ANDERSON JACOBSON, INC.

# A 242/AD 342 ACOUSTIC COUPLERS

# OPERATING MANUAL

The designs of the A 242 and AD 342 are protected by the following U.S. patent numbers:

3543172, 3628165, and 3733437.

9618220-020

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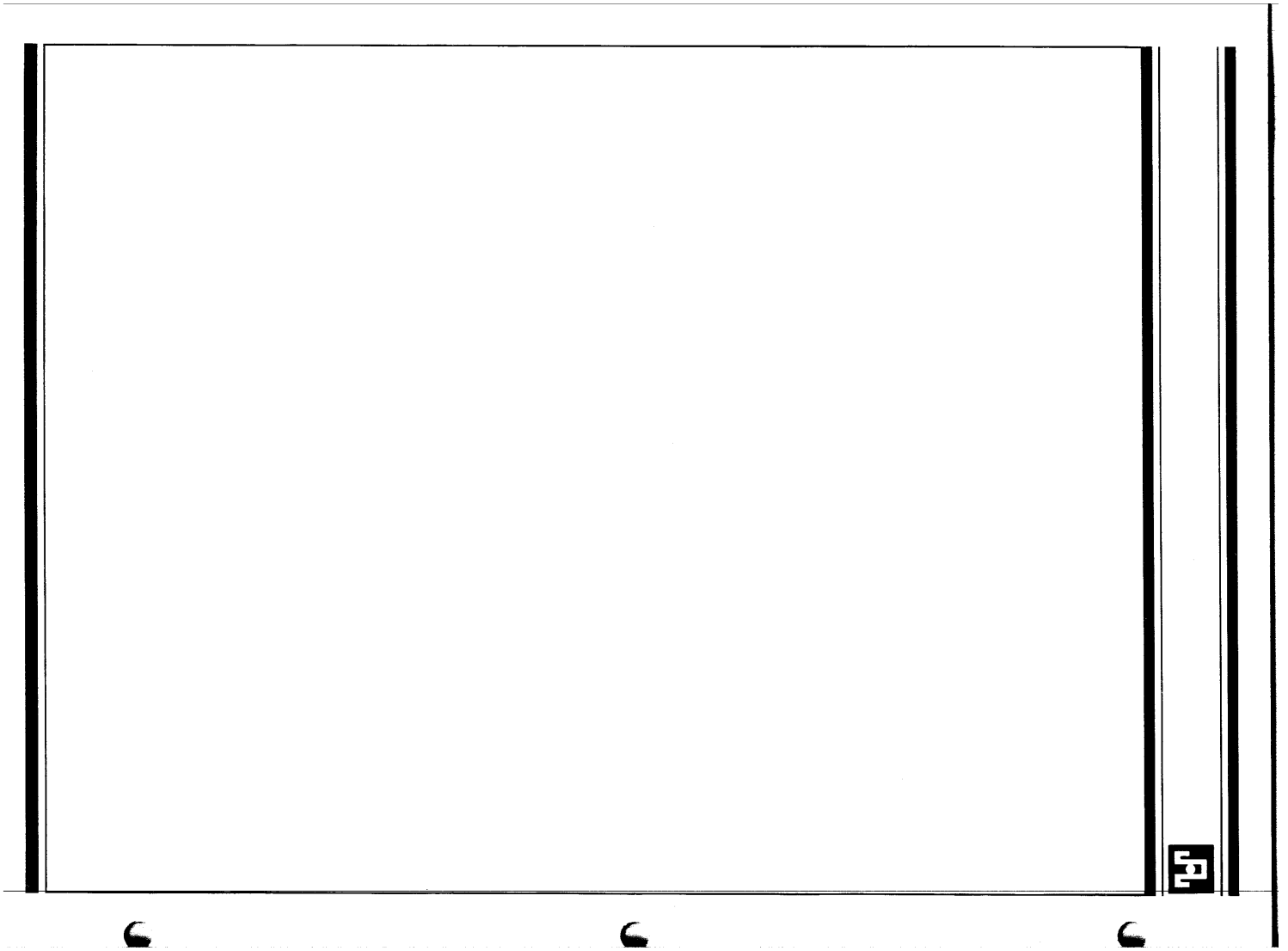

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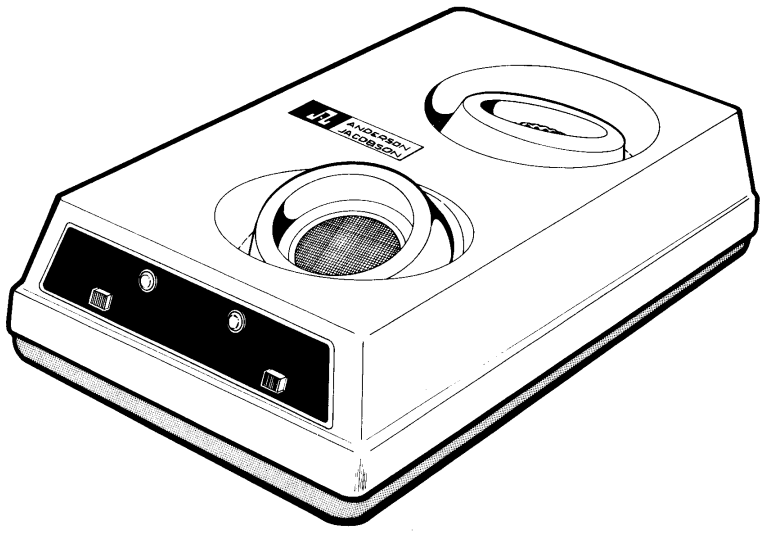
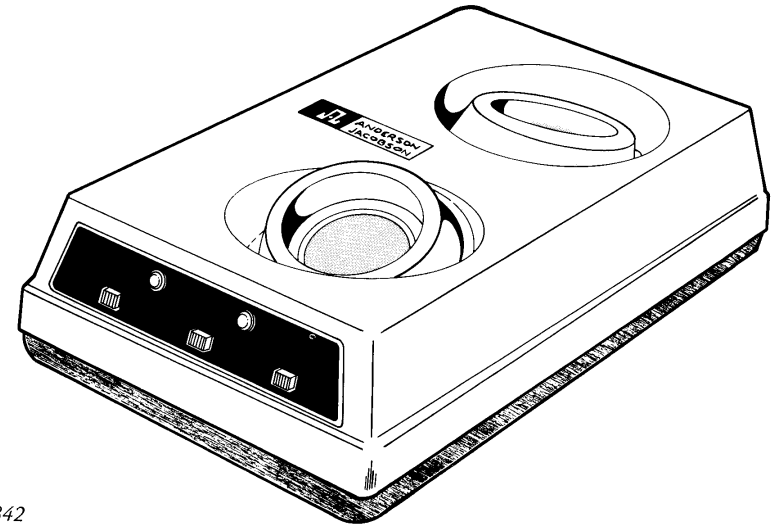



*A 242* (608A)




*AD 342* (609A)

*Figure 1-1. A 242 and AD 342 Couplers.*

# 1 DESCRIPTION

This manual is written to provide the necessary information to install, operate, and routinely troubleshoot the two configurations of Anderson Jacobson's acoustic coupler: the A 242 Originate Acoustic Data Coupler, and the AD 342 Originate/Answer Acoustic Data Access Coupler, Figure 1-1.

Any troubleshooting or maintenance procedure not described in section 4 requires the specialized test facilities provided by an Anderson Jacobson Service Center. Call your nearest center by referring to the list printed in this manual.

## 1.1 DESCRIPTION

The A 242 and AD 342 couplers enable data terminals or computers to communicate with other terminals or computers over normal telephone lines, as shown in Figure 1-2. Both units acoustically transmit and receive data through ordinary telephone handsets over ordinary switched network telephone lines. Both couplers provide Electronic Industries Association (EIA) and Teletypewriter (TTY) interfaces for use with keyboard data terminals and other terminals, such as tape recorders, plotters, or CRT displays. Both are compatible with Bell 103A-type data sets.

1.1.1 **The A 242.** This acoustic, originate only coupler can exchange data solely with an answer unit (such as the AD 342) and cannot connect to a Data Access Arrangement (DAA).

1.1.2 **The AD 342.** This coupler operates in the originate, answer, and local modes, as well as allowing both acoustic and DAA coupling to the phone line. The addition of answer mode, local mode, and DAA coupling allow greater flexibility than with the A 242. The answer mode allows the coupler to communicate with an originate unit. The local mode allows local operation with or without a telephone call (some units do not have local mode). DAA provides reliable coupling to the telephone line, even in locations where acoustic coupling may be erratic or weak because the telephone system is marginal.

## 1.2 FEATURES

The A 242 and AD 342 coupler designs benefit from AJ's experience in building more acoustic couplers than anyone else in the world. AJ was the first company to commercially manufacture acoustic couplers. Knowledge gained from designing and building more complex and sophisticated acoustic couplers has resulted in a coupler which closely approaches the theoretical limits of acoustic performance. Some of the outstanding features are:

- **Superior Acoustic Interface with Telephone Handset:** Advanced patented acoustic cup design with damped cantilever suspension provides isolation from mechanical vibration. The flexible wall of the cups makes a tight seal against acoustic noise for many different handsets.

