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**Field Adjustment and
Field Replacement Of
CALDWELL Roller-Tilt
Sash Balances**

**Illustrated Procedures For
Field Inspection,
Field Adjustment,
And
Field Replacement
Of
Roller-Tilt Sash Balances**

Field Adjustment and Field Replacement Of CALDWELL Roller-Tilt Sash Balances

Roller-Tilt Balance Components And Assemblies

Caldwell Manufacturing Company's Roller-Tilt Sash Balances are built from the components shown in Figure 1. The simplest balance is assembled from two locking case halves, a locking collar, a case support, and a constant force spring (Figures 1, 2). A mounting bracket is used to attach one end of the constant force spring to the window jamb, and a pivot bar, attached to the bottom edge of the sash, when inserted into the opening in the center of the locking collar, connects the balance to the sash. Moving the sash downward causes the spring to uncoil, and the tendency for the spring to recoil is what provides the lifting force to counterbalance the sash weight.

Springs are available in 3# through 7# capacities. When a sash heavier than 14# requires balancing, additional springs are added to the balance assemblies as tandem case assemblies coupled to the locking cases by means of the "dog bone" features, as shown in Figure 3.

Tilting the sash inward rotates the locking collar, which in turn, forces the locking case halves apart, inside the jamb pocket. With the locking case halves forced against the inside of the jamb pocket, sufficient friction is generated to prevent the balance from moving while the sash is tilted.

