



BIFOLD DOOR MAINTENANCE MANUAL

FULFAB
since  *1957*
AIRCRAFT HANGARS

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New bifold doors take a period of time, depending on frequency of use, for the lifting cables to stretch and the entire system to adjust itself. This is normal and might require another adjustment of cables, door locks, and limit switches. Before beginning routine maintenance and/or door adjustment procedures, ALWAYS inspect door hardware for wear and tear, connection tightness, and proper operation.

Bifold door adjustment is a job for two people. One person on the ground checks cables and operates the door. The other person on a ladder makes drum and limit switch adjustments.

TOOLS REQUIRED

- 1 - 1/2" Drive Ratchet
- 1 - 1/2" Drive 3/4" Dia. (Deep Well Socket)
- 2 - 3/4" Combination Open End Box Wrenches
- 2 - 7/16" Insulated Combination Open End Box Wrenches
- 1 - 1/2" Drive 3/8" Dia. 6 Point Socket
- 1 - 16 oz. Hammer
- 1 - 16' Extension Ladder
- 1 - Vise Grip
- 1 - Insulated Flathead Screw Driver
- 1 - Set Small Allen Wrenches
- 1 - Set 3/8" Drive Sockets With Ratchet

WARNING: CONTACT WITH ELECTRICAL WIRES OR LIMIT SWITCH CONNECTIONS MAY CAUSE ELECTRICAL SHOCK. USE ONLY INSULATED TOOLS WHEN WORKING INSIDE THE LIMIT SWITCH BOX.

PROCEDURES

1. Check clearance between side lock latch arm and lock plate by pulling on the lifting cable. When unlatched, clearance between the latch arm and the latch plate should be between 1/2" and 1" (See Drawing EK1880). Adjust the clearance by loosening the cable clamps attaching the door lock cable to the lifting cable and increasing or decreasing the amount of slack in the door lock cable. Re-tighten the cable clamps.
2. Remove the cover from the limit switch box. Energize the motor momentarily to raise the door and observe

the limit switch finger bolt movement and drum rotation. Be sure that the cable is starting to wind in a counter clockwise direction and that the cable is winding on the drum away from the door. IF DRUM ROTATION IS REVERSED, DISCONTINUE ADJUSTMENT PROCEDURES AND NOTIFY AN ELECTRICIAN.

3. Examine lifting cables where they enter the cable drum. The initial cable setting should be on the factory provided paint marks on the cable. Run the bifold door up enough to remove the slack from the lifting cables. There should be approximately one and one half cable wraps on the drum at this point. Make sure the cables are winding evenly on the drum (See Drawing EK1878).
4. Run the door up until the cables are just free of the breaker assemblies. Check cables for tension. The two outside lifting cables should have slightly more tension than the two inside lifting cables.
5. If the tension in the cables is not acceptable, (See step 4) they will need to be manually adjusted. Please note that the two lifting cables on each side of the door are actually one continuous piece of cable (See Drawing EK1880). Tension in the cables can be adjusted by lowering the door until the cables are loose and sliding the cable through the drum. This is a trial and error procedure that may have to be repeated several times. NEVER ADJUST CABLE CLAMPS AT THE BOTTOM OF THE LIFTING CABLES.
6. Start the door upward to test limit switches. Test the up limit switch by depressing the micro switch button with a rubber handled screw driver while raising the door. This should stop the door. Then lower the door and depress the down limit switch. IF EITHER OF THESE SWITCHES DO NOT STOP THE DOOR, DISCONTINUE ADJUSTMENT PROCEDURES AND NOTIFY AN ELECTRICIAN. Start the door upward. Stop the door when the top finger nears the up limit switch. Break loose both limit switch finger bolts so that they will turn in their retaining plates. Loosen the hose clamp nearest the limit switch box. Clamp a vise grip on the end of the threaded rod where it protrudes out of the limit switch box towards the outside of the building. When you start the bifold door up from this point, the vise grip will lodge against the platform and prevent the threaded rod from turning. Run