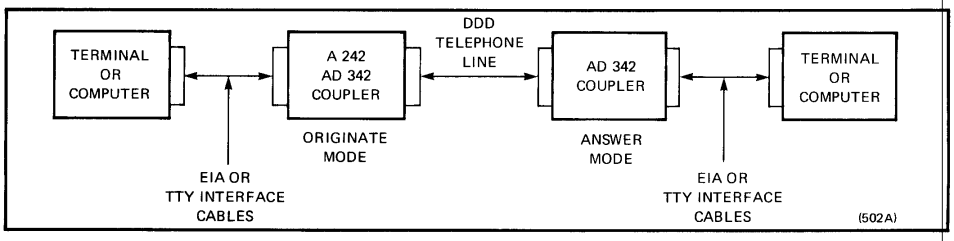



*Figure 1-2 Coupler Usage Simplified Block Diagram* (502A)

- **User-Oriented Carrier Detector:** The coupler carrier detector will not recognize signals that are too noisy for useful data reception. It not only checks for correct signal frequency (as opposed to minimum signal amplitude), but also decides whether a signal is *sufficiently* larger than the noise to produce satisfactory data. Noise, no matter how great, is prevented from ever falsely indicating carrier; the carrier light only indicates a *useable* signal, not just a strong signal.
- **High Reliability:** Ensured by crystal control (which eliminates most adjustments) and conservative component selection.
- **High Accuracy and Stability:** Crystal control and digital techniques are used for transmitter and receiver to achieve high accuracy, high stability, and low distortion over large variations in line voltage, temperature, signal level and data rate.
- **High Data Rate:** Zero to 450 baud.
- **High Sensitivity:** Better than -50 dBm.
- **Terminal Versatility:** Operates with either EIA-interface terminals or 20 mA current loop teletypewriters.
- **Low Power Consumption:** The A 242 uses only 5 watts of power, the AD 342 only 8 watts.

## 1.3 SPECIFICATIONS

Table 1-1 gives the specifications for both the A 242 and AD 342.

| | | A 242 | AD 342 |
|---|---|---|---|
| Data Rate | | 0 to 450 baud | 0 to 450 baud |
| Transmit Frequencies (±0.1%) | Originate | 1070 Hz Space and 1270 Hz Mark (FSK Modulation) | 1070 Hz Space and 1270 Hz Mark (FSK) |
| | Answer | | 2025 Hz Space and 2225 Hz Mark (FSK) |
| Receive Frequencies | Originate | 2025 Hz Space and 2225 Hz Mark (FSK Modulation) | 2025 Hz Space and 2225 Hz Mark (FSK) |
| | Answer | | 1070 Hz Space and 1270 Hz Mark (FSK) |
| Receive Sensitivity | Acoustic | 0 to better than -50 dBm | 0 to better than -45 dBm |
| | DAA | | 0 to better than -50 dBm |
| Transmit Level | Acoustic | -21 dBm | -21 dBm (Originate), -15 dBm (Answer) |
| | DAA | | -5, -8, or -12 dBm |
| Carrier Detect Turn-on Time Delay | Originate | 1.2 seconds | 1.2 seconds |
| | Answer | | 150 milliseconds |
| Teletype Loop Current Interface | | 20 mA | 20 mA |
| EIA Terminal Interface | | Compatible with RS-232-B/C specifications | Compatible with RS-232-B/C specifications |
| Coupling | | Acoustic | Acoustic or manual DAA (CDT) |
| Connection Cable (optional) | | C 43 Teletype Cable | C 43.Teletype Cable |
| | | C 44 Teletype and EIA "Y" Cable | C 44 Teletype and EIA "Y" Cable |
| | | | C 30 DAA Cable |
| Power | Line Voltage | 95 to 135 V ac | 95 to 135 V ac |
| | Line Frequency | 50 to 60 Hz | 50 to 60 Hz |
| | Consumption | 5 W | 8 W |
| | Fuse | 1/16 ASB, 3 AG | 1/8 ASB, 3 AG |
| Operational Environment | Temperature | 40°F to 120°F (5°C to 50°C) | 40°F to 120°F (5°C to 50°C) |
| | Humidity | 0 to 95% (non-condensing) | 0 to 95% (non-condensing) |
| Indicator Lamps | | CARRIER and POWER | CARRIER and POWER |
| Switches | | POWER, HALF/FULL | POWER, HALF/FULL, ORIG/LOCAL*/ANS, DAA LEVEL |
| Size | | 12-1/2 in. x 7-1/2 in. x 3-1/4 in. (32 cm x 19 cm x 8 cm) | 12-1/2 in. x 7-1/2 in. x 3-1/4 in. (32 cm x 19 cm x 8 cm) |
| Weight | | 5 pounds (2.3 kg) | 5 pounds (2.3 kg) |

* Some units do not include the LOCAL position.

**Table 1-1 A 242 and AD 342 Specifications**

# 2 INSTALLATION

Both the A 242 and the AD 342 couplers are designed for table or desktop operation. Care must be taken in making the connections. For the A 242 there are two connections: Power and EIA/TTY; for the AD 342, there is an additional connection for the manual DAA (if used). As shown in Figure 2-1, EIA/TTY provides for both EIA terminal interface and TTY connections in a single connector.

## 2.1 AC POWER CONNECTION

The A 242 and AD 342 both are equipped with a 3-wire power cord which can be connected to any 3-wire, 115 V ac, 50 or 60 Hz receptacle. These are captive cables, with the male end free to connect to a three-way, grounded, power outlet.

## 2.2 EIA CONNECTION

A standard EIA cable, normally supplied with all EIA interface terminals, is all that is required to connect either an A 242 or AD 342 coupler to any EIA terminal such as the AJ 630 or AJ 841. Figure 2-1 shows the pin connections and functions. Pin connections and electrical levels conform to EIA specification RS-232-C. Plug the cable into the EIA/TTY connector of the coupler. See section 3.1, Controls and Indicators.

Because almost every EIA terminal has a HALF/FULL duplex switch, another HALF/FULL duplex switch on the coupler would be redundant. Therefore, to avoid confusion: when an A 242 or AD 342 is connected to an EIA terminal, the coupler automatically remains in FULL duplex regardless of the HALF/FULL duplex switch position. If for any reason it is desired to re-enable the HALF/FULL duplex switch when an EIA terminal is attached, modifications must be made to the EIA cable. Call the nearest AJ Sales/Service Office to either obtain the information on how to make the modification, or to have them make it.

## 2.3 TELETYPEWRITER CONNECTION

If there is any question as to the suitability of a particular TTY terminal for use with the A 242 or AD 342 couplers, contact the nearest AJ Sales/Service Office. Some TTYs, such as those made for telephone and telegraph companies, are not suitable.

The couplers may be connected to a TTY having a loop current interface by using the optional C 43 cable (if a TTY has an EIA connector, it should be plugged directly into the EIA/TTY connector of the coupler). It is necessary to remove the TTY cover to plug in the C 43 cable. See section 2.3.1.

The coupler operates only with a TTY equipped for 20 mA full duplex operation. Thus it is necessary to ensure that the unit is correctly wired. This is done by checking the TTY Call Control Unit (CCU). If it is not modified for 20 mA full duplex according to Figure 2-1, see section 2.3.2.

Also, the coupler can be connected to DECwriters, manufactured by Digital Equipment Corp., by using cable C 51.

Cables used with various types of terminals are shown in Figure 2-2.

**2.3.1 TTY Cover Removal.** Follow these procedures to remove the TTY cover. Refer to Figure 2-3.

1. Unplug the TTY ac line cord and any other connected cables.
2. Remove the paper roll and spindle. (1)
3. Pull off the LINE-OFF-LOCAL slip-fit rotary control knob. (2)
4. Remove nameplate (3) by pulling down and off.
5. Unscrew four slot-head mounting screws (4) from front of TTY.

