



INSTRUCTIONS

HF AUTOMATIC ANTENNA TUNER

AT-160

Thank you for purchasing the **AT-160 HF AUTOMATIC ANTENNA TUNER**.

This instruction manual applies to the IC-725/726/728/729. For use with other transceivers, refer to the instruction manual of the transceiver. The AT-160 cannot be used with a transceiver in which the instruction manual does not mention connection to the AT-160.

IMPORTANT

READ THIS INSTRUCTION MANUAL CAREFULLY before attempting to operate the antenna tuner.

SAVE THIS INSTRUCTION MANUAL – This instruction manual contains important safety and operating procedures.

PRECAUTIONS

NEVER allow children to touch the antenna tuner.

NEVER let metal, wire or other objects touch any internal parts or connectors on the rear panel of the antenna tuner. This will cause electric shock.

NEVER expose the antenna tuner to rain, snow or any liquids.

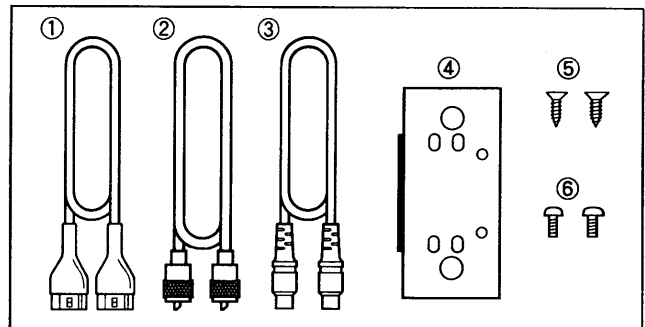
NEVER use the antenna tuner with a damaged or shortened antenna.

AVOID using or placing the antenna tuner in areas with temperatures below -10°C ($+14^{\circ}\text{F}$) or above $+60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$), in excessively dusty environments, or in direct sunlight.

OPERATING NOTES

The AT-160 is designed to match an antenna, which has a VSWR of 3:1 or less, to a transceiver. Therefore, an antenna which has a higher VSWR than 3:1 may not be tuned properly with this antenna tuner.

UNPACKING



Accessories included with the AT-160:		Qty.
①	4-pin cable (OPC-319)	1
②	Antenna cable (OPC-125C)	1
③	7-pin DIN cable (OPC-104)	1
④	Mounting plate	1
⑤	Flat head screws	2
⑥	Round-head screws	2

ANTENNA TUNER ATTACHMENT

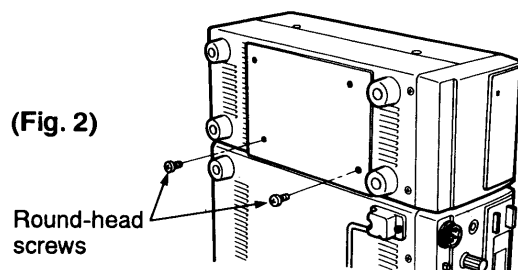
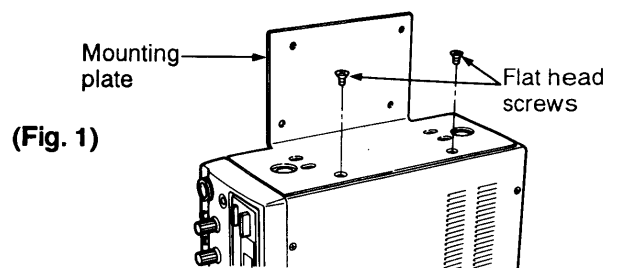
When the optional MB-23 CARRYING HANDLE has been attached, remove either the handle or the rubber feet from the side you want to attach the AT-160 to.

The AT-160 can be attached to either side of the transceiver. Choose a side before attachment.

1) Attach the mounting plate to the desired side of the transceiver with 2 flat head screws as shown in figure 1.

2) Mount the AT-160 to the mounting bracket with 2 round-head screws as shown in figure 2.