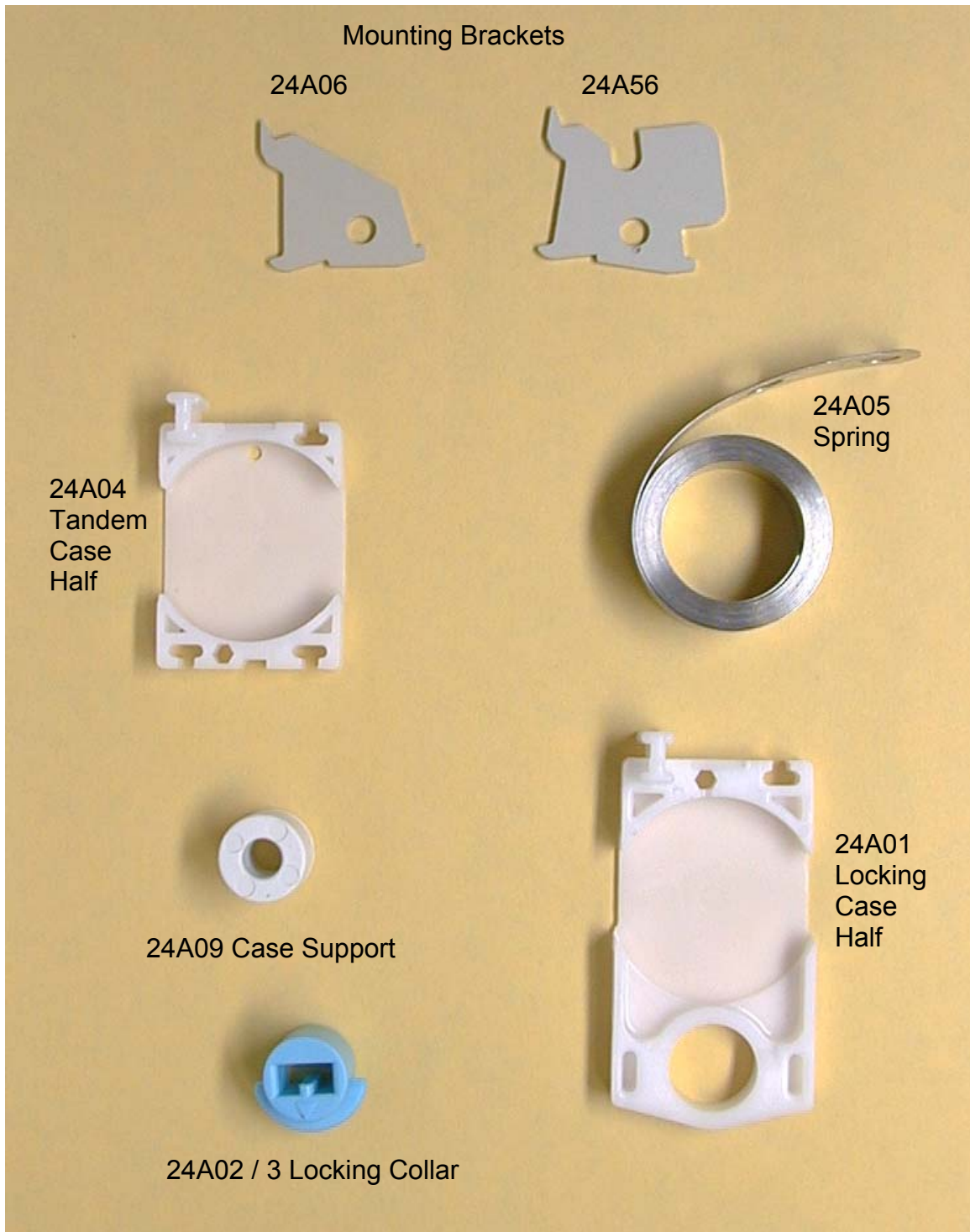


Figure 1. – Roller-Tilt Sash Balance Components

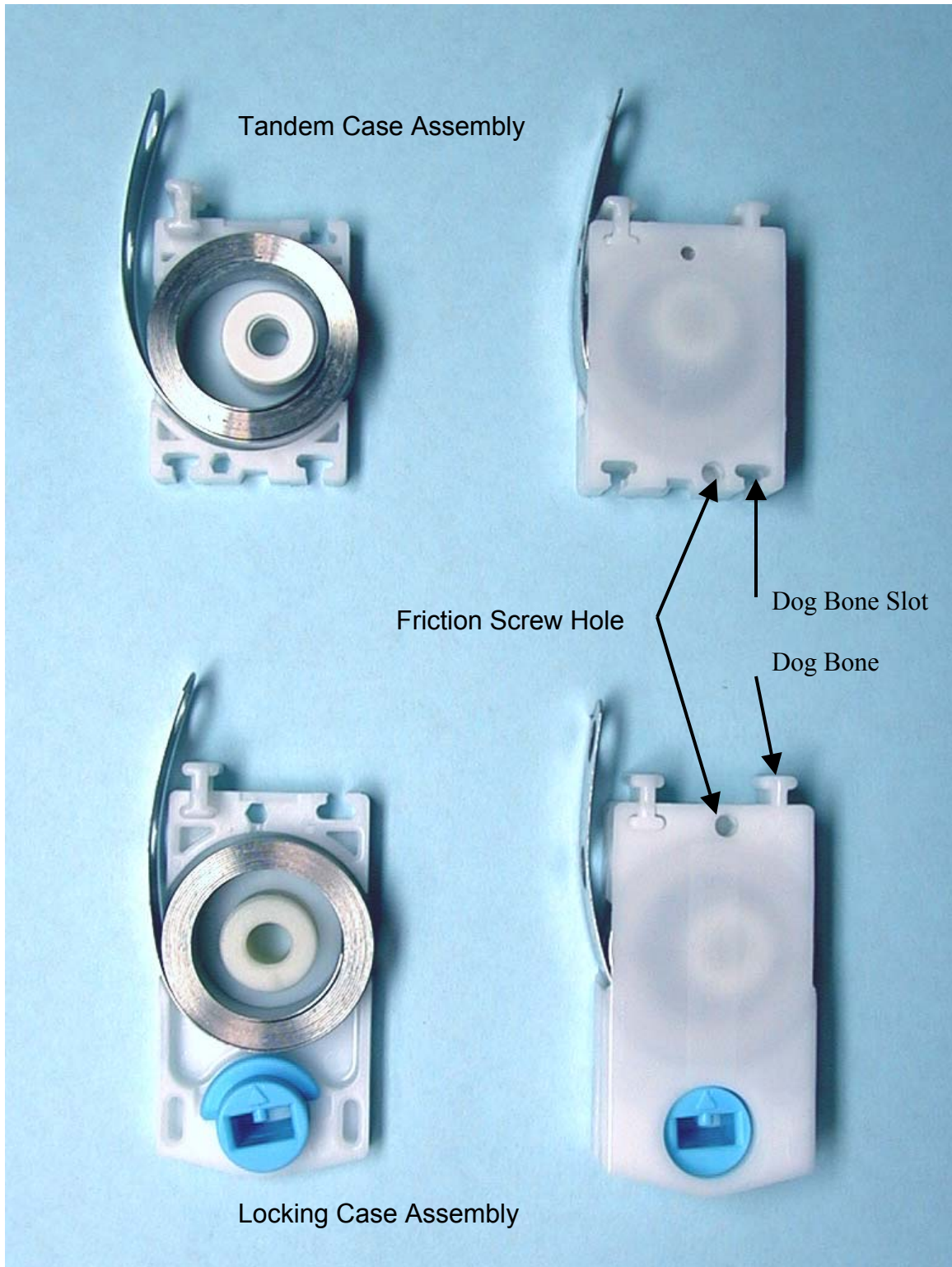


Figure 2. - Locking and Tandem Case Assemblies

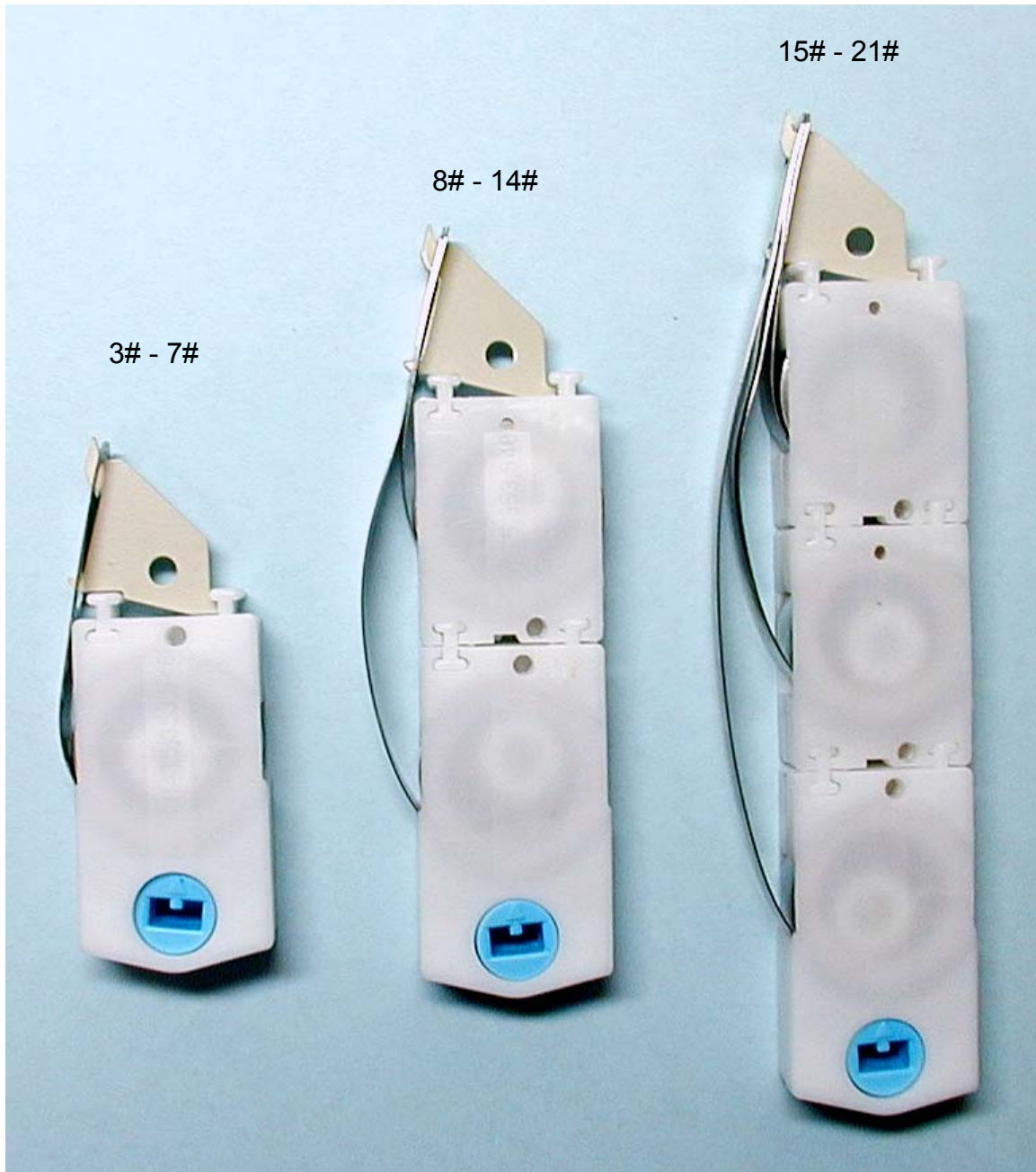


Figure 3. - Standard Single, Tandem, and Triple Roller-Tilt Balance Assemblies with Mounting Brackets

Troubleshooting Procedure – Repair or Replace?

- 1) Move the lower sash to a point 1" to 2" above the full down position, release the tilt latches, and tilt the sash inward (Figure 4.).
- 2) Inspect both sash balances.
 - a) Mounting brackets securely fastened to the jamb.
 - b) All springs straight, intact and connected to the mounting bracket.
 - c) For multi-spring balances, balance units properly interconnected.
 - d) Balance cases intact and undamaged.
 - e) Balances do not retract with sash tilted (tilt shoes lock adequately).
- 3) Any balances that fail the above inspection will need to be replaced. See Figure 6,7,8,9 for examples.

Check sash operation for simple repair option