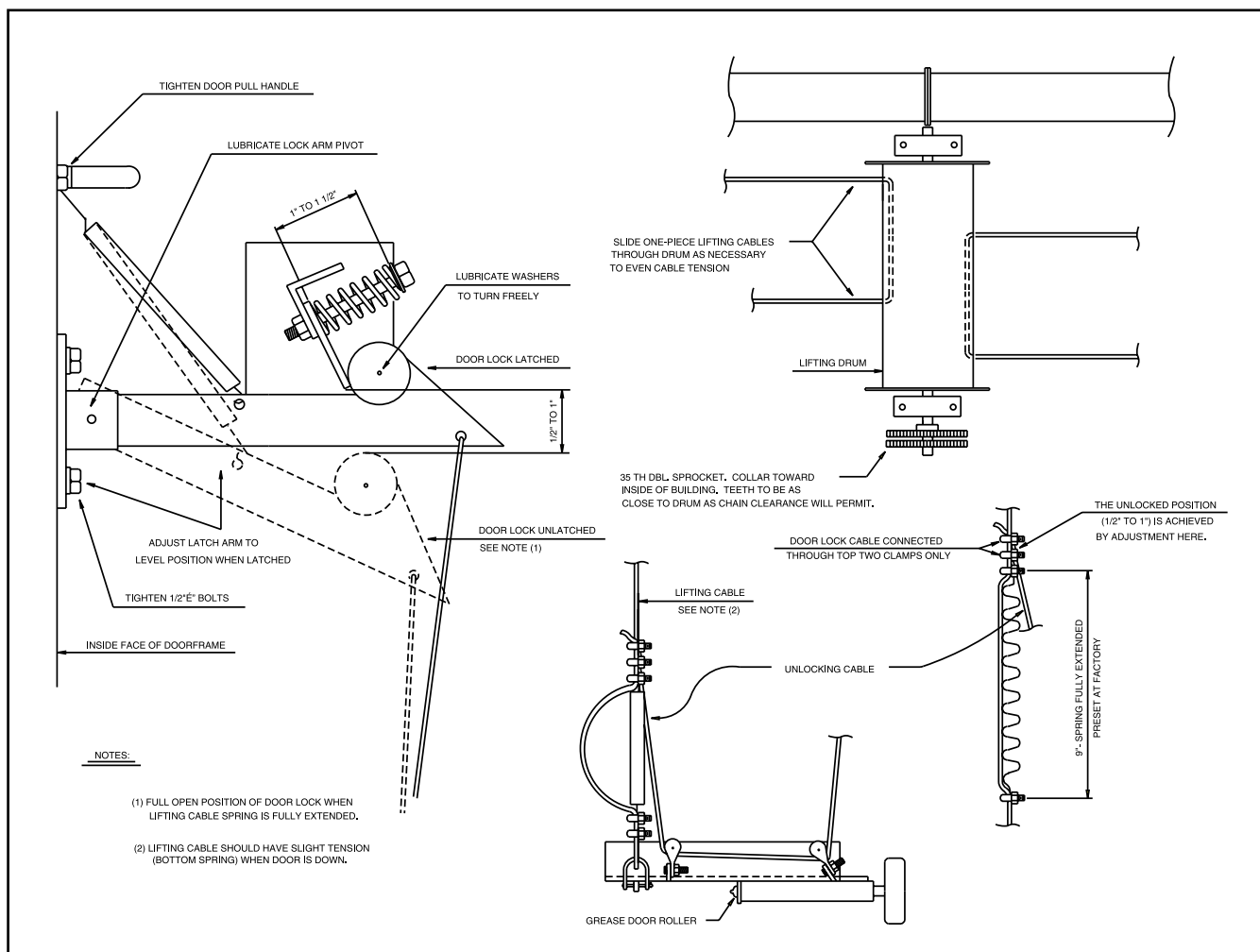
BIFOLD DOOR ADJUSTMENT PROCEDURES

the door up and stop it at the desired height (maximum 12'-0" or 14'-0" – recommended 11'-6" or 13'-6").

7. DISCONNECT THE POWER TO THE LIMIT SWITCH BOX. Remove the vise grip. Screw the top switch finger toward the up limit switch until it clicks on. Tighten the nylock nut on the limit switch finger bolt and the exterior hose clamp on the rubber connecting hose. Be sure the hose clamp is over the collar on the threaded rod. Reconnect power and partially lower and raise the door several times to see that the door stops at the desired position. Fine tune limit switch finger bolt as required. The upper limit switch is now set.
8. Run the bifold door down to the closed position. If necessary, loosen the lower limit switch finger to allow the door to come to a fully closed and locked position. DIS-

CONNECT THE POWER TO THE LIMIT SWITCH BOX. Screw the lower switch finger toward the limit switch until it clicks on. Tighten the nylock nut. Test the lower limit adjustment as indicated in step 7. Run the bifold door up and down several times to check the upper and lower limit adjustments. Make sure the side lock latch arms will unlock automatically. If necessary, adjust the latch arms by tightening/loosening the door lock cable or moving the latch plate on the column (See Drawing EK1881).