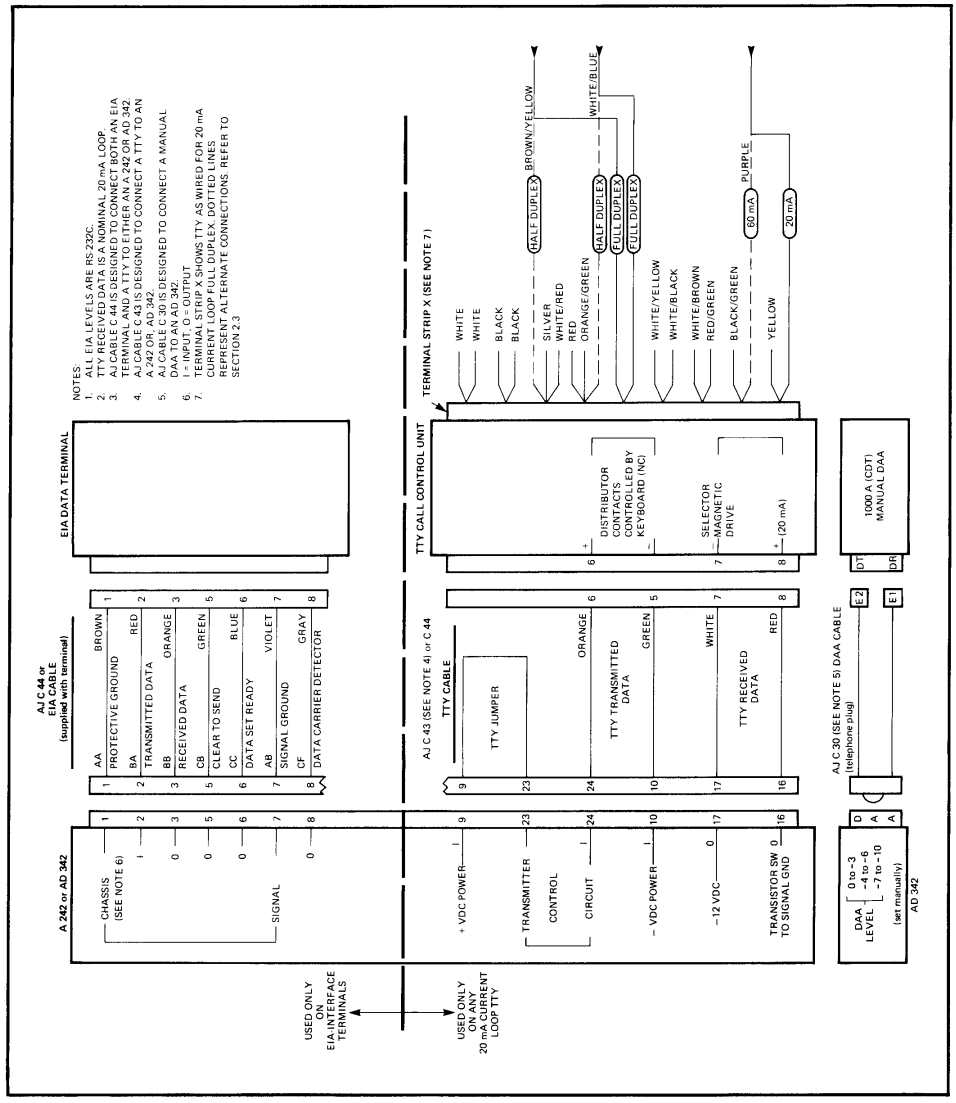



*Figure 2-1. EIA/TTY/DAA Interface Diagram* (502C)

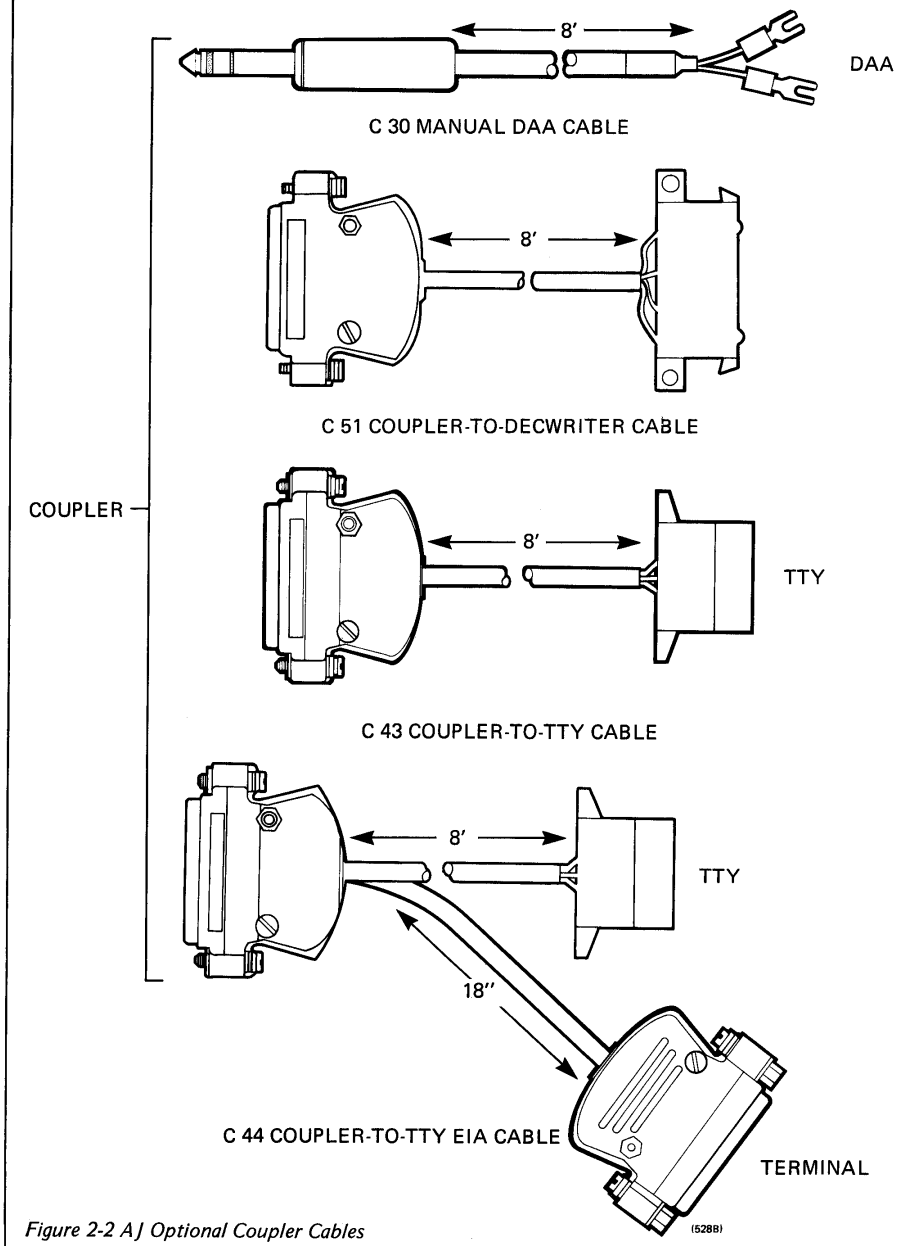



*Figure 2-2 AJ Optional Coupler Cables*

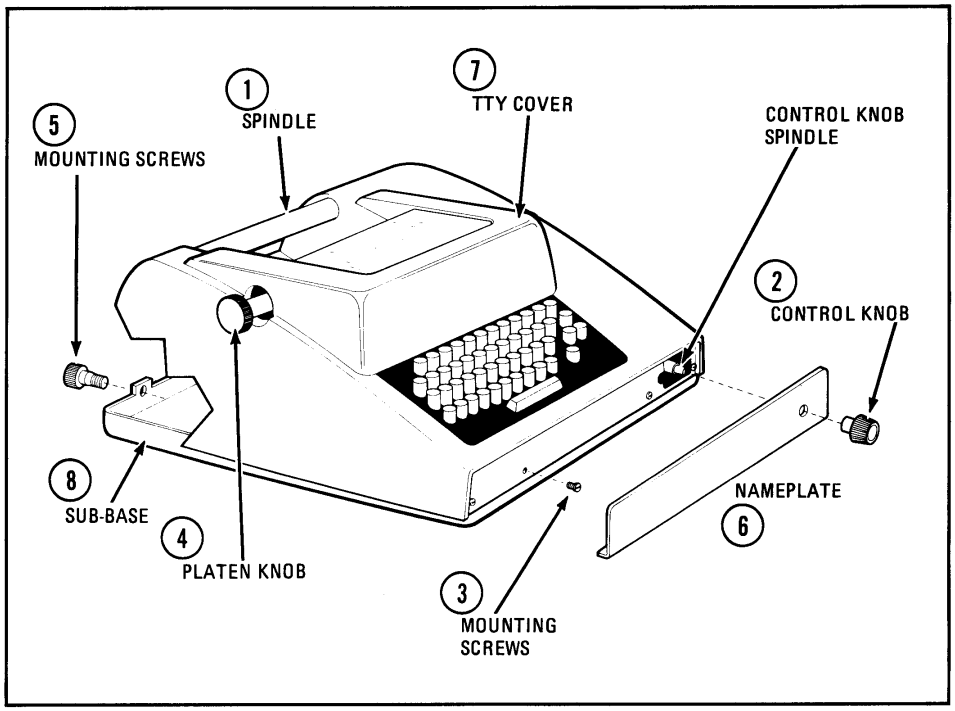



*Figure 2-3 Model 33 Teletypewriter Cover Removal* (517B)

6. On friction-feed TTYs, pull platen knob (5) off shaft. On sprocket-feed TTYs, unscrew platen knob retaining screw and pull platen knob (5) off shaft.
7. Unscrew three mounting screws (6) from rear of TTY.
8. On Automatic Send-Receive (ASR) TTYs, unscrew the slot-head screw from the left rear corner of tape reader cover (not shown in Figure 2-3).
9. Gently lift TTY cover (7) straight up from the TTY sub-base. (8)

**2.3.2 Call Control Unit Modification.** The CCU is mounted on the right-hand side of the TTY sub-base beneath the TTY cover. After the cover is removed, the CCU must be examined to ensure that it is wired for 20 mA full duplex operation. Refer to Figure 2-1 to see if the connections correspond. If they do not, wire the CCU Terminal Strip X to correspond with Figure 2-1. In addition, for 20 mA operation, it is necessary to remove the blue wire from tab 3 (usually marked 145 Ω) on the power resistor, and attach it to tab 4. Leave tab 3 free, and tabs 1 and 2 as found. Refer to Figure 2-4 for CCU component locations.

Connect the C 43 cable to plug 2 on the rear of the CCU. Connect the other connector of C 43 to the EIA/TTY coupler interface. Reinstall the TTY cover by reversing the steps given in section 2.3.1.

**Note:** To replace the cover of TTYs that have a low-paper alarm switch, first replace the paper roll and spindle, and then follow the reverse of section 2.3.1.

