

# BOGEN



## MODEL BT35A

TRANSISTOR MOBILE  
40 WATT P.A. AMPLIFIER

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**INSTALLATION AND OPERATING MANUAL**  
READ THOROUGHLY BEFORE OPERATING EQUIPMENT

## GENERAL DESCRIPTION

The model BT35A represents the latest design in compact high output amplifiers. This amplifier is intended for use in mobile and portable public address work. Separate inputs and individual gain controls are provided for a low impedance microphone, and for high level auxiliary equipment (such as a tuner, tape recorder, and crystal or ceramic phono player). A function selector switch permits selection of the input source.

The Bogen BT35A incorporates a radio input circuit so that the output (speaker voice coil) of a two-way radio (any radio for that matter) may be connected directly to the amplifier. This enables the two-way radio transmission to be heard outside the vehicle and at considerable distances. Hence a policeman, fireman or director of Civil Defense may leave his vehicle without fear of missing a vital message being transmitted over the two-way radio. The possible applications are varied (e.g. the amplifier can be used to distribute music at political rallies, etc.). The BT35A is excellent for such applications as police, fire department, civil defense, marine, military or general commercial use.

The BT35A is instantly ready for use since it employs transistors and requires no warm-up time. Hum is non-existent with this type of transistorized amplifier. A protective circuit and fuse provide absolute protection of the unit from inadvertent reversal of battery connections or the shorting of inputs or outputs to the chassis. The amplifier will operate

from the battery of any motor vehicle regardless of grounding polarity.

The unit can be operated from any 12-15 volt DC source. The amplifier supplies a full 40 watts output at a maximum power supply current drain of 4 amperes. The quiescent current drain is 0.5 amperes. The frequency response is optimized (150 to 15,000 cps) to provide maximum intelligibility. The speaker used with the unit may have an impedance of 4, 8, or 16 ohms and should be capable of handling a minimum of 40 watts.

The BT35A is exceptionally temperature stable. Operation will not be affected by extreme climatic conditions from  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ) to  $+65^{\circ}\text{C}$  ( $149^{\circ}\text{F}$ ). The amplifier is compact, lightweight and portable and very rugged in construction. The unit is splash proof if mounted with the control panel tilted upward. This enables the unit to be used in areas subjected to rain or spray. A gasket seals the chassis in the cabinet.

The BT35A incorporates a new concept in mounting and is designed for quick installation. The unit has a "U" type adjustable bracket and thumbscrews which permit mounting on any convenient surface (vehicle dashboard, vehicle frame, etc.). The adjustable bracket permits positioning of the unit to any desired angle. The unit weighs only 6 lbs and is compact in size measuring  $8'' \times 6\frac{1}{4}'' \times 3''$ .

## SPECIFICATIONS

**OUTPUT POWER:** 40 watts; peak power 55 watts.  
**RESPONSE:** Optimized for maximum intelligibility  
150 Hz to 15 kHz,  $\pm 3\text{db}$ .  
**GAIN:** Microphone Input 110db.  
Radio-Aux. Input 90db.  
**DISTORTION:** Less than 10% at full output.  
**NOISE** (Below Rated Output): Microphone -90db.  
Radio - Aux. -95db.  
**SENSITIVITY:** Microphone 1 millivolt.  
Radio and Aux. 0.40 volt.  
**FULL RATED POWER TEMPERATURE RANGE:**  $-22$   
to  $+149$  degrees Fahrenheit.

**WARM UP TIME:** Instantaneous.

**CONTROLS:** Input Selector/Power Switch, Microphone Volume, Radio-Aux. Volume.

**INPUTS:** (3) Microphone (50-500 ohms, 200 ohms nominal), Radio, Auxiliary.

**OUTPUT IMPEDANCE:** 4, 8 or 16 ohms.

**CURRENT DRAIN:** 500 ma quiescent, 4.4 amps at full rated output.

**WEIGHT:** 6 lbs. (8 lbs. shipping weight).

**DIMENSIONS:**  $8'' \times 6\frac{1}{4}'' \times 3''$ .

## INSTALLATION

### MOUNTING

The BT35A may be mounted in any position and on practically any surface. A typical installation onto the underside of an auto dashboard is illustrated in figure 1. The unit may

also be mounted on the frame of the vehicle, or to any convenient surface.

