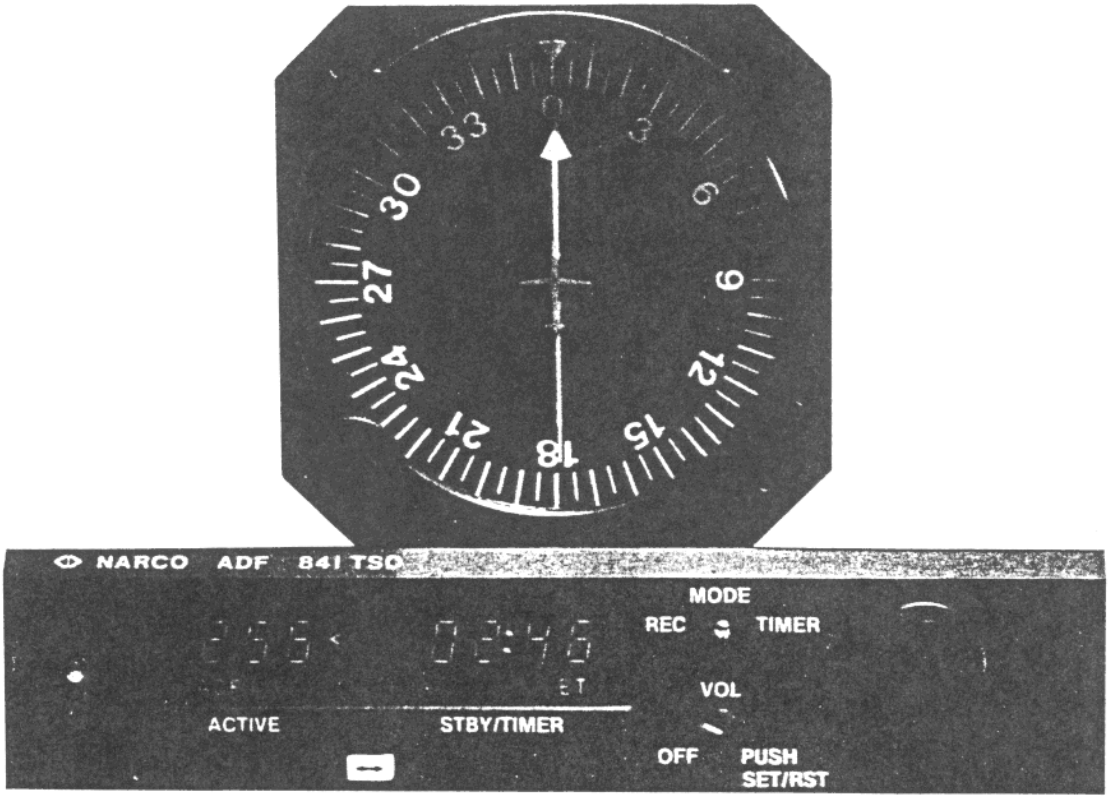
NARCO AVIONICS INC.

ADF 841 TSO SYSTEM



NARCO AVIONICS INC
270 COMMERCE DRIVE
FORT WASHINGTON, PENNSYLVANIA, 19034

PRINTED IN U.S.A

3. OPERATION

3.1 INTRODUCTION

Operation of the ADF-841 TSO System is described here only to the extent of making the electrical tests necessary to confirm proper operation. Operation of the System, as applied to navigating an aircraft, is not covered in this manual.