9. Always follow the operating instructions on the yellow decal and observe the precautions noted on the yellow "CAUTION" decal. If these decals are missing or unable to be read, please contact Fulfab, Inc. at 1-800-274-0144 for replacements.



Drawing EK 1880 - Bifold Door Adjustment Details

The key to keeping your bifold door in good working order is regular periodic maintenance. Properly maintained, your Fulfab door will provide you with many years of trouble free service.

We recommend that you inspect and lubricate your bifold door at six month intervals if your door sees regular usage. (Regular usage would be 1-2 times/week). If your door is used more frequently, such as with a flight school, we recommend inspections at three month intervals.

INSPECTION

Unlocking cables

Inspect unlocking cables for proper operation. Door side locks should release without "popping" or hanging up. Readjust if necessary (See Drawing EK1880). Make sure cable is not damaged and also that there are two cable clamps attaching the unlocking cable to the lifting cable. Replace cable or clamps as required.

Lifting cables

Examine lifting cables for any damaged, kinked, or frayed sections. Any damaged lifting cables should be replaced immediately. Check lifting cable tension. When door is down (ie: bottom limit engaged), lifting cables should not be loose. The springs should maintain enough tension in the lifting cables while still allowing the side locks to latch.

Bottom door hardware

Examine the four tension springs at the bottom of the lifting cable and the two springs on the side lock arms. Springs should not be broken or stretched out. Replace any damaged

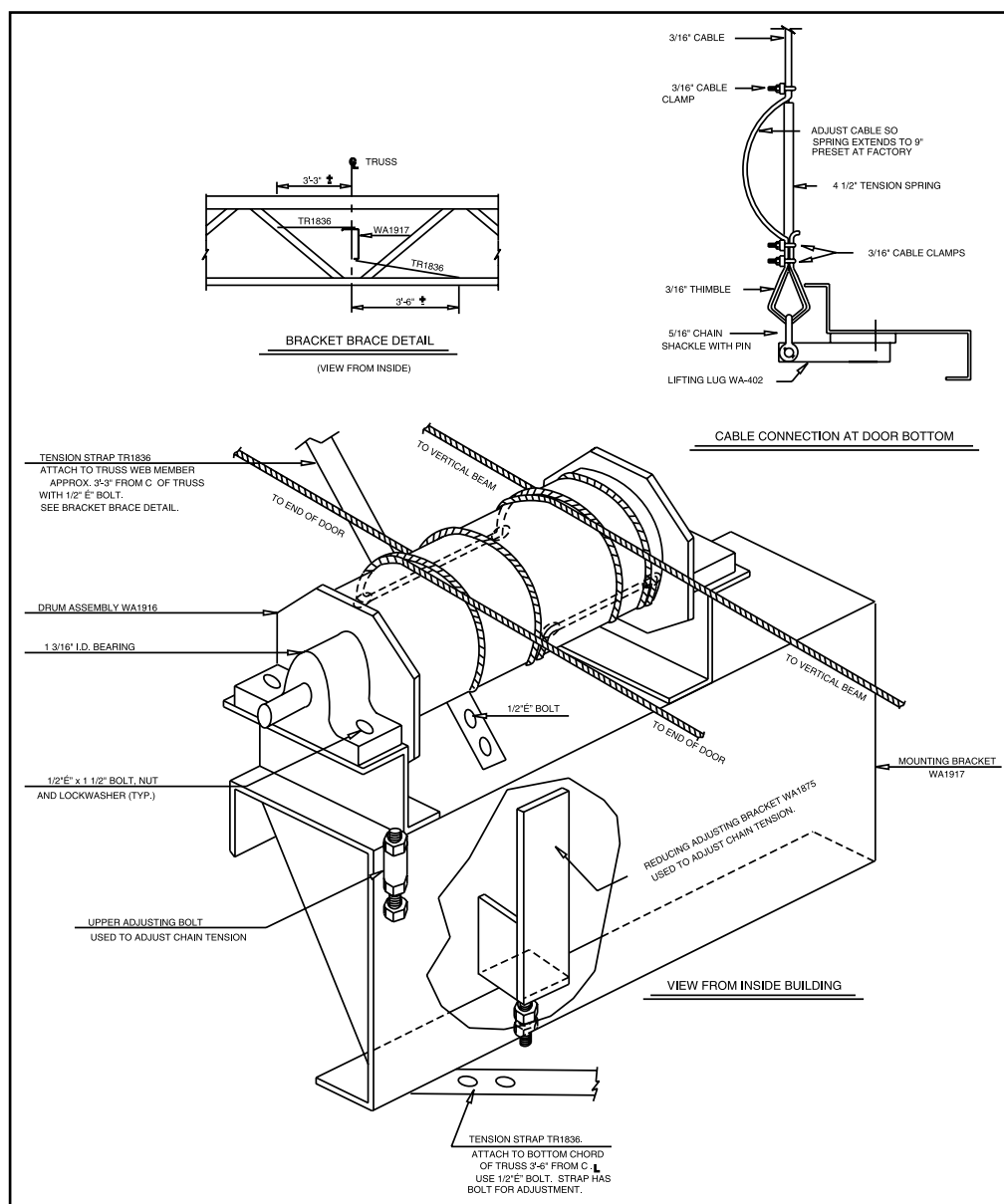
springs. Examine all cable clamps for tightness or missing nuts. Tighten clamps or replace nuts as required.