To attach the "U" bracket to the BT35A case use the thumbscrews provided. Before tightening thumbscrews, adjust the BT35A to desired angle.

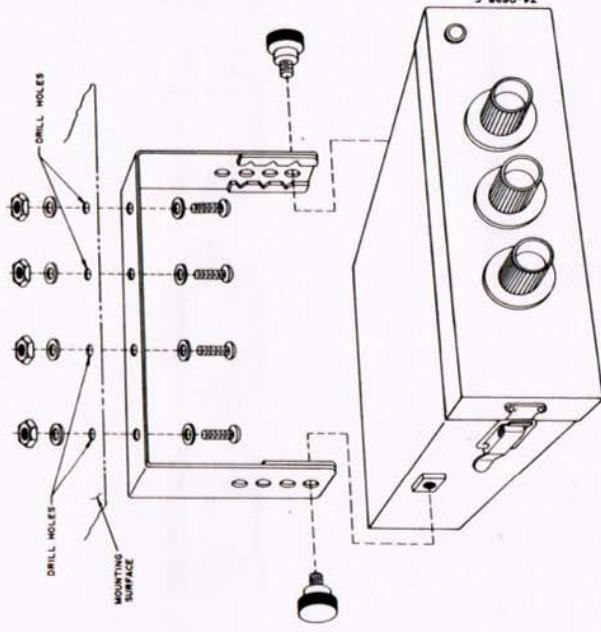


Figure 1 - Typical Installation

### CONNECTIONS

**POWER:** Two conductors (black and red) consisting of 4 feet each of No. 14 AWG wire are provided with the BT35A for making the power connections. Connect the black wire to the negative side, marked with a minus sign (-), of the DC source. Connect the red wire to the positive side of the DC source, marked with a plus (+) sign.

The BT35A is shipped with negative (-) side grounded. If the battery being used has the positive (+) side grounded, move the shorting strap from the negative to the positive terminal. If the red and black wires are not connected properly the 6 ampere fuse may blow. If the fuse blows, check polarity carefully and connect properly before replacing fuse and turning on amplifier. Operation from either a positive or negative grounded system is equally permissible. The DC power supply voltage should not exceed 15 volts.

**RADIO:** The output of any radio (e.g. two-way radio) can be connected to the radio input of the BT35A. Connect the

two wires from the radio speaker voice coil to a phono type plug. Insert this phono plug into the RADIO input receptacle on the rear of the BT35A. Do not disconnect anything in the radio.

**MICROPHONE:** Any low impedance (500 ohms or less, 200 ohms nominal) microphone may be used with this amplifier. The microphone should be connected to the amplifier using shielded audio cable and a microphone connector Amphenol type 75-MC1F (or equivalent). A plastic cased accessory microphone Bogen type 404B with 75-MC1F connector is recommended.

**AUXILIARY:** This is a high impedance level input for use with any phonograph having a crystal or ceramic cartridge, a tape recorder (with a built-in preamplifier), or a tuner. Terminate the output (shielded audio cable) of this type of program source with a phono plug. Plug auxiliary source into auxiliary input socket.

**SPEAKERS:** A terminal strip on the rear of the BT35A chassis provides output connections to speakers. The amplifier may be used in conjunction with speakers rated at 4, 8, and 16 ohms. Correct impedance matching between the amplifier output and all speaker systems is essential to obtain maximum power.

The output transformer secondary is completely isolated electrically from all other circuits and grounds. Therefore accidental shorting of speaker output leads to the grounds will not affect amplifier operation.

**CAUTION:** With Alternator type charging systems or any system giving extreme voltage variations, connect the power leads directly to the battery terminals.

The BT35A contains RF and line filters. Losses due to small size wire or poor connections (i.e. vehicle frame connections) may defeat the built-in filter action of the amplifier. This will result in noise being audible.

For best results use a microphone with case at floating potential (both center and outside leads insulated from case).

**CAUTION:** Do not short the shield (or case) of the microphone to ground (or vehicle frame) in a positive grounded system. It is recommended that a completely insulated (plastic cased) microphone be used.

## OPERATION

### TO AMPLIFY RADIO OUTPUT

1. Rotate SELECTOR control switch to RADIO position. Panel lamp will go on.
2. Adjust the RAD-AUX volume control to provide the desired output level. If necessary adjust the volume control on the radio receiver.

