WAR DEPARTMENT

AIRCRAFT RADIO LABORATORY

PRELIMINARY INSTRUCTIONS

FOR

REELS RL-41 and RL-42 and REEL CONTROL BOX BC-461

WRIGHT FIELD

DAYTON, OHIO

R. & R. DAYTON 3-20-42 15,000 COPIES

SAFETY TO HUMAN LIFE

Operation of this equipment involves the use of high voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. Do not touch antenna wire or reel bobbin when transmitter is operating.

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REELS RL-41 and RL-42
and REEL CONTROL BOX BC-461

I. GENERAL DESCRIPTION

Reel RL-41 or RL-42 and Reel Control Box BC-461 are designed for use together in aircraft for the purpose of remotely controlling the ejection and retraction of trailing wire antenna. The approximate number of feet of extended wire is indicated directly on the face of the Reel Control Box BC-461. The Reels RL-41 and RL-42 differ only in that Reel RL-41 has incorporated Motor MO-13-A designed for 12 volt operation and Reel RL-42 has incorporated Motor MO-14-A designed for 24 volt operation. Other than the differences of motors and name-plates Reels RL-41 and RL-42 are identical and all other parts are interchangeable.

The weights of the components of a reel equipment are as follows:

Reel RL-41 or RL-42 ..... 5.25 lbs.
Reel Control Box BC-461 ..... 1.08 lbs.
Tuning Shaft MC-215 ..... 0.125 lbs. per ft.

REEL RL-41.

Reel RL-41 consists of the reel proper and its associated Bobbin M-215. The reel is so designed with limit switches that when set at the control box to reel out wire no reeling out will be obtained until the tension of the wire at the bobbin is at least 10 ounces. When set at the control box to reel in wire, the wire will be reeled in until the tension of the wire reaches 12 to 15 pounds at which time the reel will turn itself off until this tension has been relieved. The Motor MO-13-A has incorporated an electromagnetic clutch which releases the motor from the reel mechanism whenever the electrical circuit is opened. This action prevents overtravel and allows fine adjustment of antenna length.

Power is obtained from 10 to 14 volts d.c. supply on the airplane. The current drain is 2.8 amperes at 14 volts input while reeling out wire and is 4.8 amperes at 14 volts input while reeling in wire.

The maximum wire capacity of Bobbin M-215 is 200 feet of Wire W-106-A.

The electrostatic capacity of the Reel RL-41 complete with a fully loaded Bobbin M-215 is approximately 25 mmfds.

The breakdown voltage of Reel RL-41 is in excess of 10,000 volts rms as measured with 60 cycle voltage.

The Bobbin M-215 may be quickly detached from the reel by means of a snap slide.

The speed of reeling in or reeling out wire is approximately 100 ft. per minute.

REEL RL-42.

Reel RL-42 is similar in all details, as described above, to RL-41 except with regard to power.

Power is obtained from the 22 to 30 volts d.c. supply on the airplane. The current drain is 1.2 amperes at 28 volts input while the reel is reeling out wire and is 2.2 amperes at 28 volts input while reeling in wire.

REEL CONTROL BOX BC-461.

The Reel Control Box BC-461 consists of a box in which is mounted a warning light, a reel control Switch SW-154, a Counter M-214 and a Socket SO-92. The revolution counter is operated by means of a Tuning Shaft MC-215 which is connected directly from the control box to the reel.

The Control Box BC-461 is used either with Reel RL-41 or RL-42. The only precaution necessary is to be sure that the correct voltage lamp is in the warning light.

A reset knob is provided to the left of the counter to enable the operator to reset the counter quickly to zero.

The reel bobbin is so designed that the length of wire reeled out, or in, is very close to one foot per revolution. The counter on the control box indicates revolutions of the bobbin so that the counter on the control box shows very closely the length of the trailing wire in feet.

The warning light is wired through the "IN" limit switch and is cut off when the tension on the wire exceeds the amount necessary to operate the "IN" limit switch. This ordinarily occurs when the reel has fully retracted the antenna wire. The warning light may also be wired through a landing gear switch which will cause the light to be extinguished when the landing gear is retracted. This connection will warn the operator that his antenna is not retracted when the landing gear is put in the landing position.

CORDS.

No connection cords are furnished as the wiring for the reel and control box is usually built into the airplane.

II. INSTALLATION

The Reel RL-41 or RL-42 and Control Box BC-461 are installed in the places provided on the airplane, preferably with the axis of the motor parallel to the axis of flight and the cable plugs screwed into the receptacles provided, one each on the reel and control box.