Hose and hose clamps

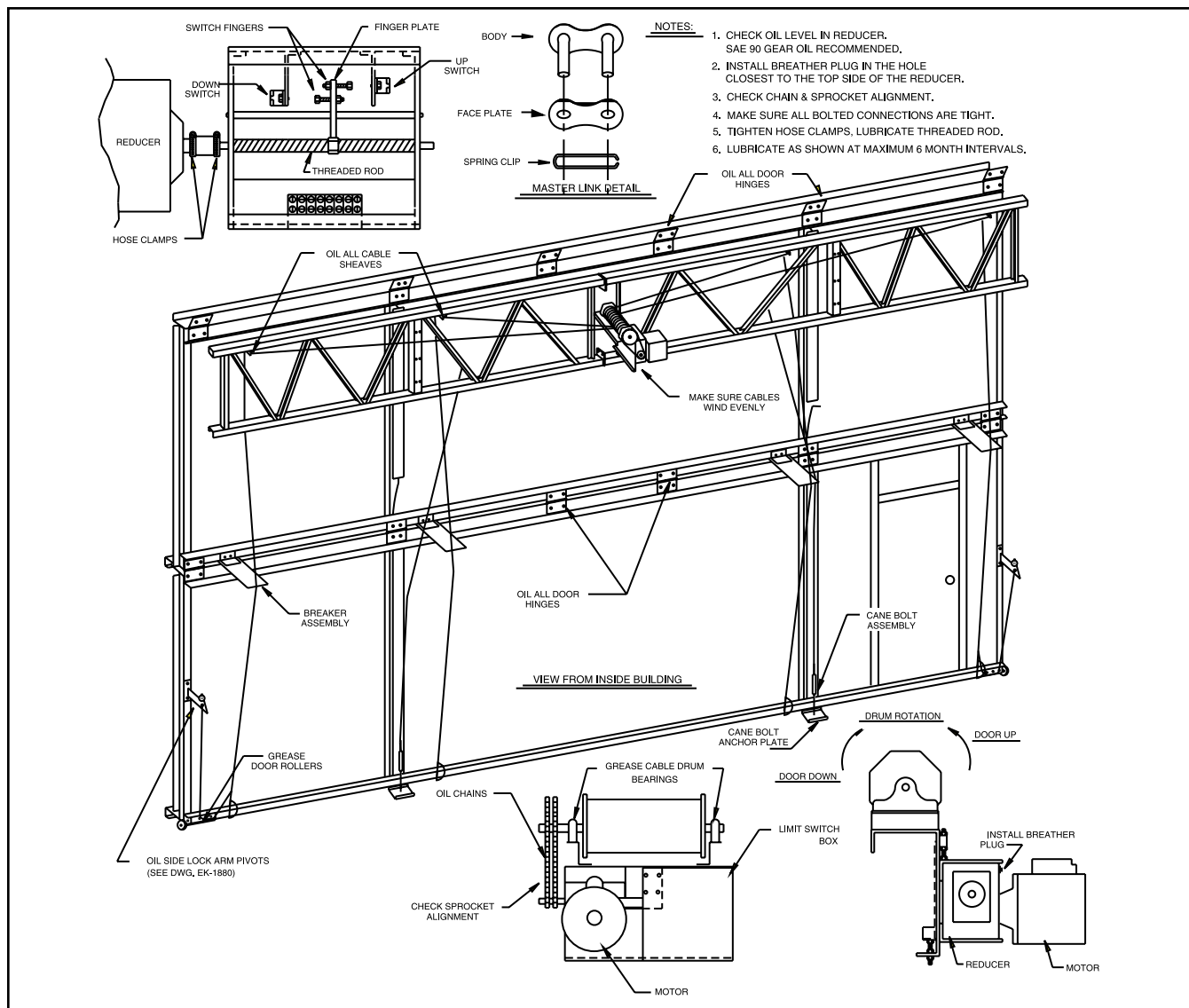
Examine rubber hose between gear reducer and limit switch assembly. Replace if damaged. Check clamps on either end of hose for tightness.