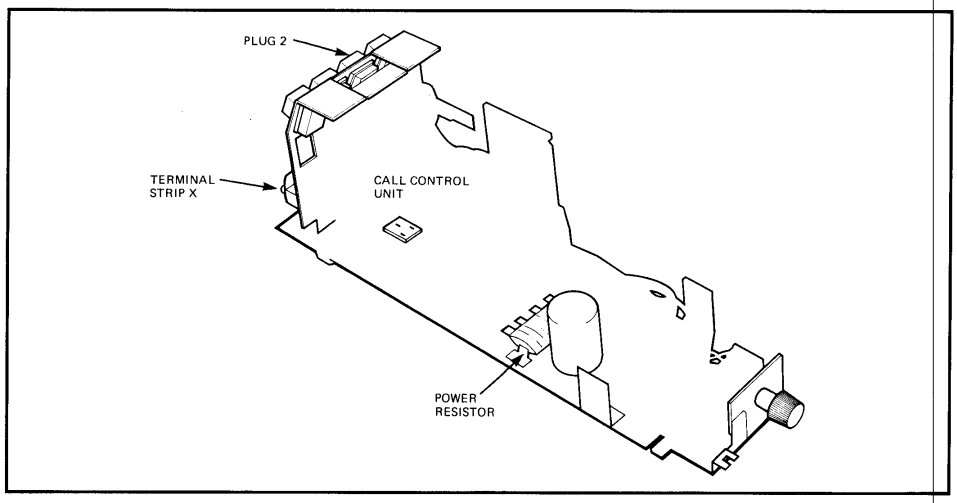



*Figure 2-4 Call Control Unit Component Locations* (651A)

## 2.4 SIMULTANEOUS EIA/TTY CONNECTION

An EIA interface terminal and a Model 33 TTY may be simultaneously connected to the coupler by using a C 44 cable (Figure 2-2). Connect the C 44 25-pin connector on the short cable stub to the EIA terminal cable and the other end to the EIA/TTY connector on the coupler. Remove the TTY cover and connect the 15-pin plastic connector to plug 2 of the TTY as described in section 2.3.1.

## 2.5 DAA CONNECTION (AD 342 ONLY)

To connect the AD 342 to a Bell System DAA using an optional AJ C 30 DAA cable, refer to Figures 2-1 and 2-2; and follow this procedure:

1. Locate the hinged cover on the lower end of the DAA. A number between 0 and -10 is written next to the "MAX. TRMT. LEVEL" label on the cover.
2. With a screwdriver, set the DAA LEVEL slide switch on the rear panel of the AD 342 (Figure 2-5) to correspond with the number on the DAA. For instance, if the DAA is marked -5 dBm, set the AD 342 level switch to the -4 to -6 position.
3. Lift the DAA hinged lid to expose the connector terminals.
4. Using a screwdriver, connect the two leads of the AJ C30 DAA cable to the DT (Data Tip) and DR (Data Ring) terminals. It doesn't matter which lead is attached to which terminal.
5. Plug the other end of the C 30 DAA cable into the DAA jack located on the AD 342 rear panel (Figure 3-2).

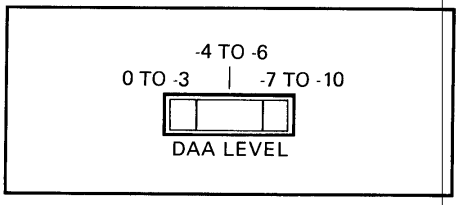



*Figure 2-5. DAA LEVEL Switch*

## 2.6 DECWRITER CONNECTION

To connect an A 242 or AD 342 to a DECwriter, manufactured by Digital Equipment Corp., use AJ cable C51. This cable has the unique DECwriter connector at one end and the standard A 242/ AD 342 connector at the other (see Figure 2-2).

# 3 OPERATION

This section first shows and describes the controls and indicators of the A 242 and AD 342 couplers. A brief description of a typical timeshare call then follows.

Finally there is a discussion of typical operating procedures for the couplers, which includes switch settings (power turn on, originate/local/answer, and half or full duplex) and coupling to the telephone line.

## 3.1 CONTROLS AND INDICATORS

Refer to Figures 3-1 and 3-2 for illustrations and functional descriptions of the couplers' front and rear panels.

### 3.1.1 Front Panel Controls and Indicators.

1. OFF/ON: This 2-position slide switch applies ac power to the couplers.
2. POWER: This red indicator light shows that power is applied to the coupler circuits.
3. CARRIER: This green indicator shows that the carrier tone is received from the telephone line.
4. HALF/FULL: A 2-position slide switch sets the coupler to either full duplex mode or half duplex mode (useable only with TTY cable).
5. ORIG/LOCAL/ANS (AD 342 only): A 3-position slide switch normally used to place the coupler in either originate or answer modes. The switch also allows a local mode of operation, as discussed in section 3.3.2. Some units do not have local mode.

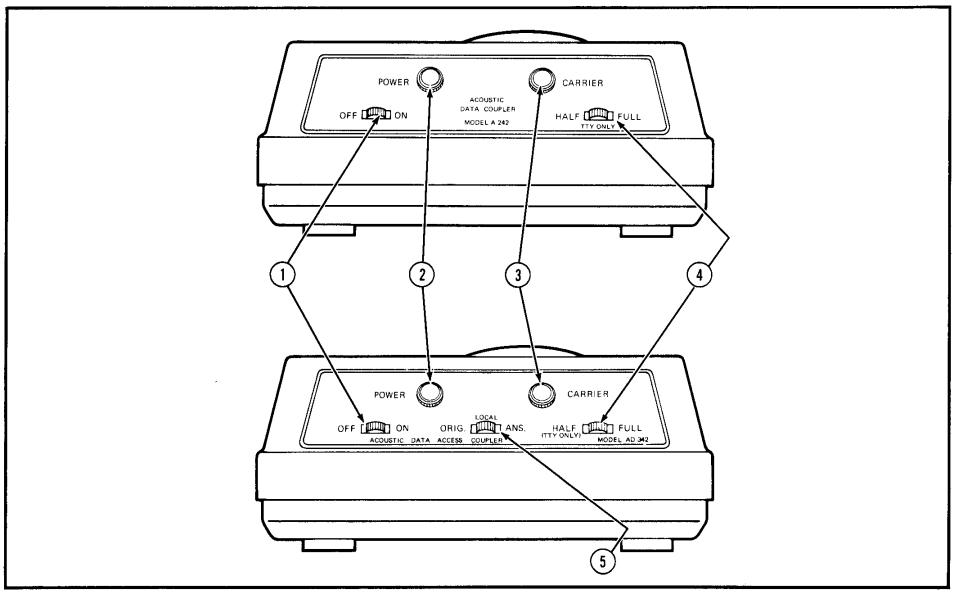



*Figure 3-1 A 242 and AD 342 Front Panel Controls and Indicators* (610A) (611A)

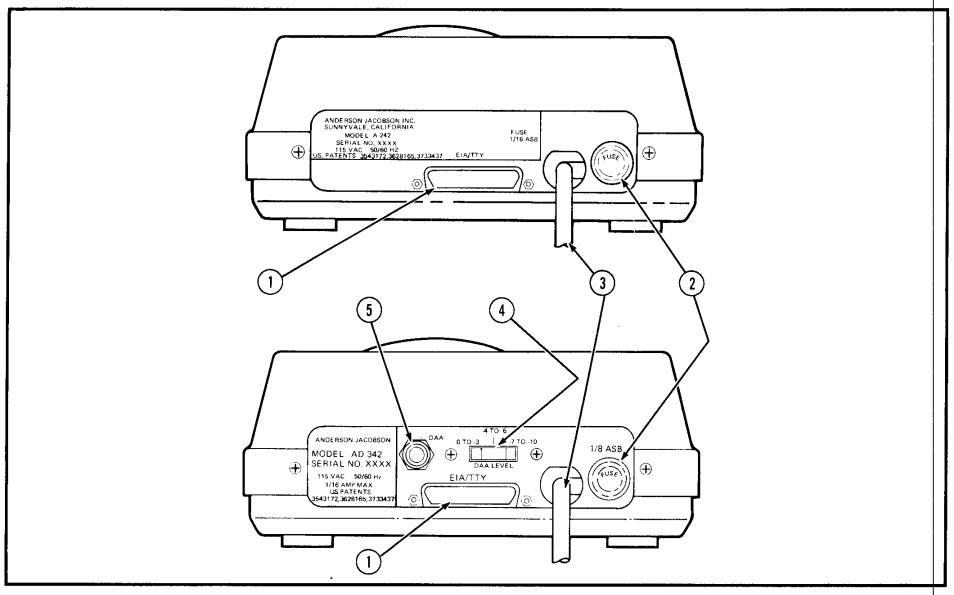



*Figure 3-2 A 242 and AD 342 Rear Panel Configuration* (612A) (613A)

### 3.1.2 Back Panel.

1. EIA/TTY: This 25-pin connector interfaces EIA or TTY terminals to the acoustic coupler; 16 pins are utilized.
2. FUSE: The A 242 uses a 1/16 ASB-type fuse; the AD 342, a 1/8 ASB-type fuse.
3. Power cord: This 3-wire cord plugs into any 3-wire 115 Vac receptacle.
4. DAA LEVEL (AD 342 only): This 3-position slide switch is set to a level to match that of the telephone company DAA.
5. DAA (AD 342 only): The DAA cable telephone-type plug is plugged into the AD 342 jack.