The Tuning Shaft MC-215 should be kept as short and have as few bends as possible and should be free running. After fastening the Tuning Shaft MC-215 to the Reel Control Box BC-461 the spline at the reel end should be rotated to make sure that the shaft is free and the counter in the control box is indicating properly. This is particularly important as any binding of the shaft will prevent the reel from reeling out wire.

The bobbin cover with its 90° opening may be rotated on the reel as it is held by a lip on the bobbin cover back plate. The bobbin cover should be rotated so that the wire opening will clear the wire in the "all in" and "all out" position. See fig. 7.

The Wire W-106-A should be fastened to the swivel on the bobbin so that the swivel is free to turn and the wire end does not cut into the bobbin. See fig. 7. This fastening of the wire to allow a free swivel action is important to prevent the wire from being bent and from breaking when the wire goes to the all out position. The swivel may be removed from the bobbin by removing the swivel mounting screw and the wrapped wire should be held by soldering. When remounting the swivel be sure that it is free to rotate.

The Bobbin M-215 is attached to the reel arbor with a snap slide which should be secured with safety wire.

The wire may be wound on the reel bobbin by using the reel installed in the airplane. The turns counter on the Control Box BC-461 will give an indication of the number of feet wound onto the bobbin if the reading before winding is started is noted. The turns recorded in this case would be subtracted from the original recorded figure to determine the number of turns on the reel. The reel winds very close to one foot per revolution and the counter indicates revolutions.

Care must be taken when winding the wire on the bobbin and not using the reel. The wire must be wound on the bobbin as indicated on the engraved bobbin flange or the reel will be inoperative.

Two hundred feet of Wire W-106-A may be wound on the bobbin but it is recommended for best service that only the amount required be wound on the reel.

The fairlead must be securely mounted in position as the action of the reel in drawing the weight securely up against fairlead will cause the fairlead to become displaced if not securely fastened.

The stainless steel leader on the Weight WT-7-A should be short enough so that the eye to which the Wire W-106-A is fastened does not come through the Connector Clamp MC-163. See fig. 7. A minimum of 3 inches is to be maintained between this eye and the top of the connector.

The antenna connection is made to the Connector Clamp MC-163 in the usual way. See fig. 7.

III. PREPARATION FOR USE

While the Reel RL-41 is designed for 12 volts and the Reel RL-42 is designed for 24 volts, the control box for each reel is the same, namely Control Box BC-461. The control boxes are normally supplied with 24 volt Lamps LM-38, in the warning light, but for 12 volt operation this lamp may be changed to the 12 volt Lamp LM-37.

A preliminary check of the reel operation should be made with the airplane on the ground. The switch of the Reel Control Box BC-461 should be thrown to the "OUT" position. The reel should then reel out wire until the weight touches the ground at which time the reel should stop reeling out wire automatically but it will be noted that the motor will coast freely to a stop disengaged from the reel bobbin. The warning light on the control box will go on as soon as the reel first begins to reel out wire. The switch on the control box may then be thrown to the "IN" position when the reel should reel wire in until the weight is snug against the fairlead bell. The reel will then stop automatically, the warning light will go out and the motor will again coast freely to a stop. The control box switch should then be thrown to the "OFF" position. To check further the operation of the reel, the control box switch should be thrown to the "OUT" position and the weight taken back by hand about fifty feet. The control box switch is then thrown to the "IN" position and the reel will then reel in the wire dragging the weight across the ground until the wire is again all in, the weight snug against the fairlead bell, the reel automatically stopped, and the warning light extinguished.

IV. OPERATION

The counter on the Control Box BC-461 should be set to zero by means of the reset knob to the left of the counter window. It should

be noted that the reset wheel only engages when the wheel is rotated with a downward motion of the wheel and also that it may not be possible to reset exactly to zero in which case the counter should be reset to some position between "999" and "000".

The antenna reel system is now ready for operation and the antenna wire may be reeled out or in as desired by using the switch on the control box. When the desired length is attained as indicated either by the counter or by a tuning indication, the switch on the control box should be thrown to "OFF". When it is desired to retract the antenna, the switch should be thrown to the "IN" position which will automatically retract the antenna and turn off the reel when the antenna is fully retracted. The switch should be thrown to the "OFF" position when the operator is through using the antenna reel but it is not necessary to do this immediately upon retracting the antenna.