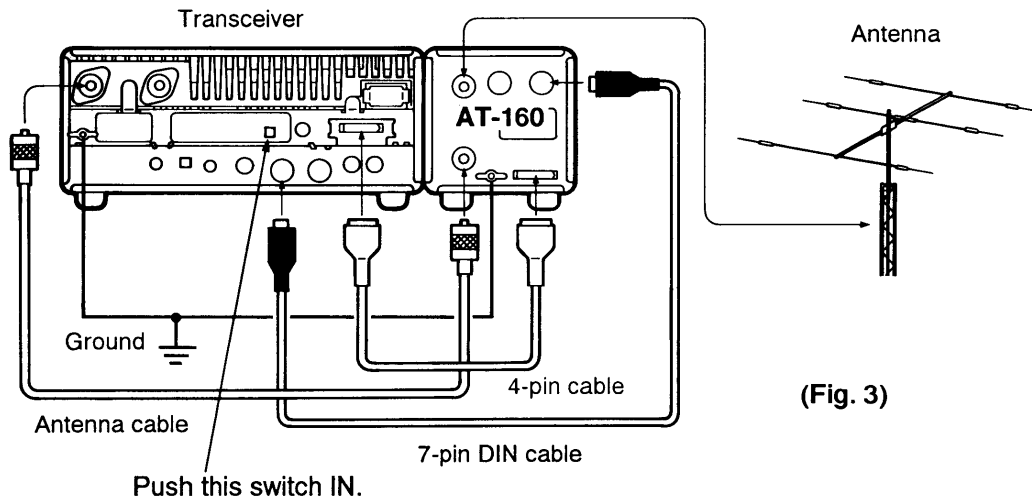
NOTE: For use of the AT-160 with the IC-725 or IC-726, internal switch presetting is necessary before attachment. See the back page for details.



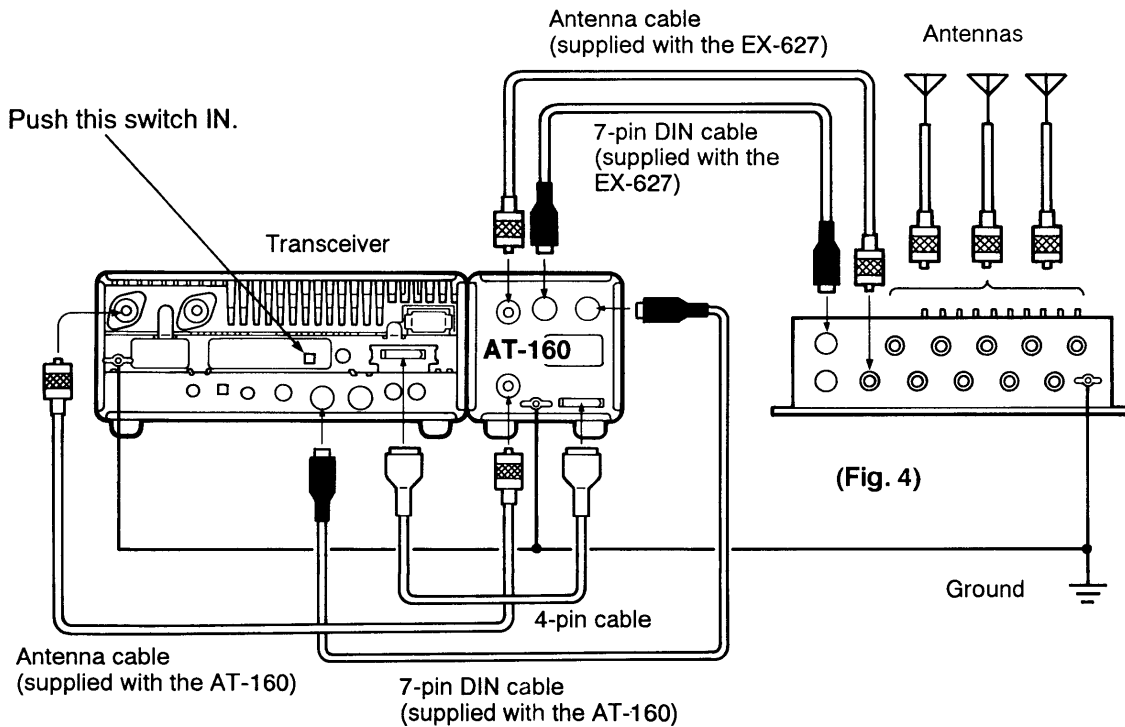
CONNECTIONS

Before making any connections, **BE SURE** to turn the transceiver power **OFF**.
 After making the connections, **BE SURE** to push the tuner selection switch **IN** (for the AT-160).