3.2 ADF-841 TSO RECEIVER FRONT PANEL DESCRIPTION

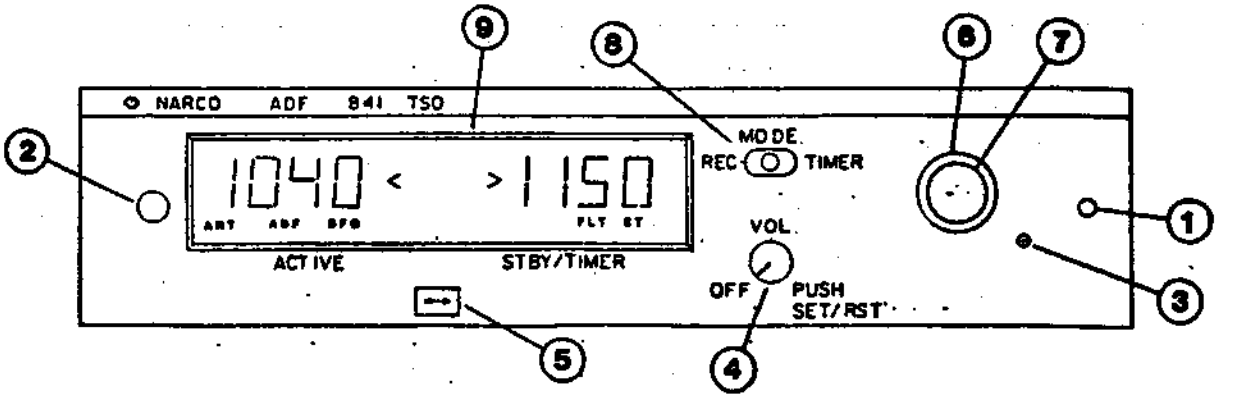


FIGURE 3-1 ADF-841 TSO FRONT PANEL

1 TRAY RELEASE ACCESS HOLE

When the spring release key that is provided in the installation kit is pushed in this hole, it releases the ADF-841 receiver from the tray.

2 DIMMING SENSOR

Automatic dimming of the gas discharge display is accomplished according to the intensity of the ambient light striking the sensor. The greater the intensity of the ambient light, the greater the intensity of the display.

3 DIMMING ADJUST ACCESS HOLE

The display intensity may be adjusted at its low end (low ambient light) in order to match other equipment with gas discharge displays. This is **NOT** an adjustment to raise the display intensity under normal or bright ambient light.

3.2 Continued

4 ON/OFF VOLUME/PUSH SET/RST SWITCH

Extreme CCW position of the volume control turns the unit OFF. CW rotation beyond the detent turns the unit ON and increases audio volume. When the volume control is PUSHED, the ET (Elapsed Time) timer is set to zero. If the volume control is PUSHED and held in for THREE SECONDS, the ET timer is set to the countdown mode. After a countdown time has been selected, another push of the volume control will start the countdown.

5 FREQUENCY TRANSFER SWITCH

When this white arrowed momentary button is depressed, it "flips" the displayed frequencies; the STBY becomes the Active and the Active becomes the STBY. A second depression once again exchanges the frequencies.

6 FREQUENCY/MINUTES SELECT CONTROL KNOB

When in the Frequency or FLT mode of operation, this outer knob will select the frequency in 100 KHz increments from 200 to 1700 KHz. When the "ET" timer is set to the Count Down Mode, this outer knob will select the "minutes to countdown".

7 FREQUENCY/SECONDS SELECT CONTROL KNOB

When in the "Frequency or FLT" mode of operation, this inner knob will select the frequency in 1 KHz increments from 1 KHz to 99 KHz. The inner knob has a feature called "Adaptive Rate Tuning", which means if this knob is rapidly turned (either direction) the frequency selection will jump from 1 KHz to 10 KHz increments.

When the "ET" time is set to the Count Down Mode, this knob will select the "seconds to countdown".

8 MODE SELECT SWITCH

The Mode Select switch is "center OFF" with momentary closure to the left for selecting ANT, ADF or ADF BFO receiver modes and momentary closure to the right to select FLT (flight time), ET (elapsed time) or Frequency Mode.

Each repeated closure to the left sequentially selects ANT, ADF and BFO mode. The modes will be annunciated in the active display with "ADF BFO" being simultaneously annunciated in the BFO mode.

Each repeated closure to the right sequentially selects FLT, ET or Frequency mode. The FLT and ET modes will be annunciated in the STBY/TIMER display while the Frequency mode will be indicated by the ABSENCE of any annunciation in the STBY/TIMER display.

3.2 Continued

9 DUAL GAS DISCHARGE DISPLAY

The display consists of the following:

a. Two four-digit number sections labled "Active & STBY/ TIMER" that display Active frequency and STBY frequency or Time (FLT, ET).

b. Annunciation legends ANT, ADF, BFO located in the Active display and under the four frequency digits.

c. Annunciation legends FLT, ET located in the STBY/TIMER display and under the four time/frequency digits.

d. Aimer arrows< >that point to either the Active or STBY/TIMER displays, signify to which section a frequency can be entered. Only one arrow at a time is displayed. When in the Frequency mode, the arrow points to the STBY/TIMER display. When in the FLT/ET mode, the arrow points to the Active display.