## 3.2 A TYPICAL TIMESHARE CALL

A typical call to a timeshare computer, after all proper connections are made and power is turned on, consists of: setting the coupler HALF/FULL duplex switch, dialing the timeshare computer, listening for an answer tone, and putting the handset into the cups (acoustic operation) or pulling the data button of the phone (DAA operation). The green carrier light then comes on, indicating a valid transmission path, and the operator signs on with the computer and begins sending and/or receiving data.

## 3.3 OPERATING PROCEDURES

The following is a detailed sequence necessary to operate the A 242 or AD 342 coupler. Included are procedures for power turn-on, mode and duplex setting, and coupling to the phone line. If the coupler doesn't operate properly, or there is a suspected malfunction, refer to section 4.1, Trouble Diagnosis.

**3.3.1 AC Power.** To turn the coupler on, set the power slide switch to ON. Verify that the red POWER light comes on.

**3.3.2 ORIGINATE/LOCAL/ANSWER Switch Setting (AD 342 Only).** Normally the switch is set to the mode opposite that of the remote coupler.

## ANDERSON JACOBSON REGIONAL SERVICE OFFICES

| | |
|---|---|
| **California** | 1065 Morse Avenue<br>Sunnyvale, California 94086 |
| **Illinois** | 3240 Commercial Avenue<br>Northbrook, Illinois 60062<br>(Chicago, Central) |
| **New Jersey** | 80 Frederick Street<br>Hackensack, New Jersey 07601 |

# 4 MAINTENANCE

The A 242 and AD 342 are designed for long, trouble-free usage. The circuitry is all solid-state. AJ's rigid quality control, thorough testing, and conservatively rated components afford maximum reliability, and thus no regular maintenance program is necessary. If a malfunction is suspected, the procedures below will isolate the problem quickly and will enable the operator to determine whether or not a service call is required.

## 4.1 TROUBLE DIAGNOSIS

If the coupler does not work properly, make these checks:

- **Is the Red Power Light On?** Check to see that the coupler is plugged into an active ac outlet and the POWER switch is on. Check the coupler fuse on the rear panel to see that it is good (the metal connection inside the fuse is not broken).
- **Is the Green Carrier Light On?** Listen to the telephone handset for the carrier tone (originate mode only). Make sure the handset is seated in the acoustic cups properly and the handset cord is at the end with the cup labeled CORD. Check that the tone stays on long enough to activate the CARRIER light.
- **Is the ORIG/LOCAL/ANS Switch (AD 342 Only) In Correct Position?** Check and see if the ORIG/LOCAL/ANS switch is set to the correct position, and if using DAA, check that the LEVEL switch setting matches that of the DAA (section 2.5) and that the DAA telephone button is set to the data mode.
- **Are the Interface Cables Connected Correctly?** See Figure 2-1 for correct connections. Be sure you are using the right cable, Figure 2-2.
- **Is the Duplex Switch in Correct Position?** Check the operator's manual of the timeshare service or data system being used. Remember that the duplex switch works only with a TTY. See section 3.3.3.
- **Is the Data Terminal Compatible with the Timeshare Service or Data System Being Used?** Check the operator's manual of the terminal and the service to ensure that the same character code (ASCII, EBCD or Correspondence) and data rate are being used for both. Make sure that the data rate being used is within the rating of the coupler (between zero and 450 baud).
- **Is the Timeshare Service in Operation?** Check the operator's manual for the hours of the computer. Call the timeshare service to make sure they are operating. Check operation with another service.

## 4.2 SERVICE CENTERS

If the trouble is not solved by checking any of the above steps, call the nearest AJ Sales/Service Office. There, trained personnel familiar with couplers, terminals, and timesharing will be able to suggest further testing, or give a verbal diagnosis of a fault elsewhere in the system, or suggest return of the coupler for repair.

If the coupler is within warranty, no charge will be made. Otherwise charges are made on a time and material basis plus transportation.

For example, if the other end is an A 242 (originate mode), the AD 342 must be set to the answer mode (for ordinary timesharing, an AD 342 must be set to ORIG). For special situations, the mode switch can be set to LOCAL (some units do not have local mode). This will cause all transmitted data to the coupler to be returned to the terminal(s) as received data whether or not a telephone connection is present. Thus a terminal may be used alone in a "local" mode, or a TTY and an EIA terminal can communicate off-line with one another when used with a C 44 cable (Figure 2-2). If an AD 342 is in originate mode and a call is in progress, switching to the local mode will not only enable local operation, but will also maintain the telephone connection without allowing data to be transmitted or received from the telephone line. Thus when local operation is complete, the switch can be reset to ORIG and data exchange can proceed as before.

**3.3.3 HALF/FULL Duplex Switch Setting.** Determine whether half or full duplex is desired. This is often specified by the time-sharing company or other remote station. Half duplex causes whatever is transmitted to be printed locally. Therefore, data cannot be transmitted and received simultaneously; otherwise, erroneous printing will result. Half duplex should not be used if data is to be transmitted and received simultaneously. Full duplex causes no local printing of transmitted data, so that simultaneous transmitting and receiving is accomplished. Some full duplex systems echo transmitted data back for verification so that the terminal seems to be operating in half duplex when actually it is not.

When the coupler is operated with a TTY using a C 43 or C 44 Teletype cable (Figure 2-2), the duplex switch is enabled. Set the coupler's HALF/FULL switch to the desired position for operation. When the coupler is used with an EIA terminal which does not use a C 43 or C 44 Teletype cable, the HALF/FULL duplex switch is disabled and the coupler always operates in full duplex. Use the duplex switch on the terminal. If the terminal doesn't have a switch and a different mode of operation is desired, a modification is required. See section 2.2.

**3.3.4 Telephone Line Coupling.** To couple the A 242 or AD 342 to the phone line (acoustic or DAA) do the following:

1. Dial the desired number (or answer the phone).
2. If the coupler is an A 242, or an AD 342 in the originate mode, listen until the high-pitched carrier tone is heard coming from the other end. If the coupler is an AD 342 in the answer mode, no tone is heard.
3. a. If the acoustic coupling is used, insert the handset completely into the rubber cups, ensuring that the cord end of the handset is placed in the cup marked CORD at the front of the unit. On an AD 342, insure that the DAA cable is not plugged in, as this disables the acoustics.

   b. If DAA coupling (non-acoustic) is used (AD 342 only), check to ensure that the DAA cable is plugged in, then set the white button on the DAA phone to the data position.
4. Check to ensure that the CARRIER light comes on within 2 seconds. When the CARRIER light comes on, data exchange can begin.

ANDERSON JACOBSON, INC.

# OPERATOR MANUAL

## A 242 ORIGINATE ACOUSTIC DATA COUPLER

## AD 342 ORIGINATE/ANSWER ACOUSTIC DATA ACCESS COUPLER



ANDERSON JACOBSON, INC.

**HEADQUARTERS OFFICE:** 1065 Morse Avenue Sunnyvale, CA 94086 408/734-4030
**REGIONAL OFFICES:** Sunnyvale (Western) 408/734-4030 Hackensack (Eastern) 201/448-2525
Northbrook (Chicago, Central) 312/498-4220
**SALES OFFICES:** Boston, New York, Rochester, Philadelphia, Pittsburgh, Washington, D.C., Atlanta, Cincinnati, Detroit, St. Paul, Dallas, Houston, Los Angeles

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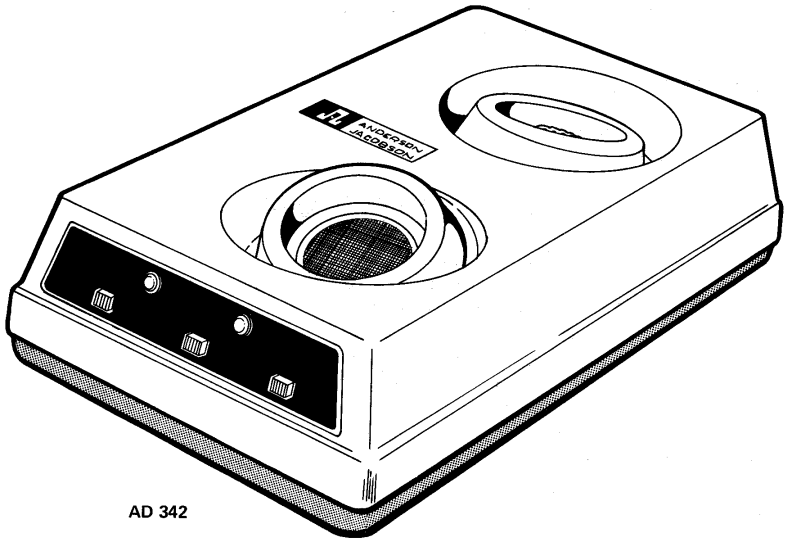
1.1 A 242 and AD 342 Specifications


A 242




AD 342

**Figure 1.1 A 242 and AD 342 Couplers**

# 1 GENERAL DESCRIPTION

This manual is written to provide information for an operator to install, operate, and perform routine troubleshooting for the two configurations of Anderson Jacobson's acoustic coupler: the A 242 Originate Acoustic Data Coupler, and the AD 342 Originate/Answer Acoustic Data Access Coupler, Figure 1.1.