• AT-160 AND TRANSCEIVER

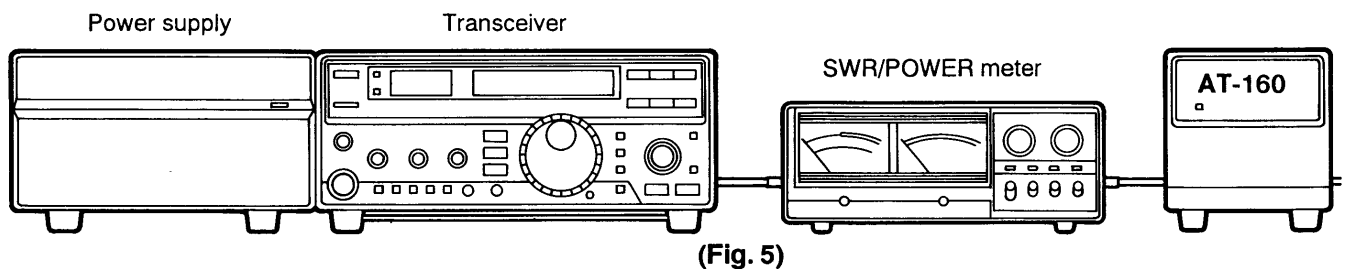


• WHEN USING THE EX-627 AUTOMATIC ANTENNA SELECTOR



• WHEN USING AN SWR/POWER METER

An SWR/POWER meter **MUST** be connected between the transceiver and the AT-160.

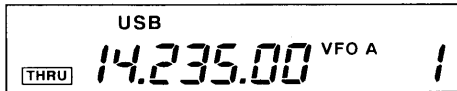


TUNING OPERATIONS

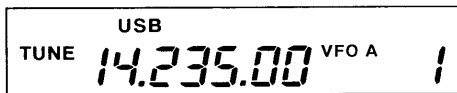
MANUAL TUNING START (PRESET OPERATION)

The manual tuning start should be performed when you first use the AT-160 on a selected band (i. e. when the AT-160 has not yet memorized a preset point), or when you just want to tune the antenna to a displayed frequency before transmission.

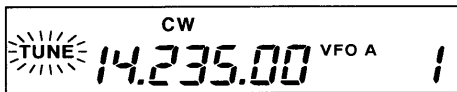
- 1) Turn the transceiver power ON.
 - The AT-160 is activated and "THRU" appears on the function display of the transceiver.



- 2) Push [TUNER] to activate the tuning circuit.
 - "TUNE" appears on the function display of the transceiver.



- 3) Push and hold [TUNER] for 1 sec. to start tuning manually.
 - The transceiver automatically transmits in CW mode and preset tuning is performed.
 - While tuning, "TUNE" blinks.



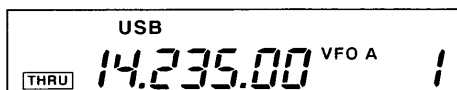
- After tuning, the preset point is automatically memorized in the AT-160.
- If the AT-160 cannot tune the antenna, the tuning circuit is bypassed and the "THRU" indicator lights. In this case, see the box at the bottom right for details.

THROUGH FUNCTION

The tuning circuit in the AT-160 can be bypassed for your convenience.

You should use the through function when the antenna has just matched to the displayed frequency. This will decrease insertion loss.

- 1) Push [FUNC]
 - "FUNC" appears.
- 2) Push [TUNER].
 - The tuning circuit is bypassed and the "THRU" indicator appears.

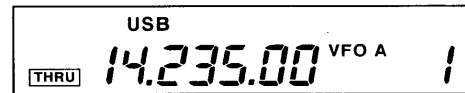


- 3) To activate the tuner again, push [TUNER].
 - "TUNE" appears.

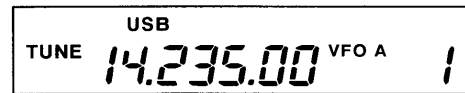
AUTOMATIC TUNING START

Once the AT-160 memorizes the preset points, manual tuning start is not necessary. When you start transmission, the AT-160 automatically tunes the antenna at high speed.

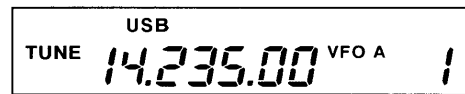
- 1) Turn the transceiver power ON.
 - The AT-160 is activated and "THRU" appears on the function display of the transceiver.



- 2) Push [TUNER] to activate the tuning circuit.
 - The AT-160 automatically presets for the selected band, and "TUNE" appears on the function display of the transceiver.



- 3) Start transmission in any mode.
 - The AT-160 automatically tunes the antenna.
 - In SSB mode tuning may take more time than in other modes because the full carrier is not emitted in SSB mode.



When the tuning is completed, the condition is automatically memorized in the AT-160 as a preset point for the band.

When the AT-160 cannot tune the antenna:

Depending on the antenna load or the supplied power, the AT-160 may not be able to tune the antenna in 7 sec., and the through function will be activated.

In this case, transmit a continuous carrier in CW or FM mode* for 10~15 sec. to tune the antenna.