Limit switch adjustment

Run door up until upper limit switch engages. Door should stop 6" from truss bottom chord or even with truss bottom



Drawing EK 1878 - Single Drum Lifting System



Drawing EK 1879 Bifold Door Lubrication Plan

chord, as required by the aircraft. Run door down until the bottom limit engages. Door cable should have a slight tension as indicated previously under "lifting cables". If upper or lower limit switches are out of adjustment, remove the limit switch box cover plate and readjust as necessary (See bifold door adjustment procedures). Loosening the hose clamp and using a vise grip should not be necessary. Fine tuning is achieved by adjusting the limit switch finger bolts in the finger plates (See Drawing EK1879).

Chains and sprockets

Inspect chains for cracked links and excessive wear or corrosion. Each strand of chain is connected with a "master

link". Inspect this link closely for excessive wear and to check that the spring retaining clip is securely in place. (See drawing EK1879.) Also examine chain sprockets for worn, broken, or missing teeth. If any damage is noted, replace both the sprockets and the chains.

Sprocket alignment - use a straight-edge and visually observe the positioning of the large and small sprockets. Loosen sprocket set screws and move on drum/gear reducer shafts to maintain straight alignment. Shafts must always extend beyond sprocket hubs. (Refer to Drawing EK1879 as needed.)

Check chain tension. With the bifold door in the down position, there should be a maximum of 1/2" play in the chain. If retensioning is required, use upper adjusting bolt and reducer adjusting bracket (See Drawing EK1878).

Operating Switch

The bifold door operating drum switch is spring-loaded and should return to its initial position once the handle is released. If the handle does not return to its initial position, replace the switch or interior springs. This should only be done by qualified maintenance personnel.

Bolted connections

Check all bolted connections on or around the motor platform for tightness. Motor vibration can loosen these connections.