Any troubleshooting or maintenance requiring more than is given in Section 4 requires the specialized test facilities provided by an Anderson Jacobson Service Center. Please call your nearest center by referring to the list printed on the inside front cover of this manual.

## 1.1 DESCRIPTION

The A 242 and AD 342 couplers are designed to enable data terminals or computers to communicate with other terminals or computers over normal telephone lines, as shown in Figure 1.2. Both units acoustically transmit and receive data through ordinary telephone handsets over ordinary switched network telephone lines. Both couplers provide Electronic Industries Association (EIA) and Teletypewriter (TTY) interfaces for use with keyboard data terminals and other terminals, such as tape recorders, plotters, or CRT displays. Both couplers are compatible with Bell 103A-type data sets.

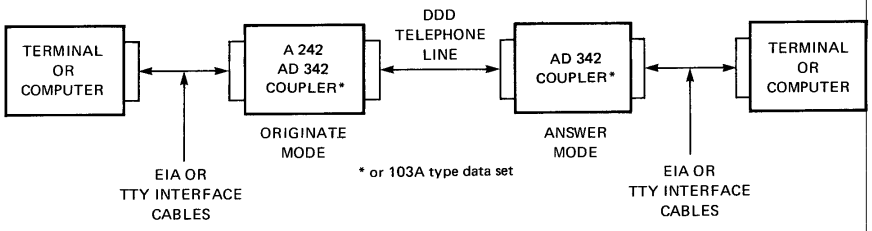



**Figure 1.2 Coupler Usage Simplified Block Diagram**

**1.1.1 THE A 242.** This acoustic only, originate only coupler can exchange data only with an answer unit (such as the AD 342) and cannot connect to a Data Access Arrangement (DAA).

**1.1.2 THE AD 342.** This coupler operates in the originate, answer, and local modes, as well as allowing both acoustic and DAA coupling to the phone line. The addition of answer mode, local mode, and DAA coupling allow greater flexibility than with the A 242. Answer mode allows the coupler to communicate with an originate unit. Local mode allows local operation with or without a telephone call (some units do not have local mode). DAA provides reliable coupling to the telephone line in locations where, due to the telephone system, acoustic coupling may be marginal or erratic.

## 1.2 FEATURES

The A 242 and AD 342 coupler designs benefit from AJ's experience building more acoustic couplers than anyone else in the world. AJ was the first company to commercially manufacture acoustic couplers. Knowledge gained from designing and building more complex and sophisticated

acoustic couplers has resulted in a coupler which closely approaches the theoretical limits of acoustic coupler performance. Some of the outstanding features are:

- **Superior Acoustic Interface with Telephone Handset:** Advanced patented acoustic cup design with damped cantilever suspension provides isolation from mechanical vibration. The flexible wall of the cups makes a tight seal against acoustic noise for many different handsets.

- **User-Oriented Carrier Detector:** The coupler carrier detector will not recognize signals that are too noisy for useful data reception. It not only checks for correct signal frequency (as opposed to minimum signal amplitude), but also decides whether a signal is *sufficiently* larger than the noise to produce satisfactory data. Noise, no matter how great, is prevented from ever falsely indicating carrier; the carrier light only indicates a *useable* signal, not just a strong signal.

- **High Reliability:** Ensured by crystal control (which eliminates most adjustments) and conservative component selection.

- **High Accuracy and Stability:** Crystal control and digital techniques are used for transmitter and receiver to achieve high accuracy, high stability, and low distortion over large variations in line voltage, temperature, signal level and data rate.

- **High Data Rate:** Zero to 450 baud.

- **High Sensitivity:** Better than -50 dBm.

- **Terminal Versatility:** Operates with either EIA-interface terminals or 20 mA current loop teletypewriters.

- **Low Power Consumption:** Uses only 1/10 of the power of an ordinary light bulb.

## 1.3 SPECIFICATIONS

Table 1.1 gives the specifications for both the A 242 and AD 342.

**TABLE 1.1 A 242 AND AD 342 SPECIFICATIONS**

| | | A 242 | AD 342 |
|---|---|---|---|
| Data Rate | | 0 to 450 baud | 0 to 450 baud |
| Transmit Frequencies (±0.1%) | Originate | 1070 Hz Space and 1270 Hz Mark (FSK Modulation) | 1070 Hz Space and 1270 Hz Mark (FSK) |
| | Answer | | 2025 Hz Space and 2225 Hz Mark (FSK) |
| Receive Frequencies | Originate | 2025 Hz Space and 2225 Hz Mark (FSK Modulation) | 2025 Hz Space and 2225 Hz Mark (FSK) |
| | Answer | | 1070 Hz Space and 1270 Hz Mark (FSK) |
| Receive Sensitivity | Acoustic | 0 to better than -50 dBm | 0 to better than -45 dBm |
| | DAA | | 0 to better than -50 dBm |
| Transmit Level | Acoustic | -21 dBm | -21 dBm (Originate), -15 dBm (Answer) |
| | DAA | | -5, -8, or -12 dBm |
| Carrier Detect Turn-on Time Delay | Originate | 1.2 seconds | 1.2 seconds |
| | Answer | | 150 milliseconds |
| Teletype Loop Current Interface | | 20 mA | 20 mA |
| EIA Terminal Interface | | Compatible with RS-232-B/C specifications | Compatible with RS-232-B/C specifications |
| Coupling | | Acoustic | Acoustic or manual DAA (CDT) |
| Connection Cable (optional) | | C 43 Teletype Cable | C 43 Teletype Cable |
| | | C 44 Teletype and EIA "Y" Cable | C 44 Teletype and EIA "Y" Cable |
| | | | C 30 DAA Cable |
| Power | Line Voltage | 95 to 135 V ac | 95 to 135 V ac |
| | Line Frequency | 50 to 60 Hz | 50 to 60 Hz |
| | Consumption | 5 W | 8 W |
| | Fuse | 1/16 ASB, 3 AG | 1/8 ASB, 3 AG |
| Operational Environment | Temperature | 40°F to 120°F (5°C to 50°C) | 40°F to 120°F (5°C to 50°C) |
| | Humidity | 0 to 95% (non-condensing) | 0 to 95% (non-condensing) |
| Indicator Lamps | | CARRIER and POWER | CARRIER and POWER |
| Switches | | POWER, HALF/FULL | POWER, HALF/FULL, ORIG/LOCAL*/ANS, DAA LEVEL |
| Size | | 12-1/2 in. x 7-1/2 in. x 3-1/4 in. (32 cm x 19 cm x 8 cm) | 12-1/2 in. x 7-1/2 in. x 3-1/4 in. (32 cm x 19 cm x 8 cm) |
| Weight | | 5 pounds (2.3 kg) | 5 pounds (2.3 kg) |

*Some units do not include the LOCAL position.

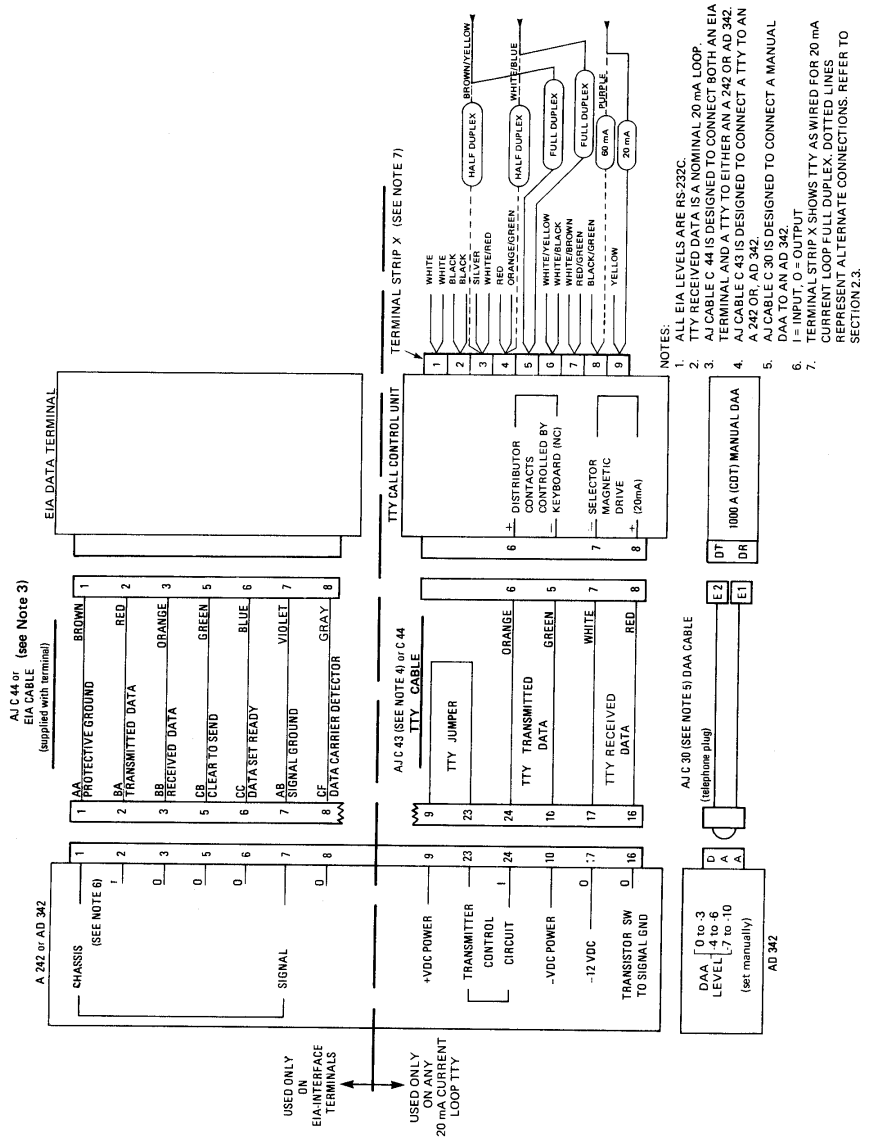



**Figure 2.1 EIA/TTY/DAA Interface Diagram**

# 2 INSTALLATION

Both the A 242 and the AD 342 couplers are designed for table or desktop operation. The prime requirement is to make the proper connections. For the A 242 there are two connections: Power and EIA/TTY; for the AD 342, there is an additional connection for the manual DAA (if used). As shown in Figure 2.1, EIA/TTY provides for both EIA terminal interface and TTY connections in a single connector.