- 4) Tilt the sash back into the operating position, and engage tilt latch.
- 5) Move the sash to the full down position, and release.
- 6) If sash rises from the down position, add and adjust friction screws. (Pg.7)
- 7) Move the sash to the full up position, and release.
- 8) If sash falls from the up position, add and adjust friction screws. (Pg.7)
- 9) Move the lower sash to a position 1" to 2" above the full down position, release the tilt latches, and tilt the sash fully inward, or remove as per step 1 of the replacement procedure on page 10.
- 10) Repeat steps 1) through 8) with the upper sash.
- 11) Tilt the lower sash into the operating position and latch, or if the sash was removed, reinstall as per step 5c, of the replacement procedure on page 17.



Figure 4. - Sash Tilted Inward

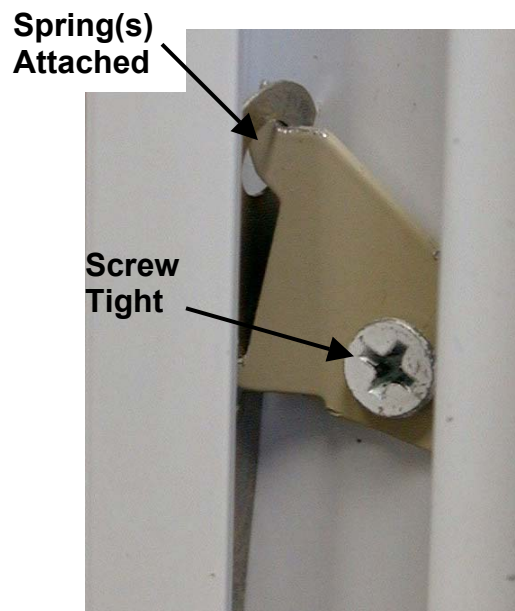


Figure 5. – Mounting Bracket



Figure 6. - Kinked Spring (Replace)



Figure 7. - Broken Spring (Replace)



Figure 8. - Detached Tandem Case (Replace)