If the warning light does not go out and merely dims when the antenna weight is fully retracted, this indicates that the automatic "IN" limit switch has failed. The control switch on the Reel Control Box should then be immediately thrown to the "OFF" position to prevent blowing the fuse or damaging the antenna reel motor. The antenna reel can be used in an emergency with the above failure but care must be taken to turn the reel off, as explained above, as soon as the wire is fully retracted.

When the wire is reaching its fully retracted position the warning light may do a certain amount of turning on and off due to rapid oscillation of the antenna weight but in normal operation of the antenna reel the warning light will be completely extinguished when the antenna is fully retracted.

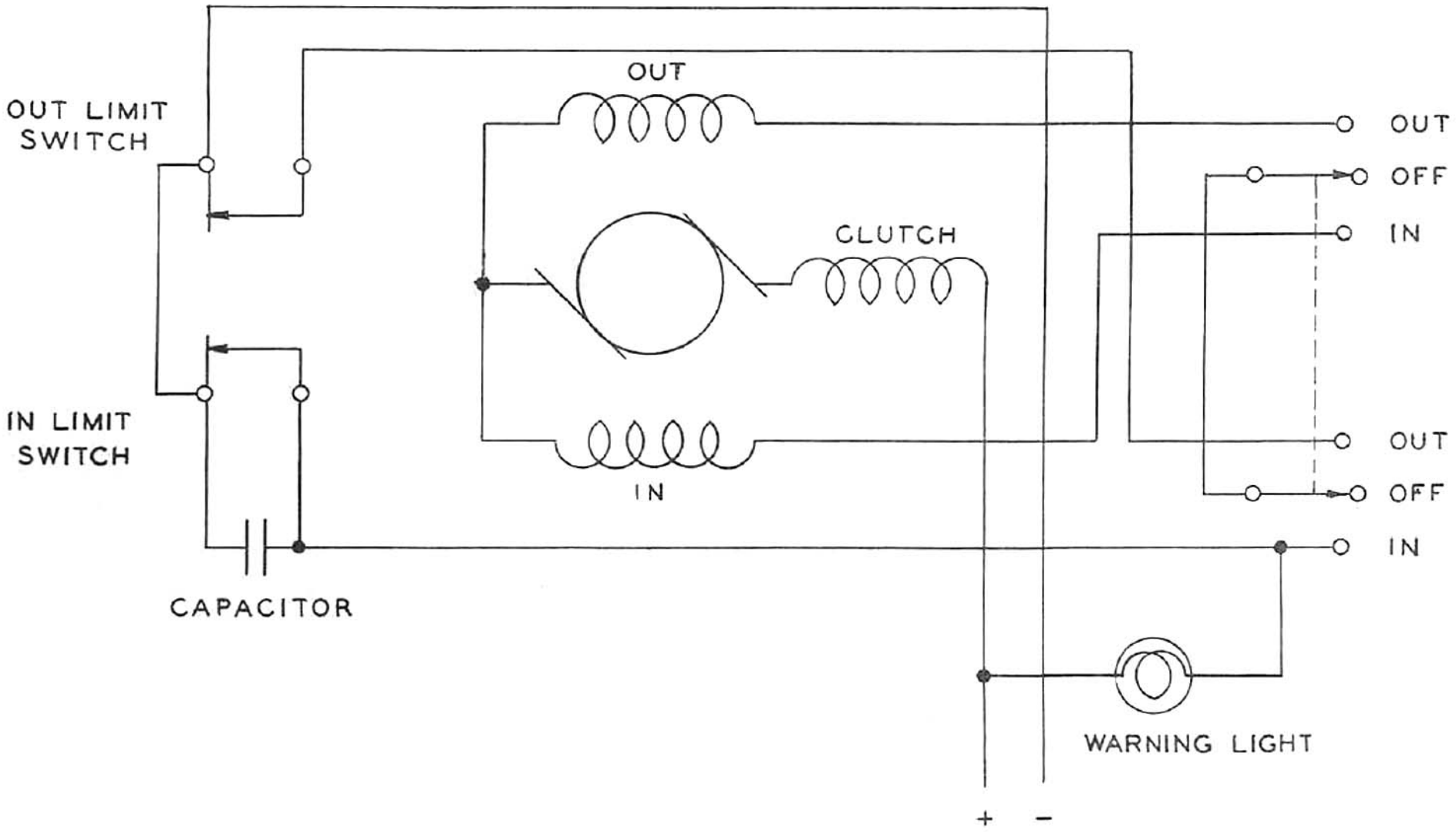


FIG. 1

REEL RL-41 OR RL-42 AND REEL CONTROL BOX BC-461 SCHEMATIC DIAGRAM

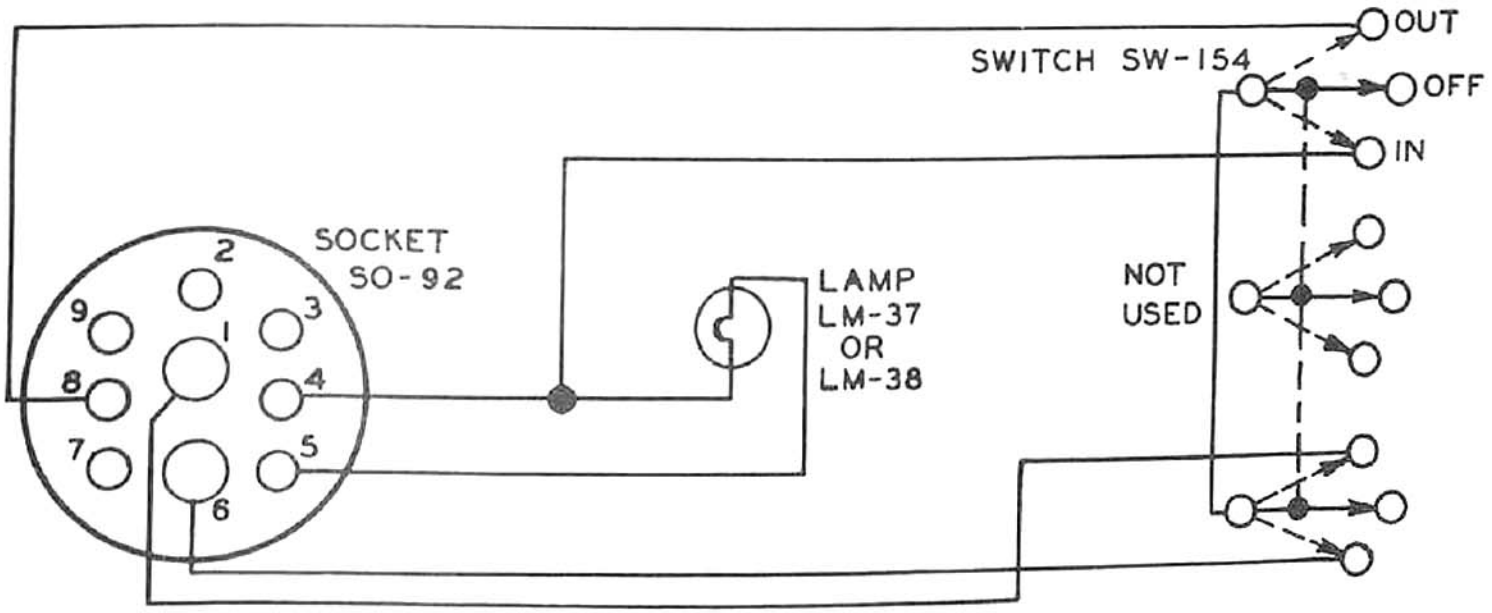


FIG. 2 REEL CONTROL BOX BC-461 CIRCUIT DIAGRAM

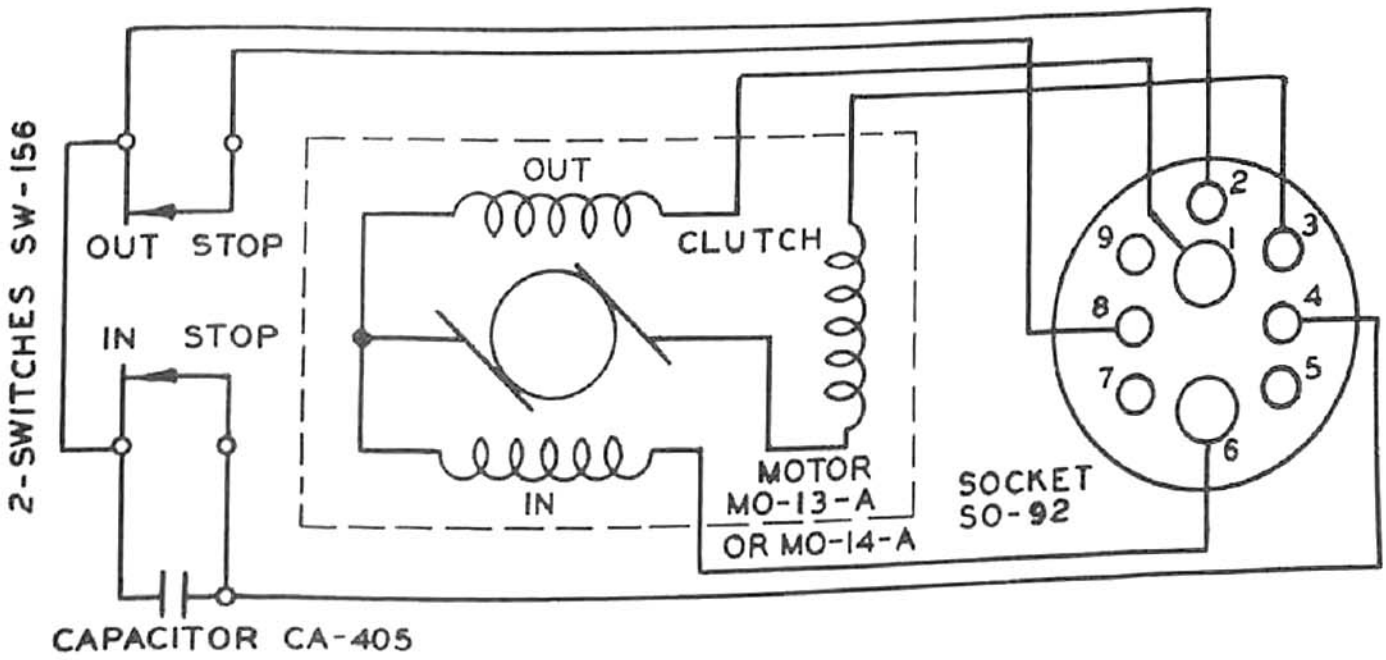
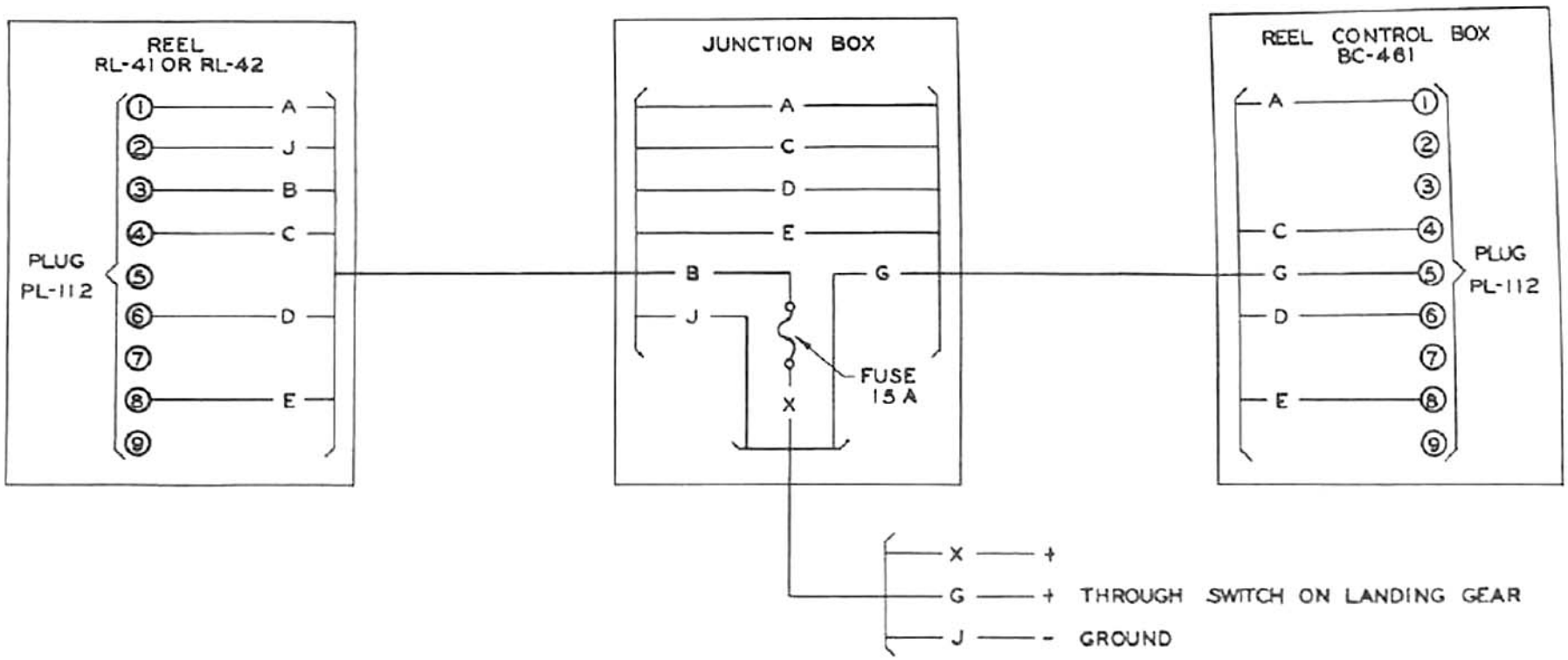