### TO USE AS MICROPHONE AMPLIFIER

1. Rotate SELECTOR control switch to MIC position.
2. Make a speech test, using the microphone, to determine the desired setting, of the MIC volume control. Starting with the MIC control in the maximum counterclockwise position (∞) rotate the control clockwise (∞) until the required sound level is reached. If acoustic feedback (squealing) occurs, either move the microphone so as to increase the dis-

tance between it and the loudspeakers or reduce the setting of the MIC volume control.

### TO USE AS AUXILIARY AMPLIFIER

1. Rotate the SELECTOR control switch to AUX position. (Auxiliary input source should have been connected previously as explained in CONNECTIONS section.)
2. Adjust the RAD-AUX volume control to provide the desired output level.

**NOTE:** Because of the low quiescent current drain of the BT35A, the unit may be left on (in the RADIO position) for extended periods while nothing is being amplified, without excessive drain from the vehicles battery.

# MAINTENANCE

## BOGEN SERVICE

We are interested in your Bogen unit for as long as you have it. If trouble ever develops with your unit, please do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Division, P. O. Box 500, Paramus, New Jersey 07652.

When communicating with us, give the model number and series number of your unit. Describe the difficulty encountered and the effects each operating control has upon the symptoms of trouble. Include details on electrical connections to associated equipment and list such equipment.

When we receive this information, we will send you service information if the trouble appears to be simple. If trouble requires more extensive servicing, we shall send you the name and address of the nearest Bogen authorized service agency to which you can and send your unit for repair.

When shipping your unit, pack instrument well using sufficient filler material to prevent damage in transit. Send unit, fully insured and prepaid, via railway express. Do not ship via parcel post unless so instructed. The unit will be promptly repaired and returned to you prepaid.

## PREVENTIVE MAINTENANCE

A thorough check of the complete system at regular intervals, as a matter of routine, greatly reduces the possibility of failure when system is in use. The output should be checked when microphone is spoken into, or signal source operated. Tests under all operating conditions should be performed. Transistors should not be removed for checking unless they are suspected of being defective.

## SERVICE CHECKS

The following service checks are recommended in the event of failure or improper operation of the equipment:

1. Check all fuses. Be sure SELECTOR switch is in off position when checking fuses. The 6-ampere fuse, which is located in a holder on the rear of the chassis, is an overload protector. To replace the fuse, turn the fuse holder cap counterclockwise, press it in, and remove both cap and fuse. Insert another fuse of the same rating and replace the cap.

Use only a fuse of the same rating as one taken out; do not replace fuse with one of higher current rating. If a second fuse blows, do not attempt to further operate equipment until fault has been located and corrected. Consult an experienced technician or Bogen representative for inspection of the unit.

2. Inspect equipment visually. Before proceeding to analyze trouble further, a quick and thorough visual inspection should be made to locate any possible loose, broken, dirty

or intermittent connections or damaged components. Check all input and output connections.

3. Check that the 12-volt supply voltage is correct and is reaching the unit. Check microphone and speaker connections to the amplifier.

4. Check speakers and microphone by substitution, or by connecting them to an amplifier which is known to be in proper working order.

5. If it has been determined that the amplifier is defective, standard circuit tracing procedures should be used to isolate the defective stage. After the defective stage has been isolated, voltage measurements should be used to locate the defective component.

## REMOVING CHASSIS

To remove BT35A chassis from case, first disconnect all input and output connections from the rear of the amplifier. Remove knobs from front panel. Disengage latches from locking clasps and remove case front cover and amplifier chassis.

## NOISE

A possible source of noise (and distortion) is the vehicle's battery. A run-down or old battery has a high internal resistance, which is in series with the battery power supply. This internal resistance, if high enough, will affect the regulation of the power supply, causing distortion on high level signal peaks, when the amplifier draws maximum current. Noise generated in the vehicle's electrical system also appears across the internal resistance of a run-down battery and is therefore in series with the amplifier's power supply. The battery should, therefore, be checked regularly to be sure that it is fully charged and in good operating condition.

## TRANSISTORS

Transistors show little, if any, deterioration with age, and, at the present time are considerably more reliable than the best vacuum tubes. If the set is inoperative, it is generally safe to assume that the transistors have not failed and that the trouble is elsewhere in the equipment.