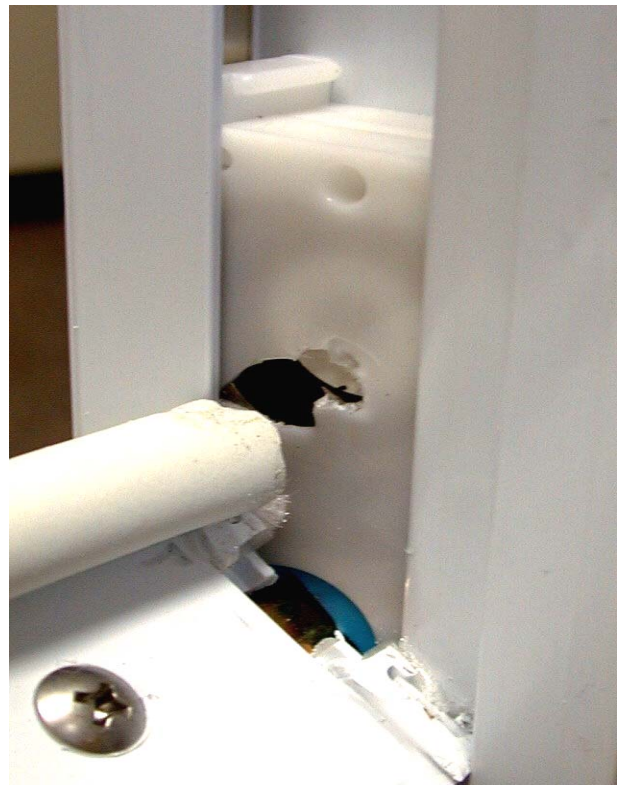


Figure 9. - Broken Balance Case (Replace)

Adjusting Balance Friction

Recommended Tools: 1/16" Allen wrench (Figure 10.).

Required Materials : Two #6-32 UNC X ¼ Socket Set Screws, Cup Point, 18-8 SS, Caldwell Manufacturing Company Part #20H44

Procedure: Insert a setscrew (Figure 11.) into the friction screw hole (Figure 2) of each locking case, and tighten to force the balance case halves apart (Figure 12), creating additional friction. Tighten the setscrews equally to create sufficient added friction to correct any drifting of the sash. In multi-spring balances, friction screws can also be added to the tandem case assemblies as needed.

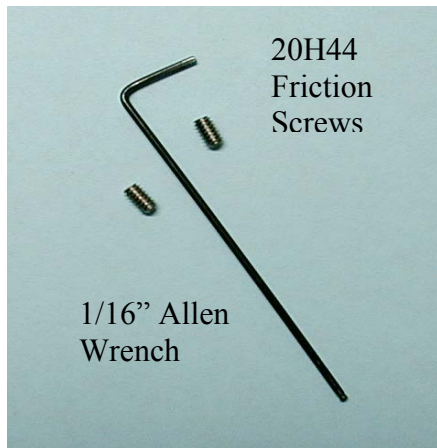


Figure 10. - Friction Screws



Figure 11. - Adding Friction Screw



Figure 12. - Adding Friction

Balance Replacement Procedure

Recommended Tools: Pencil or scribe; hacksaw blade (32 tooth), in hacksaw blade holder (Buck Brothers #40206); common utility knife; file (Nicholson 8" 4-In_Hand); screwdrivers (#2 Phillips, and 1/4" flat blade); needle nose plier; #8 X 3" drywall or deck screw; pattern block (see Appendix A).



Figure 13. - Balance Replacement Tools

Other Useful Tools: Dremel tool; Xacto saw; diagonal cutter; end cutter; angled cutter; sheet metal nibbler, such as Radio Shack #64-823; screw starter.

Required Materials: Replacement balance; snap in stop, to cover balance access opening.

Replacement balances are identical to original balances except that long tail springs are provided in multi-spring applications to facilitate reconnecting the springs to the mounting bracket. The replacement mounting bracket is the single screw mounting bracket, Caldwell Manufacturing Company Part #24A06. (Figure 1.)

Replacement balances with capacities 3# through 7# consists of a single locking case assembly, with a short (standard) tail spring. For replacement balances with capacities 8# through 14#, the balance consists of one tandem case assembly with a short tail spring, and a locking case assembly with a medium tail spring. Replacement balances with capacities 15# through 21# consist of one tandem case assembly with a short tail spring, one tandem case assembly with a medium tail spring, and one locking case assembly with a long tail spring.