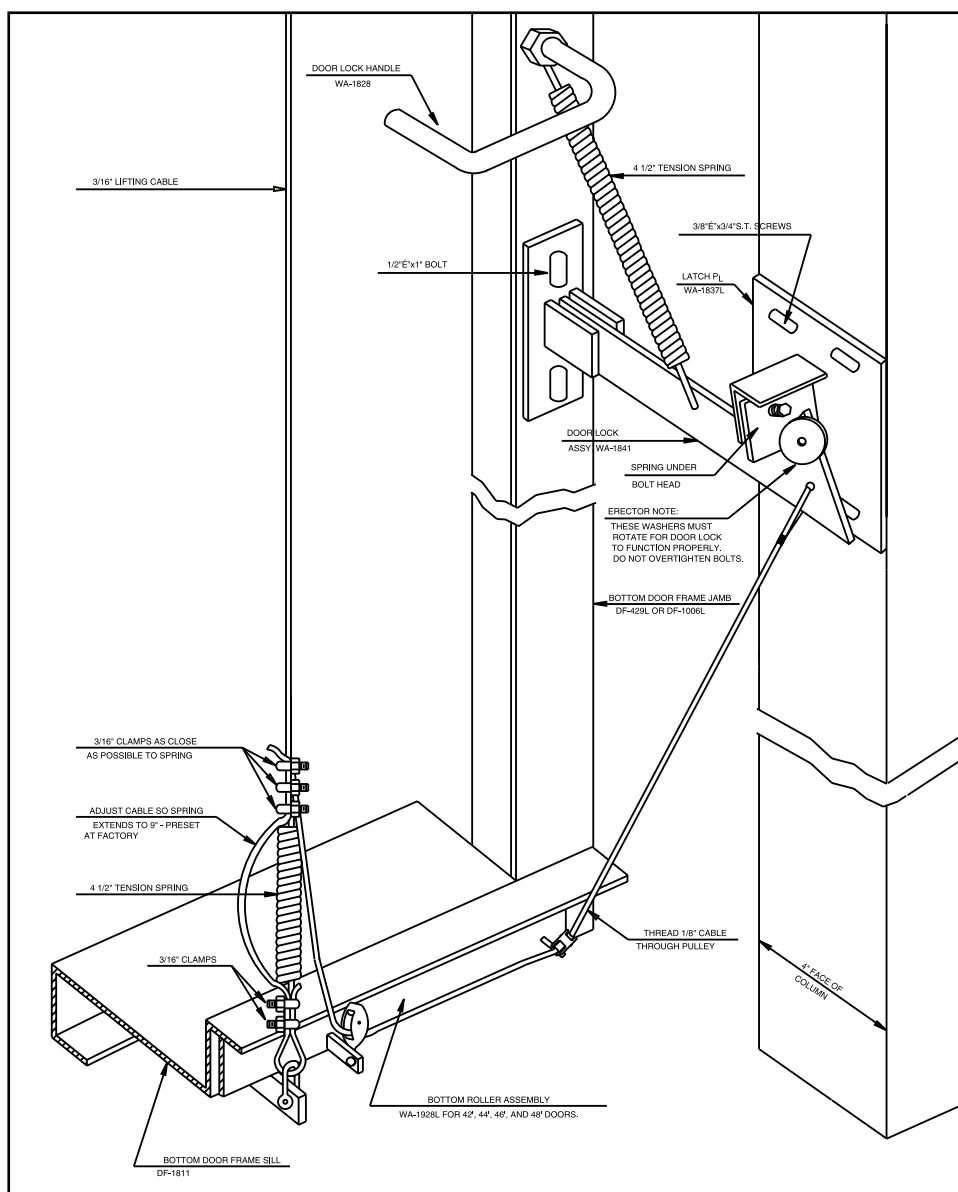
LUBRICATION

- Lubricate bifold door hinges (See Drawing EK1879) — use 10W30 motor oil
- Lubricate side lock arm pivot (See Drawing EK1880) — use 10W30 motor oil
- Lubricate cable sheaves at top of bifold door (See Drawing EK1879) — use 10W30 motor oil
- Lubricate chains (See Drawing EK1879) — use 10W30 motor oil
- Lubricate threaded rod in limit switch box (See Drawing EK1879) — use 10W30 motor oil or WD40 type product
- Grease door side rollers (See Drawing EK1880) — use Lithium general purpose grease
- Grease cable drum bearings (See Drawing EK1879) — use Lithium general purpose grease

- Remove breather plug on reducer and fill reducer until lubricant starts to run back out — use all purpose gear oil SAE 90

Frayed or kinked cable, or damaged chain or sprockets constitutes a safety hazard to the tenant. Use of the door should be discontinued and replacement parts ordered. Contact Fulfab at 1-800-274-0144 for replacement parts.

A copy of our "Bifold Door Maintenance Checklist" is shown on page 11. Please use a copy of this list to check off your maintenance procedures.



Drawing EK 1881 - Bifold Door Lock Details

ALL BIFOLD DOORS

Your Fulfab bifold door has been designed to be as safe as possible. However, as with all mechanical devices, proper care needs to be taken during door operation. Please remember the following:

- Make sure the personnel door is closed and latched before starting bifold door operation.
- Watch bifold door side locks to be sure they unlatch when the door starts up. If they do not unlatch automatically, unlatch them manually.
- Remain at the drum switch during door operation. **DO NOT MODIFY DRUM SWITCH TO OPERATE WITHOUT CONSTANT PRESSURE.**
- Keep people, aircraft, vehicles and all other objects clear of bifold door during operation.
- Make sure both side locks are engaged when door is down.
- Make sure bifold door cane bolts engage in cane bolt plates when door is down.
- Do not leave the bifold door in the "UP" position for extended periods of time (e.g. while flying). All bifold doors are vulnerable to wind gusts while in the "UP" position.
- Always inspect and lubricate the bifold door as indicated on the "Bifold Door Maintenance Check List".
- If the bifold door malfunctions or excessive wear is noted, please contact Airport Maintenance or Fulfab, Inc. At 1-800-274-0144.