## 2.1 AC POWER CONNECTION

The A 242 and AD 342 both come equipped with a 3-wire power cord and plug to connect to any 3-wire, 115 V ac, 50 or 60 Hz receptacle.

## 2.2 EIA CONNECTION

A standard EIA cable, normally supplied with all EIA interface terminals, is all that is required to connect either an A 242 or AD 342 coupler to any EIA terminal such as the AJ 630 or AJ 841. Figure 2.1 shows the pin connections and functions — pin connections and electrical levels conform to EIA specification RS-232-C. Plug the cable into the EIA/TTY connector of the coupler. See Section 3.1, Controls and Indicators.

Because almost every EIA terminal has a HALF/FULL duplex switch, another HALF/FULL duplex switch on the coupler would be redundant. Therefore, to avoid confusion: when an A 242 or AD 342 is connected to an EIA terminal, the coupler automatically remains in FULL duplex regardless of the HALF/FULL duplex switch position. If for any reason it is desired to re-enable the HALF/FULL duplex switch when an EIA terminal is attached, modifications must be made to the EIA cable. Call the nearest AJ Sales/Service Office to either obtain the information on how to make the modification, or to have them make it.

## 2.3 TELETYPEWRITER CONNECTION

If there is any question as to the suitability of a particular TTY terminal for use with the A 242 or AD 342 couplers, contact the nearest AJ Sales/Service Office. Some TTYs, such as those made for telephone and telegraph companies are not suitable.

The couplers may be connected to a TTY having a loop current interface by using the optional C 43 cable (if a TTY has an EIA connector, it should be plugged directly into the EIA/TTY connector of the coupler). It is necessary to remove the TTY cover to plug in the C 43 cable. See Section 2.3.1.

The coupler operates only with a TTY equipped for 20 mA full duplex operation. Thus it is necessary to ensure that the unit is correctly wired. This is done by checking the TTY Call Control Unit (CCU). If it is not modified for 20 mA full duplex according to Figure 2.1, see Section 2.3.2.

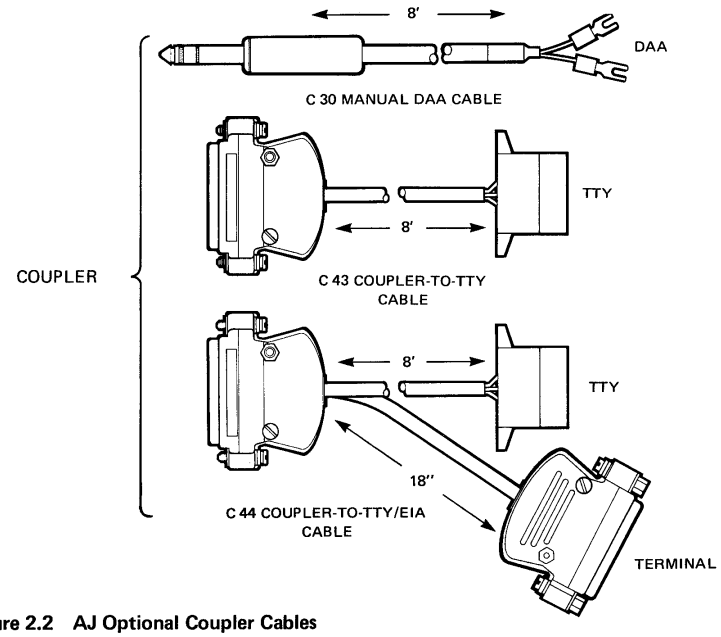



**Figure 2.2 AJ Optional Coupler Cables**

**2.3.1 TTY COVER REMOVAL.** Follow these procedures to remove the TTY cover. Refer to Figure 2.3.

1. Unplug the TTY ac line cord and any other connected cables.
2. Remove the paper roll and spindle (1).
3. Pull off the LINE-OFF-LOCAL slip-fit rotary control knob (2).
4. Remove nameplate (3) by pulling down and off.
5. Unscrew four slot-head mounting screws (4) from front of TTY.
6. On friction-feed TTYs, pull platen knob (5) off shaft. On sprocket-feed TTYs, unscrew platen knob retaining screw and pull platen knob (5) off shaft.
7. Unscrew three mounting screws (6) from rear of TTY.

8. On Automatic Send-Receive (ASR) TTYs, unscrew the slot-head screw from the left rear corner of tape reader cover (not shown on Figure 2.3).

9. Gently lift TTY cover (7) straight up from the TTY sub-base (8) .

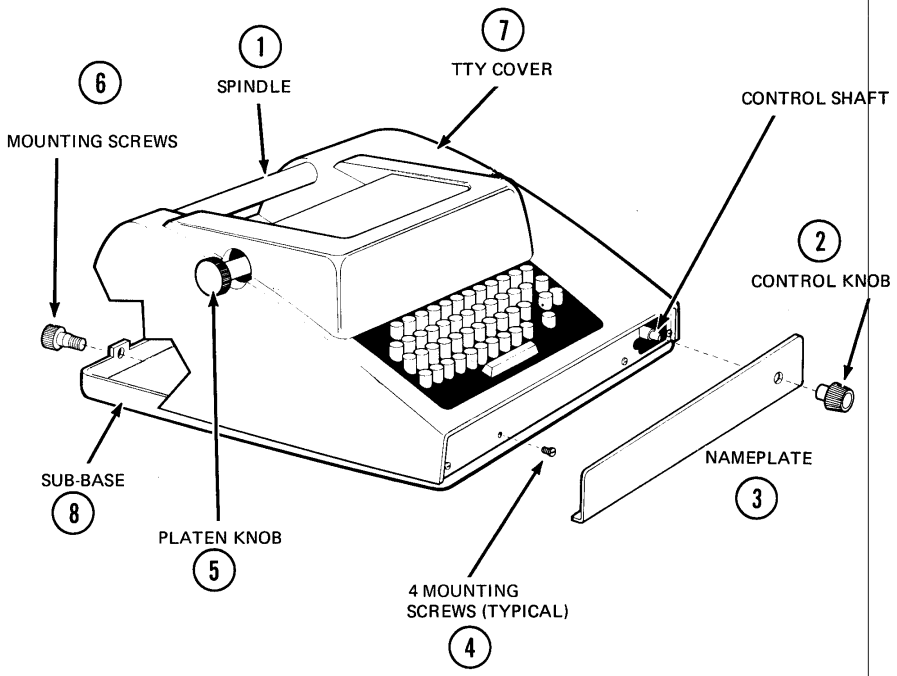



**Figure 2.3 Model 33 Teletypewriter Cover Removal**

**2.3.2 CALL CONTROL UNIT MODIFICATION.** The CCU is mounted on the right-hand side of the TTY sub-base beneath the TTY cover. After the cover is removed, the CCU must be examined to ensure that it is wired for 20 mA full duplex operation. Refer to Figure 2.1 to see if the connections correspond. If they do not, wire the CCU Terminal Strip X to correspond with Figure 2.1. In addition, for 20 mA operation, it is necessary to remove the blue wire from tab 3 (usually marked 1450Ω) on the power resistor, and attach it to tab 4. Leave tab 3 free, and tabs 1 and 2 as found. Refer to Figure 2.4 for CCU component locations.

Connect the C 43 cable to plug 2 on the rear of the CCU. Connect the other connector of C 43 to the EIA/TTY coupler interface. Reinstall the TTY cover by reversing the steps in Section 2.3.1.

**Note**

To replace the cover of TTYs that have a low-paper alarm switch, first replace the paper roll and spindle, and then follow the reverse of Section 2.3.1.

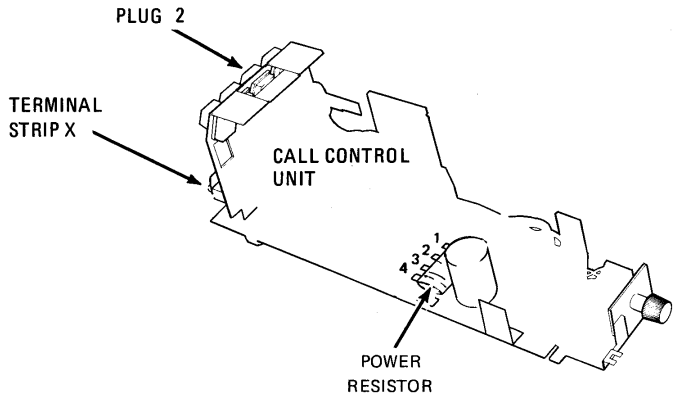



**Figure 2.4 Call Control Unit Component Locations**

## 2.4 SIMULTANEOUS EIA/TTY CONNECTION

An EIA interface terminal and a Model 33 TTY may be simultaneously connected to the coupler by using a C 44 cable (Figure 2.2). Connect the C 44 25-pin connector on the short cable stub to the EIA terminal cable and the other end to the EIA/TTY connector on the coupler. Remove the TTY cover and connect the 15-pin plastic connector to plug 2 of the TTY as described in Section 2.3.1.