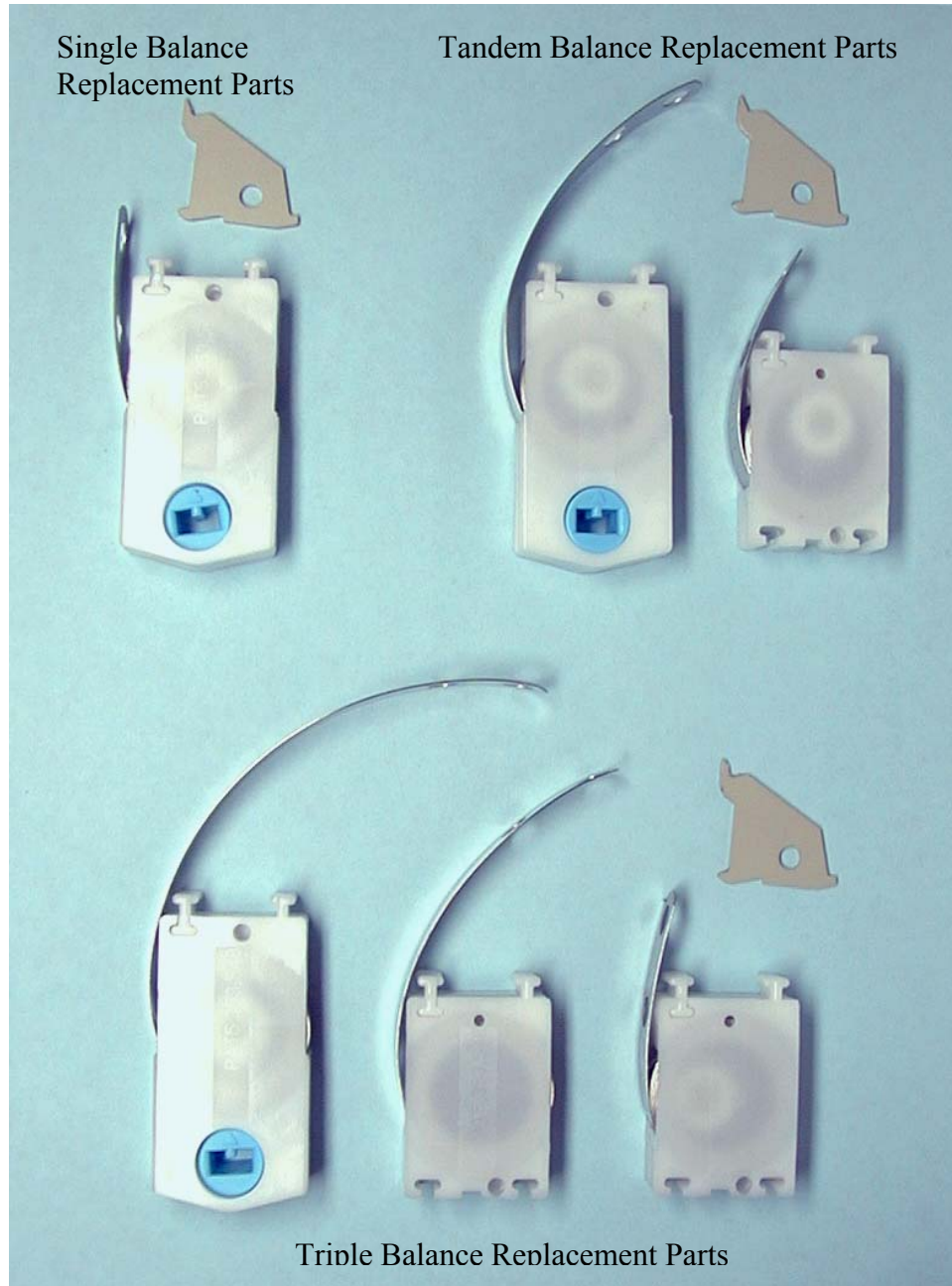


Figure 14. - Single, Tandem, and Triple Replacement Balances

General Procedure: Remove sash, create balance access opening (if not provided by the window manufacturer), remove old balance, install replacement balance, install stops, re-install sash. Replacement can be done in 10 – 15 minutes. Replacements are easiest with both sash, and any screens removed.

Specific Procedure:

- 1) Sash Removal – for upper sash, remove lower sash first
 - a) Raise or lower sash to a halfway position, release tilt latches, and tilt the sash inward. (Figure 15.)
 - b) Grasp the sash at a corner of the lower sash edge, and force that corner upward or downward (Figure 16.), until the pivot bar on the sash bottom disengages from the balance carrier.
 - c) Disengage the opposite pivot bar from it's carrier, and remove the sash.



Figure 15. - Sash Tilted Inward



Figure 16. - Sash Removal

- 2) Balance Access Opening
 - a) Remove any existing stop from the jamb pocket containing the balance to be replaced (Figure 17).
 - b) If the jamb pocket already has an access opening at least 2 5/8" high, then skip to step 3.



Figure 17 - Stop Removal

- c) Utilizing one of the pattern blocks shown in Appendix A, scribe or mark the size of the access opening (Figure 18). If replacing the balance for a lower sash, the access opening is made at the top of the jamb, and if replacing the balance for an upper sash, the opening is made near the sill. Leave at least $\frac{1}{4}$ " of material above or below the opening, to properly engage the stop which will later cover the opening.



Figure 18 - Marking Access Opening

- d) Using a fine tooth hacksaw blade, in a hacksaw blade holder, carefully make the 4 horizontal cuts at the upper and lower ends of the access opening (Figure 19). Finish the cuts with the cutting edge of the saw blade parallel to and flush with the jamb pocket interior sidewalls.



Figure 19 - Horizontal Cuts

- e) Using the edge of the pattern block as a guide, carefully score the jamb leg between the ends of the saw cuts, with a utility knife (Figure 20). Make a first score, with very light pressure, followed by additional strokes with greater pressure. While scoring, keep the knife blade parallel to the jamb pocket sidewall, to insure that the cut will remain flush with the sidewall.



Figure 20. - Scoring

- f) Remove the pattern block, and continue to cut with the utility knife until the piece of the jamb leg is removed (Figure 21). Alternatively, the scored piece can be broken out by striking lightly with a hammer.
- g) Use the utility knife or a file to trim any material left overhanging the opening along the sides. The opening should be flush with the interior walls of the jamb pocket.
- h) For jamb extrusions with double return legs, remove the outer leg first, then score and remove the inner leg.
- i) Alternatively, the access opening may be cut with end cutters, angled cutters, or sheet metal nibblers, Dremel tools, etc., if desired.
- j) Remove any debris from the jamb pocket.



Figure 21. - Completed Access Opening

3) Old Balance Removal

- a) Insert a ¼" flat screwdriver blade in the pivot bar opening of the old balance, and rotate to unlock the balance (CW – balance on the left, CCW – balance on the right), while holding the screwdriver to prevent the balance from flying upward (Figure 22).
- b) Allow the balance to fully retract.
- c) Remove the screw(s) from the mounting bracket, and, using a needle nose plier, disengage the mounting bracket from the balance spring(s), and remove (Figure 23).
- d) Slide the balance to the access opening, and remove from the jamb (Figure 24). A #8 X 3" drywall or deck screw, driven into the friction adjustment screw hole of the balance, makes a nice handle for pulling the old balance cases out through the access opening. Multi-spring balances are connected by means of the "dog bones" at the top of each balance section. Pull each additional unit of a multi-spring balance straight out of the access opening, to slide the dog bone connectors apart.