3.3 ADF-841 INDICATOR DESCRIPTION (refer to Figure 3-2)

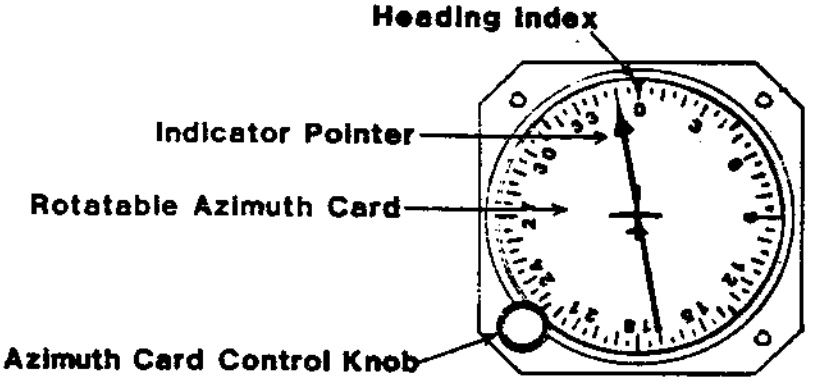


FIGURE 3-2 ADF-841 INDICATOR FRONT PANEL

3.3.1 AZIMUTH CARD CONTROL KNOB

The ADF-841 Indicator has a single front panel operating control; the azimuth card control knob. The control is the knob located at the lower left of the indicator. The selected heading is shown on the rotating azimuth card under an index at the top of the indicator.

3.3.2 INDICATOR POINTER OPERATION

a. RECEIVER ADF MODE: If the indicator azimuth card is set to correspond with the heading of the aircraft, the indicator pointer will point at the ADF station and will read the magnetic bearing to that station.

b. RECEIVER ANT MODE: The indicator pointer is inoperative when the receiver is operating in the ANT mode and rests at "90°".

c. RECEIVER ADF BFO MODE: Pointer operation is identical to ADF mode.

3.4 ADF-841 TSO RECEIVER OPERATING PROCEDURES (Refer to Figure 3-1)

3.4.1 POWER SWITCHING (ON/OFF)

Extreme CCW rotation of the volume knob (item 4) turns the unit OFF. CW rotation past the detent turns the unit ON.

3.4.2 ADF AUDIO VOLUME

Counter clockwise rotation of the volume knob (item 4) reduces the audio level while clockwise rotation increases the audio level.

3.4.3 FREQUENCY SELECTION

Frequency selection is accomplished by two knobs; an outer knob (item 6) and an inner knob (item 7). The outer knob selects the frequency in 100 KHz increments with limits between 200 and 1700 KHz.

The inner knob selects the frequency in 1 KHz increments with limits between 0 to 99 KHz. To facilitate rapid tuning, the inner knob has a feature called "adaptive rate tuning". When the inner knob is rapidly rotated, the frequency increments jump from 1 KHz to 10 KHz per increment. Total receiver frequency range is from 200 to 1799 KHz.

3.4.4 FREQUENCY ENTRY

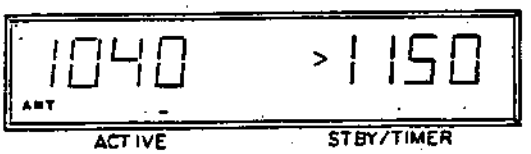
There are two aimer arrows (< >) in the display. One arrow points to the STBY/TIMER display and the other arrow points to the ACTIVE display. Only one arrow at a time is illuminated. These arrows signify to which display the selected frequency will be entered.

3.4.4 Continued

Whenever the STBY/TIMER display is set to display "frequency" (Frequency mode) by the mode select switch (Item 8), the aimer arrow will point to the STBY/TIMER display signifying any selected frequency will be entered into this display. When this frequency is to be used, the white arrowed button (Item 5) **MUST** be depressed to transfer the required frequency to the Active display. The receiver mode of operation (ANT, ADF, BFO) has no effect on frequency selection or entry.

A display example is shown here in which the receiver is set to the ANT mode, the Active frequency is 1040 KHz, the STBY/TIMER display is set to the Frequency mode with a standby frequency of 1150 KHz. Note that the aimer arrow points to the STBY/TIMER display signifying frequency entry to this display. Also, note that there are **NO** illuminated legends (FLT, ET) in the STBY/TIMER display.