*An optional AM•FM UNIT is required for some transceivers.

If the AT-160 cannot tune the antenna even after the procedure described above, stop transmitting and check that:

- The VSWR of the connected antenna is 3:1 or less.
- The supplied power voltage is in the range of 12~15.5 V.

USING THE AT-160 WITH THE IC-725 OR IC-726

The AT-160 can be used with the IC-725 or IC-726, however, operation is different from with other transceivers. This is because the CPU in the IC-725/726 cannot control the AT-160.

• INTERNAL SWITCH PRESETTING

For use with the IC-725/726, an internal switch must be set in the AT-160 before operation. Refer to figure 6 at right.

- 1) Unscrew the 8 screws as shown and remove the top cover.
- 2) Set the switch for IC-725/726 use.
- 3) Replace the top cover and the 8 screws.

• CONNECTION

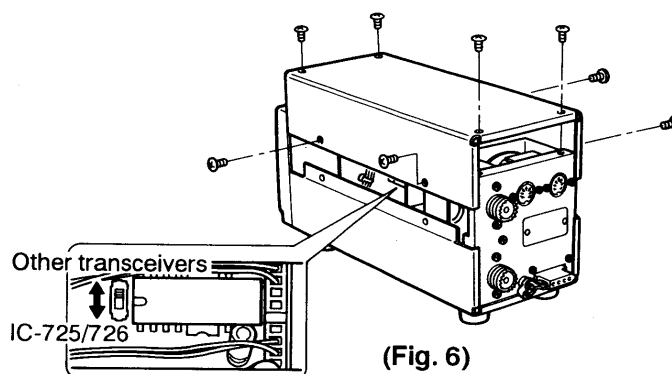
Connect the AT-160 to the IC-725/726 as shown on the inside, left page. All cables must be connected in the same way as for other transceivers.

• OPERATION

The [TUNER] switch on the IC-725/726 front panel does not function with the AT-160. Therefore manual tuning start is impossible – only automatic tuning start is possible.

- 1) Turn the transceiver power ON.
 - The AT-160 is activated and "THRU" appears on the function display of the transceiver. "THRU" is always indicated when connecting the AT-160.
- 2) Start transmission in any mode.
 - The AT-160 automatically tunes the antenna.
 - In SSB mode, tuning may take more time than in other modes, because the full carrier is not emitted in SSB mode.
 - When an SWR meter has been connected, an SWR of 1.5 or less is indicated when tuning is complete.
 - Note that the "TUNE" indicator does not appear during or after tuning.

We recommend using the AT-160 with an SWR meter. Without one it is difficult to judge whether tuning has been completed or not.



(Fig. 6)

How to judge whether tuning has been completed or not without an SWR meter.

When tuning is complete:

- The RF meter stops swinging at the point at which power is set by the [RF POWER] control while tuning in CW or FM mode.
- Whistling in SSB mode may have the same effect as transmitting in CW or FM mode.

When tuning is incomplete (or during tuning):

- The RF meter continues swinging until transmitting stops.
- You may hear the whirring of the AT-160's motor.

NOTE 1: When the AT-160 cannot tune the antenna, tuning will go on indefinitely with the IC-725/726. In this case, stop transmitting and check the antenna and power supply voltage.

NOTE 2: You can manually bypass the tuning circuit by pulling out the 4-pin connector on the AT-160's rear panel. **NEVER** pull out the connector during transmission.

AT-160 SPECIFICATIONS

- **Operating band** : 1.8 MHz band ~ 28 MHz band
- **Input impedance** : 50 Ω
- **Matching impedance range**: 16.7~150 Ω (unbalanced)
(less than VSWR 3:1)
- **Standard input power** : 100 W (150 W max.)
- **Min. operating input power**: 8 W
- **Waiting time** : Less than 3 sec.
- **Waiting time for band changing**
- **Tuning time** : Less than 7 sec.
- **Tuning accuracy** : VSWR 1.5:1 or less

- **Insertion loss** : 3.5-28 MHz band Less than 0.5 dB
(after tuning) 1.8 MHz band Less than 1.0 dB
- **Power supply requirement** : 13.8 V DC
(supplied from the transceiver)
- **Current drain** : Less than 500 mA
- **Usable temperature range** : -10 $^{\circ}$ C ~ +60 $^{\circ}$ C; +14 $^{\circ}$ F ~ +140 $^{\circ}$ F
- **Dimensions** : 94(W) \times 94(H) \times 239(D) mm;
(projections not included) 3.7(W) \times 3.7(H) \times 9.4(D) in
- **Weight** : Approx. 2.5 kg; 5.5 lb