Figure 22. - Unlocking the Balance



Figure 23. - Removing Mounting Bracket

Figure 24. - Removing Old Balance(s)

4) Replacement Balance Installation

- a) Balances are commonly installed with the spring exiting the case toward the interior of the window so that the springs tuck under the interior return leg of the jamb pocket and are less visible when the sash is tilted inward.
- b) Make sure that the locking collar in the locking case assembly is in the unlocked position (arrow on locking collar face pointed toward dog bone end of case) (Figure 25).
- c) Lower Sash Balance – Access opening at top of jamb
 - i) Wrap any excess spring tail length over the dog bone end of the locking case assembly, then insert the bottom end of the locking case assembly through the access opening (Figure 26), and pull downward to cause the balance case and spring tail to fully enter the jamb pocket.
 - ii) For multi-spring balances, push the end of the spring tail against the sidewall of the jamb pocket (normally the interior side of the window), and slide the locking case assembly upward, until the dog bones are just above the lower edge of the access opening.
 - iii) Place the tail of the next spring in the pocket, adjacent the first spring tail, push the case upward as necessary, align the dog bones of the locking case with the dog bone slots of the tandem spring case, and slide the tandem spring case into engagement with the locking case (Figure 27).
 - iv) For triple spring balances, connect the third spring case by the same method as the second.

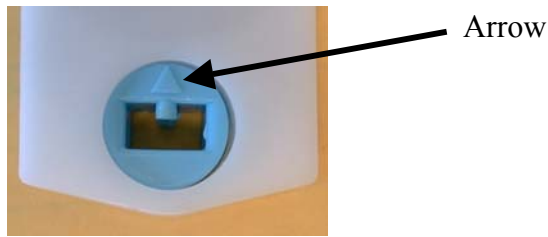


Figure 25. - Locking Collar



Figure 26. - Installing the Locking Case Assembly

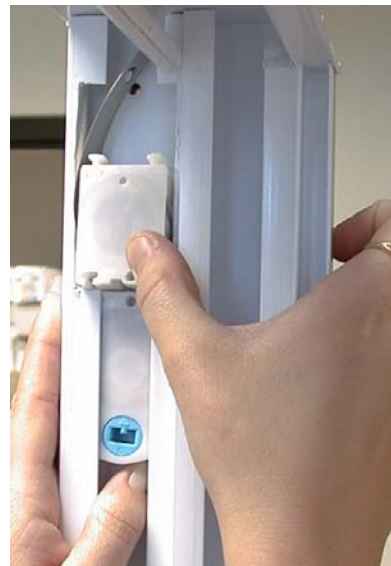


Figure 27. - Installing the First Tandem Case Assembly

- d) Upper Sash Balance – Access opening at the sill
- i) For multi-spring balances, install the uppermost spring case (short tail spring) (Figure 28), and slide upward until the dog bone slots are just below the top of the access opening.
 - ii) For triple spring balances, insert the bottom of the second tandem case into the opening, and partially engage the dog bones into the upper case. Grasp the spring tail with a needle nose plier, between the two holes, and push the spring tail down, until the end can be inserted through the access opening, alongside the upper tandem case (Figure 29).
 - iii) Push the spring tail and the balance case fully into the jamb pocket.
 - iv) Slide the assembly up the jamb pocket, and back down, to facilitate feeding the second spring tail past the first spring case.



Figure 28. - Installing a Tandem Case



Figure 29. - Installing a Second Tandem Case



- iv) Install the locking case assembly (Figure 30). Use the technique described in steps ii) through iv) above, if the locking case assembly contains a medium or long tailed spring.

Figure 30. - Installing the Locking Case Assembly

- e) Align the mounting holes of all springs, using a needle nose plier.
- f) Grasp the mounting bracket with a needle nose plier (inset), insert the upper hook of the mounting bracket through the upper holes of all springs (make sure to engage all springs).
- g) While holding back the balance assembly, pull the springs upward approximately $\frac{1}{4}$ " with the bracket, and rotate the bracket about a horizontal axis, to insert the second hook through the lower holes of all springs (Figure 31).
- h) Rotate the bracket about a vertical axis, to insert the back tab beneath the edge of a dog bone (see Figure 3).