Transistors and semiconductor diodes do not ordinarily require testing. When the amplifier does not perform properly and it is suspected that transistors or diodes are at fault, only a qualified technician should test them.

If a power transistor (screw-on type) must be replaced, be certain that no foreign matter is on heat sink or transistor. Brush Dow Corning No. 3 Silicon Grease Compound (or equivalent) on the heat sink and transistor to insure proper heat transfer to heat sink.

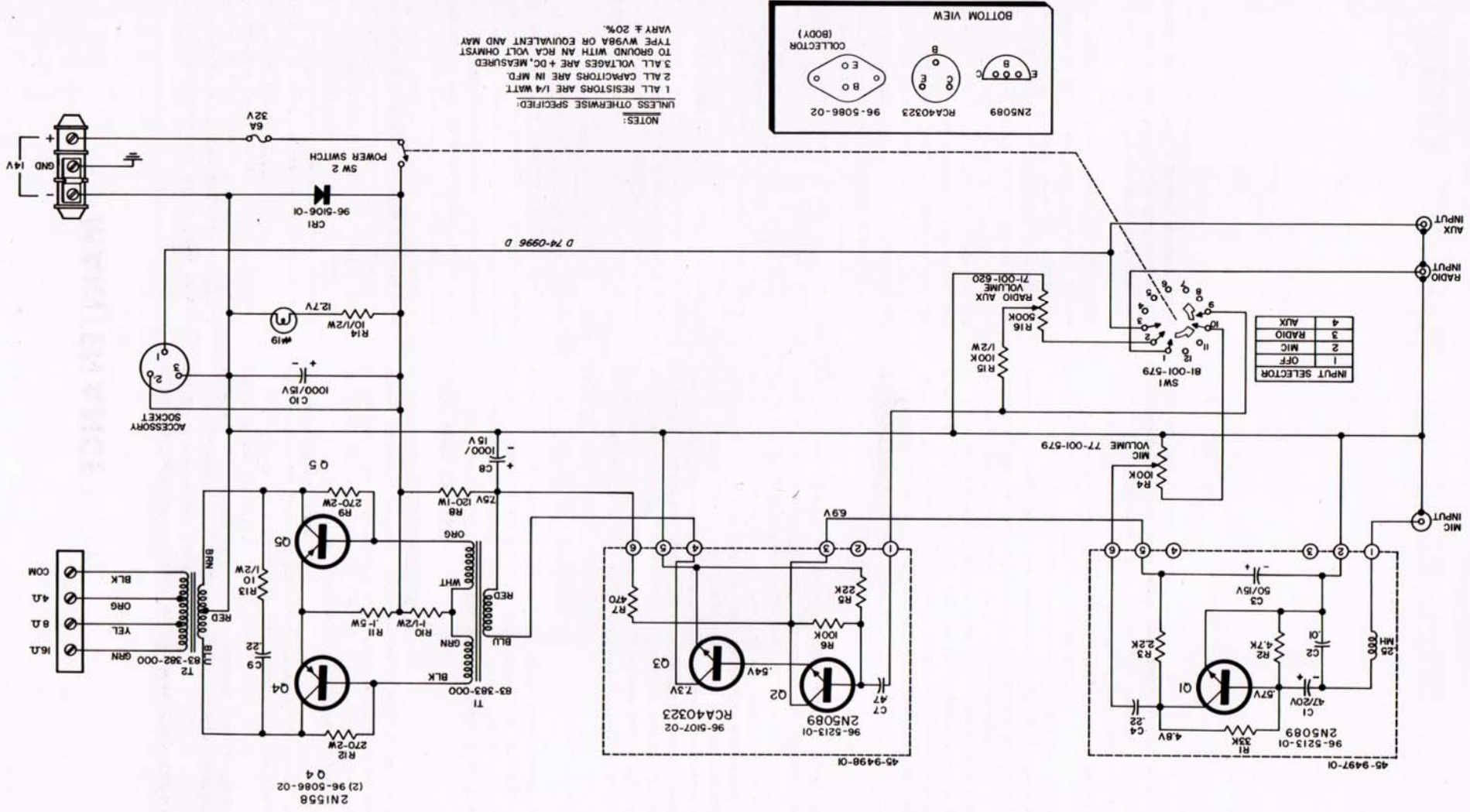


Figure 2 - Model BT35A Amplifier, Schematic Diagram.