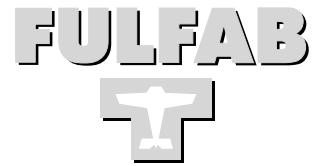
OLDER BIFOLD DOORS

The Fulfab bifold door operating system has utilized a sprocket and chain combination to lift the bifold door since our door was first introduced in 1967. Over the years, our system has been designed and modified to provide safe and efficient operation for the tenant. The safety of the system, however, can be compromised if recommended routine maintenance procedures are ignored or performed inadequately. Lack of proper maintenance can especially affect the drive chain and sprockets.

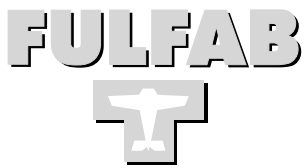
In the Fall of 1992, Fulfab designed a dual-chain drive system to replace the single chain drive that was utilized up to that point. This new system provided an added measure of safety with two separate drive chains used to lift the bifold door. In the event one strand of chain fails, the second chain will act as a fail-safe to prevent the bifold door from falling.

This dual chain system is now available for all of our pre-1992 bifold door systems. If you are in a hangar with a Fulfab single chain system, we can provide you with a retrofit kit designed to replace your existing single chain system with our current double chain system. If you are concerned that your hangar has not been properly maintained in the past, or if you would simply like the added safety, please consider purchasing one of these kits for your hangar. These kits come with instructions and drawings to help you to install the parts quickly and efficiently. Please contact Fulfab, Inc. At 1-800-274-0144 for further information.

TROUBLE SHOOTING GUIDE



CONDITION/SYMPTOM	POSSIBLE CAUSE	WHAT TO DO
Rusted chain	Exposure to moisture Water in lubricant Inadequate lubrication	Replace chain. Protect from moisture. Change lubricant Provide or re-establish proper lubrication. Replace chains, if needed.
Excessive noise from chain drive	Chain striking an obstruction Excess chain slack Excessive chain wear Excessive sprocket wear Sprocket misalignment Inadequate lubrication	Replace chains. Eliminate interference. Re-tension chains Replace and re-tension chains Replace sprockets and chains Replace sprockets and chains, if needed. Re-align sprockets. Replace chain if needed. Re-establish proper lubrication.
Chain clings to sprocket	Excessive sprocket wear Sprocket misalignment	Replace sprockets and chains Replace sprockets and chains if needed. Re-align sprockets.
Chain climbs sprocket teeth	Excess chain slack Excessive chain wear Excessive sprocket wear.	Re-tension chains Replace and re-tension chains Replace sprockets and chains
Slack cables - Door down Slack cables - Door up	Lower limit out of adjustment Cable tension not even	Re-adjust lower limit Lower door and adjust cable tension
Bifold door "coasts" when operating switch is released to neutral position	Worn gear reducer	Discontinue use. Replace gear reducer
Side locks "pop" when bifold door is opened	Side locks out of adjustment	Adjust side lock cable at lifting cable Adjust lock plate on column
Uneven door travel	Lifting cables out of adjustment	Lower door and adjust lifting cables
Drum switch will not operate door	No power Malfunctioning switch	Contact electrician Contact electrician
Lifting spring catches in upper sheave wheel	Upper limit set too high	Adjust upper limit switch
Cables winding over each other on drum	Cables not aligned properly	Run door down and align cable on drum. Replace cables if necessary.
Bifold door does not stop in full up or down position	Limit switches not engaging	Check limit switch adjustment. Replace limit switches if necessary



BIFOLD DOOR MAINTENANCE CHECKLIST

	UNIT DATE	UNIT DATE	UNIT DATE	UNIT DATE	UNIT DATE	UNIT DATE	UNIT DATE	UNIT DATE	UNIT DATE	UNIT DATE
INSPECTION										
Unlocking Cables										
Lifting Cables										
Bottom Door Hardware										
Hose and Hose Clamps										
Limit Switch Adjustment										
Sprockets and Chains										
Operating Switch										
Bolted Connections										
LUBRICATION										
Oil Door Hinges										
Oil Side Lock Arm Pivots										
Oil Cable Sheaves										
Oil Chains										
Oil Threaded Rod										
Grease Side Rollers										
Grease Drum Bearings										
Fill Reducer										
REMARKS										