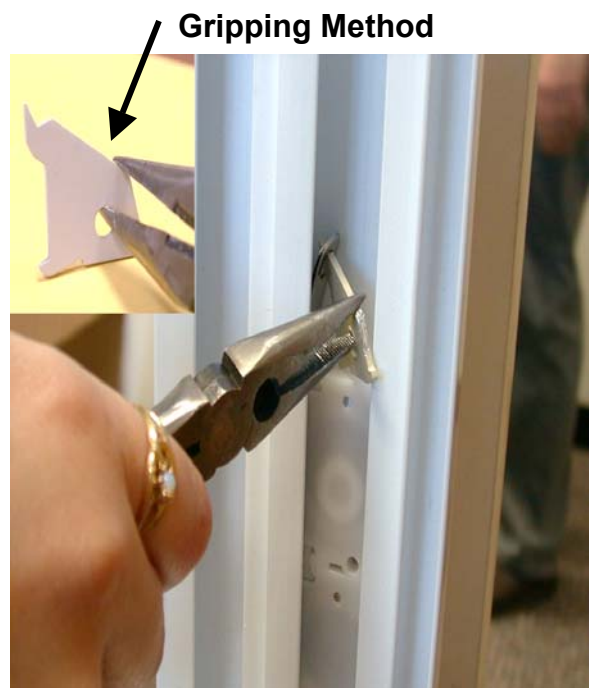


Figure 31. - Installing the Mounting Bracket

- i) Slide the complete balance assembly and mounting bracket to the original mounting position, and drive the original mounting screw.
- 5) Sash Installation
 - a) With the replacement balance, insert a ¼" flat blade screwdriver into the pivot bar opening of the locking collar, pull the balance assembly to a position several inches above or below the position of the opposite sash balance, and, with the screwdriver, rotate the locking collar (CCW – left side, CW – right side) to lock the balance for sash installation.
 - b) Make sure that the arrow head on the face of the locking collar is pointed toward the interior side of the window.
 - c) If upper sash was removed, install it first.
 - d) Correctly orient sash – hold approximately horizontal, with interior glass surface facing downward, pivot bars toward the window frame.
 - e) Tilt the sash slightly to the side, and insert one pivot bar into the pivot bar opening of the appropriate balance. Force this balance upward or downward, until the opposite pivot bar can be aligned with and inserted into the pivot bar opening of the opposite balance.
 - f) Continue forcing the first balance upward or downward, until it is approximately opposite the second, then tilt the sash closed, and latch.
- 6) Stop Installation
 - a) Cut stop to length (access opening length + ½") if necessary.
 - b) Snap stop into opening between return legs, over access opening.



Figure 32. - Completed Lower Sash Balance Replacement



Figure 33. - Completed Upper Sash Balance Replacement

Appendix A

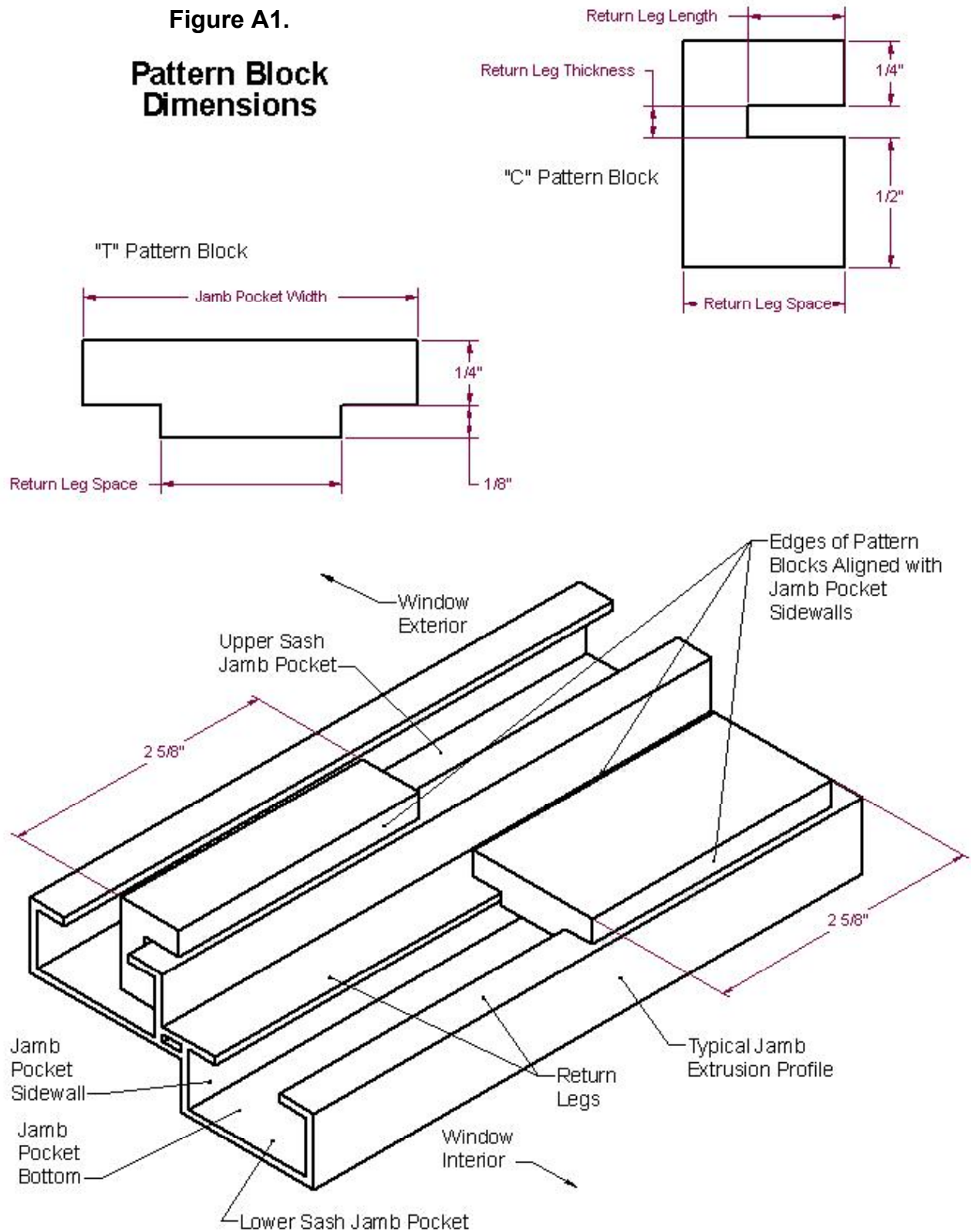
It is recommended that a pattern block be utilized to help define the size and location of the required access opening. It should be used to mark and assist with cutting an access opening 2-5/8" tall, and to the full width of the jamb pocket interior. An undersize opening will make it difficult to remove old balance components, and install new balances. An oversize opening may not be covered properly by the replacement stops. The main purpose of the pattern block is to accurately transfer the location of the jamb pocket sidewalls to the surface of the return legs to allow portions of the return legs to be easily and accurately cut away.