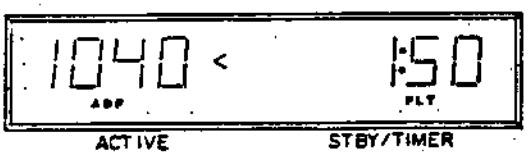
EXAMPLE — Frequency Mode



Whenever the STBY/TIMER display is set to display a time (FLT or ET mode) by the mode select switch, the aimer arrow will point to the ACTIVE display signifying frequency selections are entered iinto this display.

A display example is shown here in which the receiver is set to the ADF mode with an active frequency of 1040 KHz, and the TIMER is set to the FLT mode. Note that the aimer arrow is pointing to the ACTIVE display and the legend FLT annunciates that the STBY/TIMER display is displaying the accumulated flight time.

EXAMPLE — Flt Timer Mode



3.4.5 ACTIVE/STANDBY FREQUENCY TRANSFER

By depressing the white "arrowed" ⟷ push button switch, the ACTIVE and STBY frequencies exchange positions.

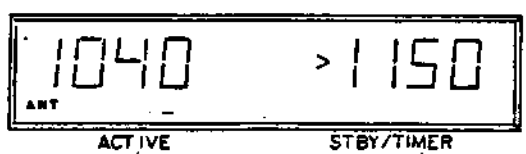
If the STBY/TIMER display is set to a Timer mode (FLT or ET), when the transfer button is pushed the transferred previously active frequency will be displayed for 3 seconds in the STBY/TIMER display after which the display reverts back to the TIMER mode.

3.4.6 RECEIVER MODE SELECTION

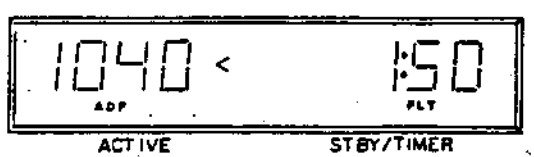
The Mode switch REC (MODE) TIMER controls the selection of the three (ANT, ADF, ADF BFO) receiver modes. The Mode switch is a spring loaded momentary ON (left/right), center position OFF switch. Each momentary closure of the mode switch to the "REC" position will sequentially select ANT, ADF, ADF BFO. The selected mode will be annunciated in the ACTIVE display with the legends ADF BFO being simultaneously annunciated in the BFO mode.

The modes are described as follows:

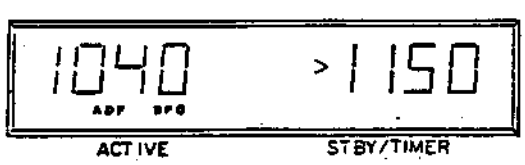
a. **ANT:** The antenna mode is used for optimum intelligibililty of the received identification signal. In this mode the loop signal is OFF, rendering the direction finding capability inoperative and the needle resets at 90°.



b. **ADF:** This mode is used for Automatic Direction Finding



c. **ADF BFO:** The BFO mode turns a 1 KHz beat frequency oscillator ON to generate a tone in the presence of a CW signal. The BFO mode is needed to identify keyed CW stations. ADF operation is provided in BFO mode. Note that both the ADF and BFO legends are annunciated.



3.4.7 TIMER MODE SELECTION

The Mode switch MODE REC ○ TIMER controls the selection of the two (FLT, ET) Timer modes and the Frequency mode, which are relevant to the STBY/TIMER display. Each momentary closure of the Mode switch to the TIMER position will sequentially select FLT, ET and Frequency mode. **ONLY** the **TIMER** modes will be annunciated in the STBY/TIMER display.

Operation of the Timer modes is as follows.

3.4.7.1 FLIGHT TIMER (FLT) MODE OPERATION

Initially, when the ADF-841 receiver is turned ON, the receiver is always set to the ADF mode, the STBY/TIMER display is set to the Frequency mode, and BOTH the FLT and ET timers are turned ON and start to count up from zero. The purpose of the FLT timer is to record the total flight time. The accumulated flight time will be displayed when the FLT Timer mode is selected. The flight timer will count up to 99 hours, 59 minutes and 59 seconds. The four-digit display will display minutes and seconds up to 59 minutes and 59 seconds and then display hours and minutes.

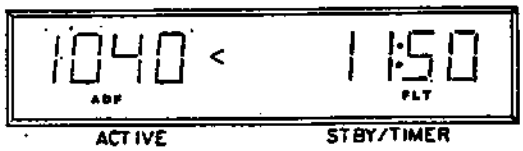
The flight timer can ONLY be set to zero by turning the receiver OFF and then back to ON.

