-5/16	1-1/4	1-1/4	4-3/4	6	17-1/16	30-1/8	7-11/16	1-3/8	1/2
102	6-5/8	3-3/4	2-5/8	1-3/8	7	8-7/8	20-1/4	36-7/32	9-11/16	1-1/4	5/8
103	7-5/16	4-11/16	2-5/8	1	8-1/4	10-3/4	24-5/16	44-27/32	11-3/16	1-7/8	5/8
104	8-3/8	5-3/16	4	0	10-1/4	19-1/2	27-9/16	50-27/32	12-5/8	1-3/4	3/4
105	8-7/16	6	4	0	13-1/8	22-1/4	30-11/16	58-7/8	16-1/2	2-3/4	3/4



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