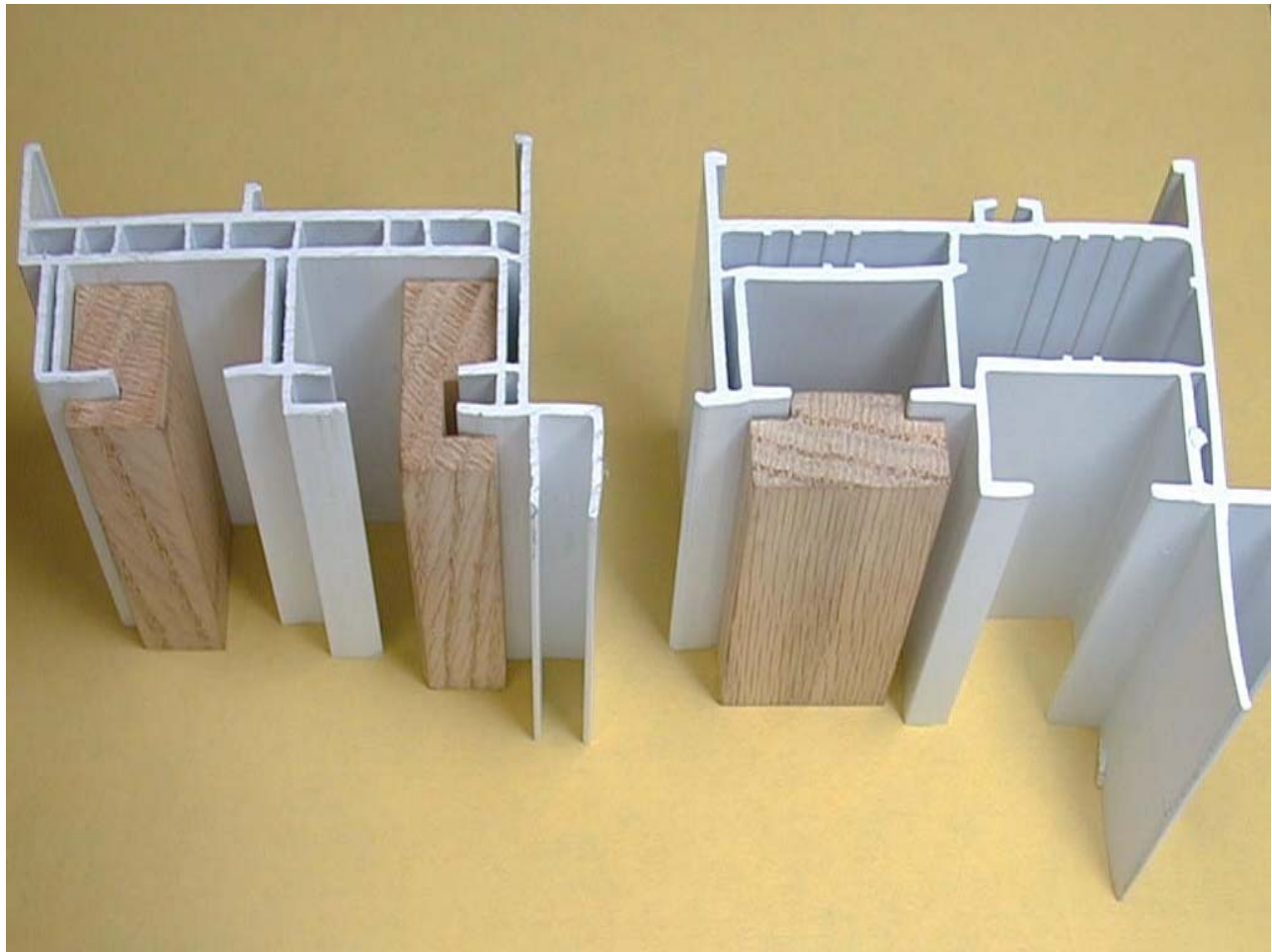
Pattern blocks may be fabricated from wood, metal, or plastic. A hard plastic, or metal block would be recommended for multiple uses by field service technicians.

If a sample of the jamb extrusion profile is available, or accurate dimensions are known, a "T" shaped pattern block can be made. The width of the top of the "T" should closely match the width of the jamb pocket, and the width of the center leg of the "T" should closely match the width of the space between the return legs of the extrusion profile. If the return legs are of equal length, the center leg of the "T" is centered. If there are unequal return legs, then the center leg of the "T" is positioned so that the edges of the top of the "T" are aligned with the sides of the pocket. The top of the "T" is made approximately 1/4" thick, to facilitate scoring the jamb surface by running a utility knife along the side of the pattern block. The block can be cut to a length 2-5/8", to facilitate marking the size of the access opening.

If the dimensions of the jamb extrusion profile are not known, and if no sample is available, then a "C" shaped pattern block can be used to transfer the interior jamb pocket sidewall location to the jamb surface. Using a piece of stock that will fit between the return legs of the extrusion, insert the piece, and hold against the bottom wall of the jamb pocket. Mark the location of the outer surface of the return leg, and cut a kerf wide enough to accept the return leg, and deep enough to allow the block to reach the interior sidewall of the jamb pocket. Cut the height of the block to leave 1/4" material overlaying the return leg surface, and cut the block to a length of 2-5/8".

Figure A1.
Pattern Block
Dimensions





**Figure A2. - “C” and “T” Pattern Blocks
In Typical Jamb Extrusion Profiles**