If the frequency transfer button is depressed when the FLT Timer mode is selected, the transferred previously active frequency will be displayed for 3 seconds after which the display will revert back to flight time.

The **PUSH-SET/RST** knob has **NO** effect in FLT Timer mode. The frequency select knobs will enter frequencies into the ACTIVE display, and is annunciated by the aimer arrow pointing to the ACTIVE display.

In the example shown here, the displayed flight time is 11:50. If the last digit changes every second, then the time would be 11 minutes and 50 seconds. If the last digit changes once a minute, then the time displayed would be 11 hours and 50 minutes.

EXAMPLE **FLT MODE**

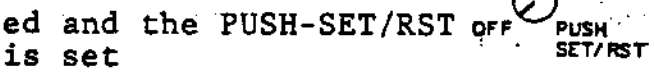


3.4.7.2 ELAPSED TIMER (ET) MODE OPERATION

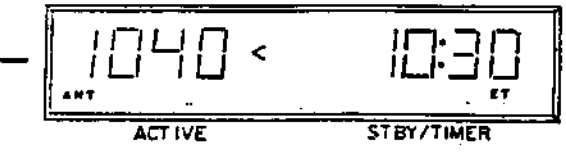
When the ADF-841 receiver is turned ON, the ET time will start at zero and count up to 99 hours and 59 minutes, as is true of the FLT timer. However, unlike the FLT timer, the ET timer can be reset to zero without turning the receiver OFF and can also be set to a Count Down mode.

a. **Resetting the ET Timer to Zero in Count Up Mode**

When the ET timer mode is selected and the PUSH-SET/RST knob is depressed, the ET timer is set to zero and begins to count up to 99 hours and 59 minutes. The four-digit display will display minutes and seconds up to 59 minutes and 59 seconds after which it will display hours and minutes. In the example shown here, a time of 10:30 is displayed. If the last digit changes every second, the time displayed would be 10 minutes and 30 seconds counting up. If the last digit changes once every minute, the displayed time would be 10 hours and 30 minutes counting up.



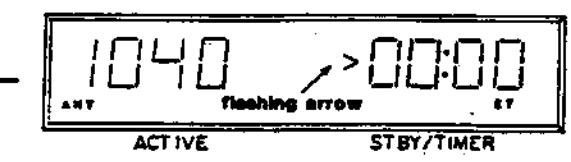
EXAMPLE — ET Mode Counting Up



b. **Setting the ET Timer to the Count Down Mode**

When the ET Timer mode is selected and the PUSH-SET/RST knob is depressed and held in for a minimum of 3 seconds, the 4-digit display will display four zeros and the aimer arrow will flash and point to the STBY/TIMER display. The ET timer is now set to the Count Down mode. An example is shown here.

EXAMPLE — ET Timer Set to Count Down Mode



The aimer arrow will continue to flash for 10 seconds, which is the allotted time for setting the timer to the desired count down time.

3.4.7.2 Continued

c. Setting/Starting the ET Timer to a Desired Count Down Time

Count down time is entered into the ET Timer by means of the frequency select knobs. The outer knob selects time in 1 minute increments and the inner knob selects time in 1 second increments. The timer can be set to count down from a maximum of 59 minutes and 59 seconds to zero.

It is only possible to set the desired count down time during the 10 second period the aimer arrow is flashing. After 10 seconds has elapsed, the aimer arrow disappears from the STBY/TIMER display closing off the time entry and switches over to the ACTIVE display and appears there as a normal arrow signifying that a selected frequency will be entered there. If the 10 second entry period is missed or the time is to be corrected, set the timer back to the count down entry mode and proceed to enter the time.

The ET Timer will **NOT** start counting down on its own like it does when it is in the count up mode. The pilot must initiate the start by pressing the PUSH-SET/RST knob.

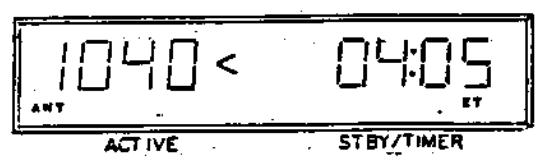
CAUTION: Push the knob and immediately release it. If your finger lingers on the knob too long (3 sec.) when it is pushed in, you will set the timer back to the count down entry mode and erase the set time to zero.