FIG. 3 REEL RL-41 OR RL-42 CIRCUIT DIAGRAM



NOTES:

① + TO BE CONNECTED TO +12 VOLTS FOR RL-41, AND TO +24 VOLTS FOR RL-42.

② LANDING GEAR SWITCH IS CLOSED WHEN GEAR IS IN LANDING POSITION. WHEN LANDING GEAR SWITCH IS NOT USED CONNECT "G" TO "B" AT JUNCTION BOX.

FIG. 4 REEL RL-41 OR RL-42 AND REEL CONTROL BOX BC-461. TYPICAL INTERCONNECTION DIAGRAM

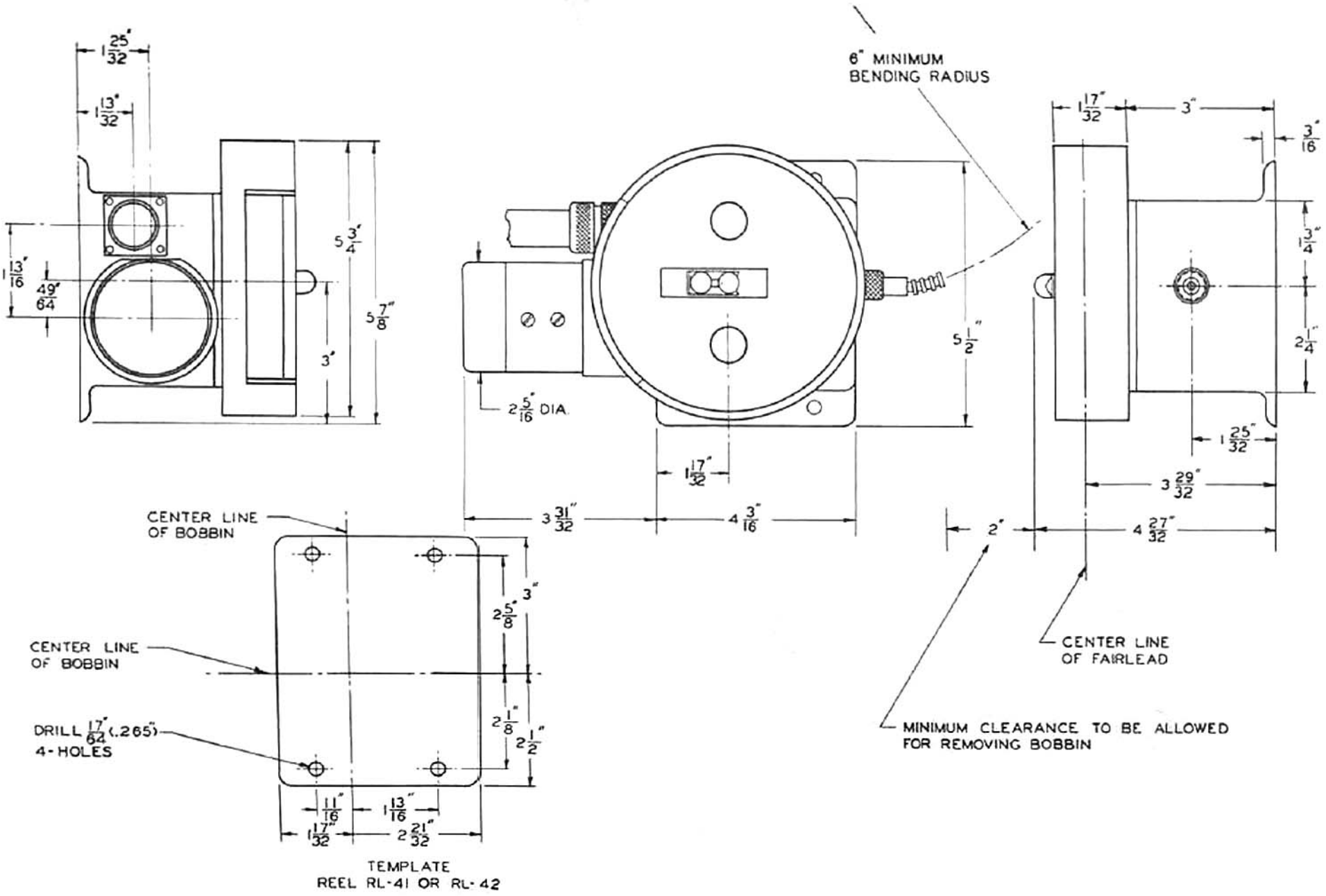
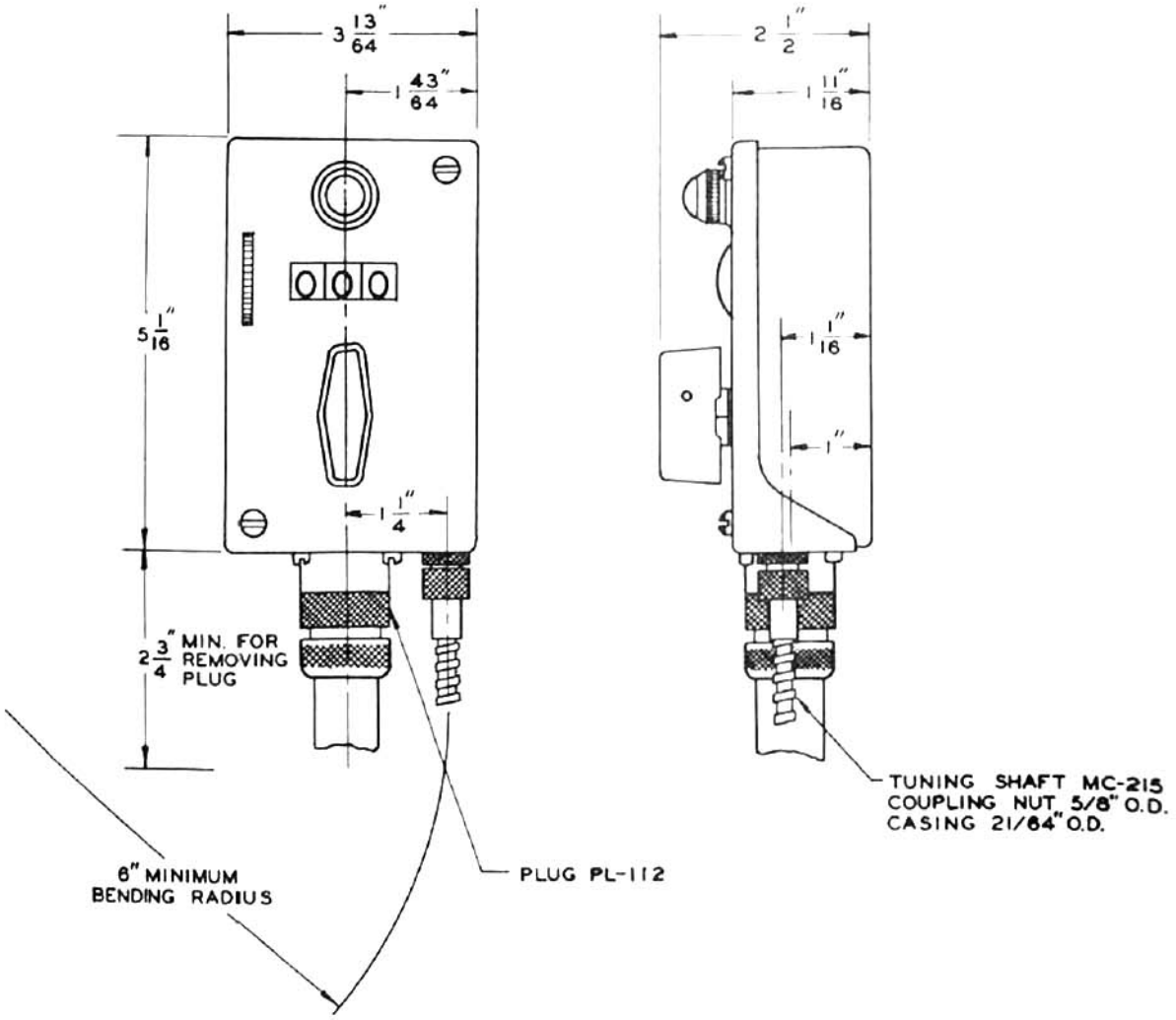


FIG. 5
REEL RL-41 OR RL-42
OUTLINE DIMENSIONAL SKETCH & MOUNTING TEMPLATE



NOTE:

MOUNTING HOLES TO BE DRILLED AT INSTALLATION IN REAR OF CONTROL BOX BC-461 IN ANY AREA EXCEPT DIRECTLY IN BACK OF PILOT LIGHT AND RESET WHEEL.