The count down timer does not have to be started within a set period of time. It can be set up in advance and started at any time during the flight provided that the ADF-841 receiver has not been turned off at any time during the flight.

An example is shown here in which the count down time is set to 4 minutes and 5 seconds.

EXAMPLE

Time Set to Count Down



When the ET timer reaches zero, it automatically changes to the count up mode and the STBY/TIMER display will flash for 10 seconds. Also, a 1 KHz audio alarm (available from receiver rear connector P202 pins 11 and M) is enabled at this time for a duration of 2 seconds.

3.4.7.2 Continued

No matter what mode is selected (FLT, ET or Frequency), the alarm audio will sound and the STBY/TIMER display will flash at the zero crossing of the count down timer. The ET Timer (now in count up mode) will continue to count up from the zero crossing until it is reset or changed back to the count down mode.

3.4.7.3 ACTIVE/STANDBY MEMORY KEEP ALIVE

When power is applied to the ADF-841 receiver, the receiver is always set to the ADF mode and the STBY/TIMER display is set to the Frequency mode. The frequencies that are displayed at initial turn on will depend on how the keep-alive pin 12 at the P202 rear connector is terminated.

If P202-12 is wired to the aircraft battery (Keep-Alive), the displayed frequencies will be the last used active and standby frequencies prior to receiver turn off.

If P202-12 is wired to ground, the displayed frequencies will be the preset Active 200 KHz and STBY 400 KHz.

If P202-12 is left open circuited, the displayed frequencies could be any random valid frequency; however, they would be predisposed to display Active 200 KHz and STBY 400 KHz because, if the microprocessor reads an illegal frequency code from the memory register, the preset frequencies will be displayed.

3.4.7.4 RECEIVER AUDIO MUTING

When the receiver is in the ADF or ANT mode of operation, the receiver audio will be automatically muted when the following conditions occur:

1. During selection or changing of the active frequency.
2. When the receiver is NOT locked-on to a station.

When the receiver is in the ADF BFO mode of operation, there is audio muting only when the active frequency is changed.

2.6 MECHANICAL INSTALLATION

This Section provides the mechanical installation steps for mounting the tray and the rear connector.

2.6.1 Tray Lock

The tray has a built-in spring locking device. When the Unit is positioned into the tray's track and slid into the tray the tension (lock) spring contacts the Unit. When the Unit's connector(s) touch the tray connectors an additional set of tension springs can be felt holding back the inward direction of the Unit. At this point using firm pressure the Unit will continue inward approximately a half-inch stopping as the forward tension/locking spring "clicks" into position. The Unit is now locked in place.

Removal of the Unit requires an extraction tool. Place the tool into the small hole provided in the right corner and push into the hole. This action clears the forward tension spring from the locking detent, and due to the rear springs, the Unit will "pop" outward an inch or two. The Unit is now disconnected from the rear connector(s) and the tray lock, and is ready to be slid out of the tray.

2.6.2 Mechanical - Tray

Upon removing the Unit from its shipping container, the Unit must be removed from its mounting tray.

Position the assemblies on a flat surface, place a block behind it as shown in Figure 2-9. Insert the key straight into the key hole in the trim panel, exert sufficient pressure to release the spring lock. Upon release the tension (eject) springs will "pop" the Unit outward, freeing it. SAVE THE KEY.

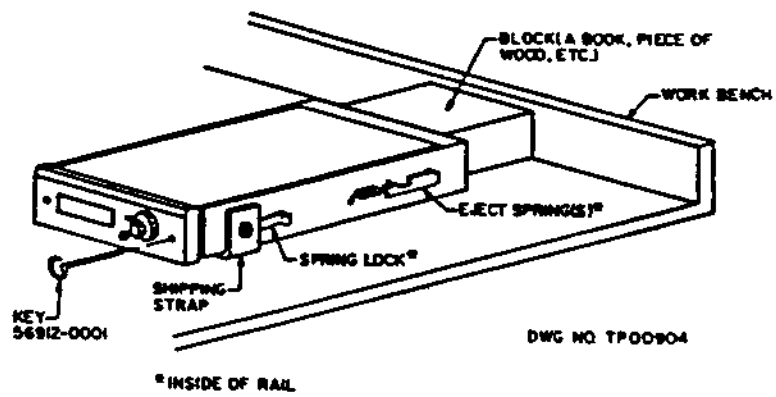


FIGURE 2-9. TRAY LOCK