FIG. 6 OUTLINE DIMENSIONAL SKETCH OF REEL CONTROL BOX BC-461

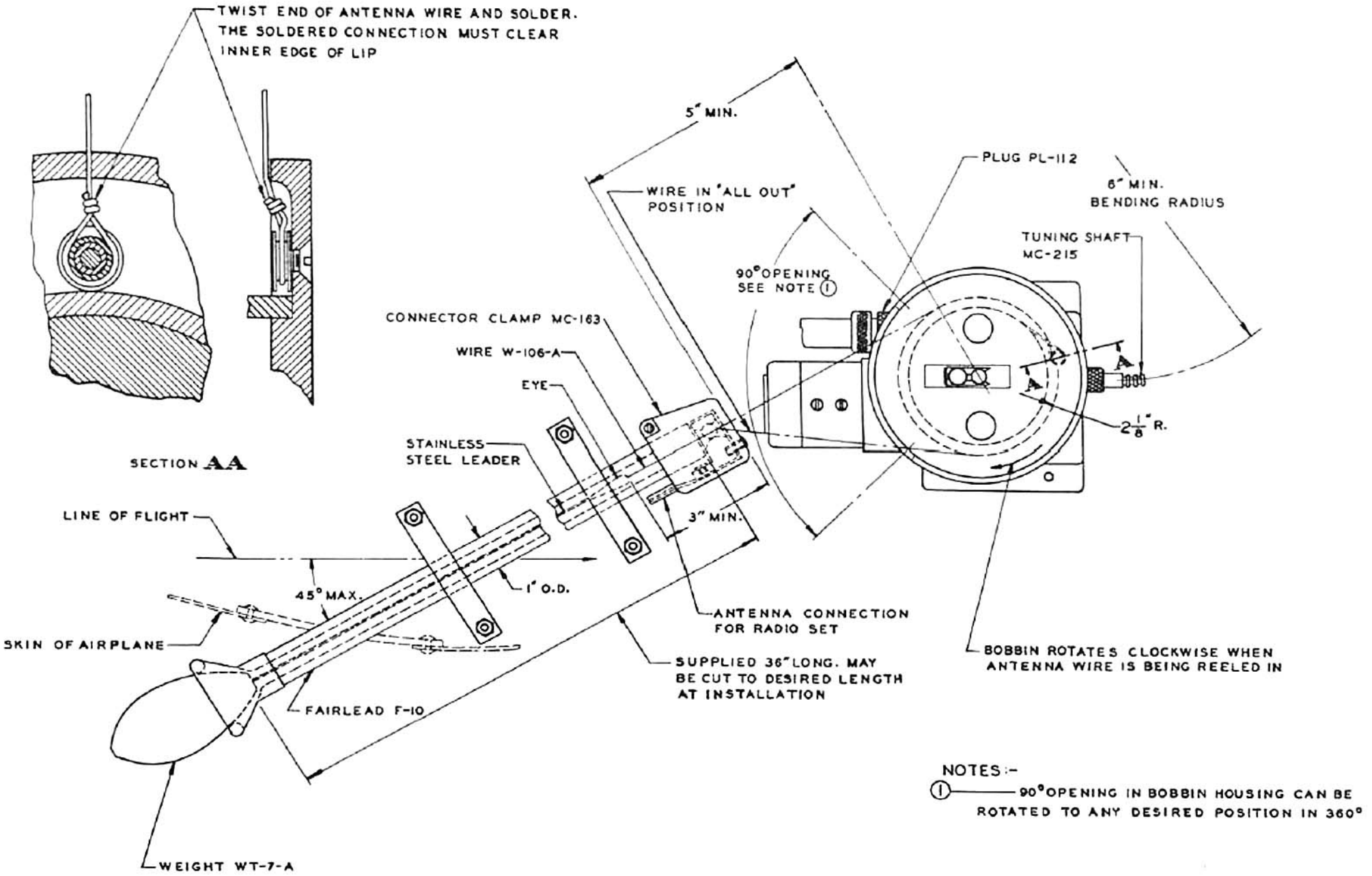


FIG. 7 REEL RL-41 OR RL-42, INSTALLATION