## 2.5 DAA CONNECTION (AD 342 Only)

To connect the AD 342 to a Bell System DAA using an optional AJ C 30 DAA cable, refer to Figures 2.1 and 2.2, and follow this procedure:

1. Locate the hinged cover on the lower end of the DAA. A number between 0 and -10 is written next to the "MAX. TRMT. LEVEL" label on the cover.

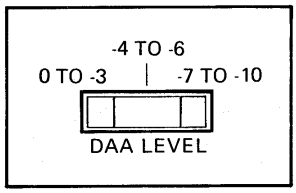



**Figure 2.5 DAA Level Switch**

2. With a screwdriver, set the DAA LEVEL slide switch on the rear panel of the AD-342 (Figure 2.5) to correspond with the number on the DAA. For instance, if the DAA is marked -5 dBm, set the AD 342 level switch to the -4 to -6 position.

3. Lift the DAA hinged lid to expose the connector terminals.

4. Using a screwdriver, connect the two leads of the AJ C 30 DAA cable to the DT (Data Tip) and DR (Data Ring) terminals. It doesn't matter which lead is attached to which terminal.

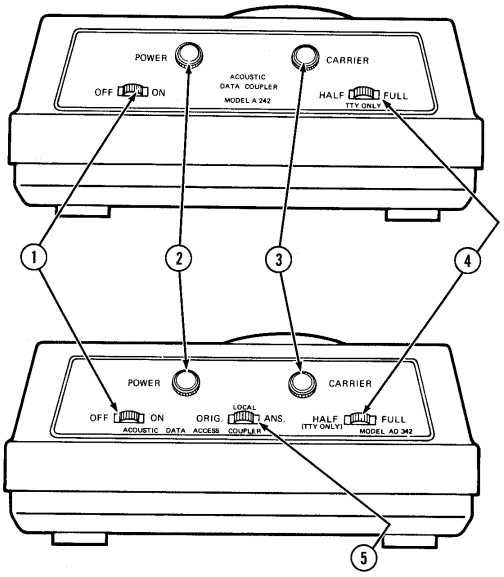
5. Plug the other end of the C 30 DAA cable into the DAA jack located on the AD 342 rear panel (Figure 3.2).

# 3 OPERATION

This section first shows and describes the controls and indicators of the A 242 and AD 342 couplers. A brief description of a typical timeshare call follows, and given finally is a detailed discussion of the couplers' operation.

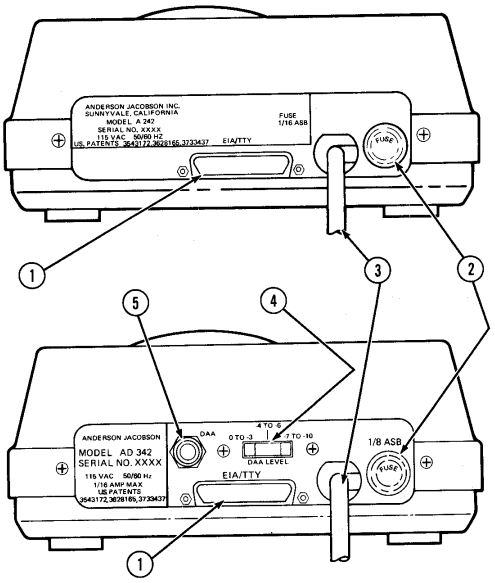
## 3.1 CONTROLS AND INDICATORS

Refer to Figures 3.1 and 3.2 for illustrations and functional descriptions of the couplers' front and rear panels.




1. OFF/ON: This 2-position slide switch applies ac power to the couplers.
2. POWER: This red indicator light shows that power is applied to the coupler circuits.
3. CARRIER: This green indicator shows that the carrier tone is received from the telephone line.
4. HALF/FULL: A 2-position slide switch sets the coupler to either full duplex mode or half duplex (useable only with TTY cable) mode.
5. ORIG/LOCAL/ANS (AD 342 only): A 3-position slide switch normally used to place the coupler in either originate or answer modes. The switch also allows a local mode of operation, as discussed in Section 3.3.2. Some units do not have local mode.

**Figure 3.1 A 242 and AD 342 Front Panel Controls and Indicators**




1. EIA/TTY: This 25-pin connector interfaces EIA or TTY terminals to the acoustic coupler; 16 pins are utilized.
2. FUSE: The A 242 uses a 1/16 ASB-type fuse; the AD 342, a 1/8 ASB-type fuse.
3. Power cord: This 3-wire cord plugs into any 3-wire 115 V ac receptacle.
4. DAA LEVEL (AD 342 only): This 3-position slide switch is set to a level to match that of the telephone company DAA.
5. DAA (AD 342 only): The DAA cable telephone-type plug is plugged into the AD 342 jack.

**Figure 3.2 A 242 and AD 342 Rear Panel Configuration**

## 3.2 A TYPICAL TIMESHARE CALL

A typical call to a timeshare computer after all proper connections are made, and power is turned on consists of: setting the coupler HALF/FULL duplex switch, dialing the timeshare computer, listening for an answer tone, and putting the handset into the cups (acoustic operation) or pulling the data button of the phone (DAA operation). The green carrier light then comes on, indicating a valid transmission path, and the operator signs on with the computer using the terminal and begins sending and/or receiving data.

## 3.3 OPERATING PROCEDURES

The following is a detailed sequence necessary to operate the A 242 or AD 342 coupler. Included are procedures for power turn-on, mode and duplex setting, and coupling to the phone line. If the coupler doesn't operate properly, or there is a suspected malfunction, refer to Section 4.1, Trouble Diagnosis.

**3.3.1 AC POWER.** To turn the coupler on, set the power slide switch to ON. Verify that the red POWER light comes on.

**3.3.2 ORIGINATE/LOCAL/ANSWER SWITCH SETTING (AD 342 only).** Normally the switch should be set to the mode opposite that of the remote coupler. For example, if the other end is an A 242 (originate mode), the AD 342 must be set to the answer mode (for ordinary timesharing, an AD 342 must be set to ORIG). For special situations, the mode switch can be set to LOCAL (some units do not have local mode). This will cause all transmitted data to the coupler to be returned to the terminal(s) as received data whether or not a telephone connection is present. Thus a terminal may be used alone in a "local" mode, or a TTY and an EIA terminal can communicate off-line with one another when used with a C 44 cable (Figure 2.2). If an AD 342 is in originate mode and a call is in progress, switching to the local mode will not only enable local operation, but will also maintain the telephone connection without allowing data to be transmitted to or received from the telephone line. Thus when local operation is complete, the switch can be reset to ORIG and data exchange can proceed as before.

**3.3.3 HALF/FULL DUPLEX SWITCH SETTING.** Determine whether half or full duplex is desired. This is often specified by the time-sharing company or other remote station. Half duplex causes whatever is transmitted to be printed locally. Therefore, data cannot be transmitted and received simultaneously; otherwise, erroneous printing will result. Half duplex should not be used if data is to be transmitted and received simultaneously. Full duplex causes no local printing of transmitted data, so that simultaneous transmitting and receiving is accomplished. Some full duplex systems echo transmitted data back for verification so that the terminal seems to be operating in half duplex when actually it is not.

When the coupler is operated with a TTY using a C 43 or C 44 Teletype cable (Figure 2.2), the duplex switch is enabled. Set the coupler's HALF/FULL switch to the desired position for operation.

When the coupler is used with an EIA terminal which does not use a C 43 or C 44 Teletype cable, the HALF/FULL duplex switch is disabled and the coupler always operates in full duplex. Use the duplex switch on the terminal. If the terminal doesn't have a switch and a different mode of operation is desired, a modification is required. See Section 2.2.

**3.3.4 TELEPHONE LINE COUPLING.** To couple the A 242 or AD 342 to the phone line (acoustic or DAA) do the following:

1. Dial the desired number (or answer the phone).

2. If the coupler is an A 242, or an AD 342 in the originate mode, listen until the high-pitched carrier tone is heard coming from the other end. If the coupler is an AD 342 in the answer mode, no tone is heard.

3. a. If acoustic coupling is used, insert the handset completely into the rubber cups, ensuring that the cord end of the handset is placed in the cup marked CORD at the front of the unit. On an AD 342, ensure that the DAA cable is not plugged in, as this disables the acoustics.

   b. If DAA coupling (non-acoustic) is used (AD 342 only), check to ensure that the DAA cable is plugged in, then set the white button on the DAA phone to the data position.

4. Check to ensure that the CARRIER light comes on within 2 seconds. When the CARRIER light comes on, data exchange can begin.

# 4 MAINTENANCE

The A 242 and AD 342 are designed for long, trouble-free usage. The circuitry is all solid-state. AJ's rigid quality control, thorough testing, and conservatively rated components afford maximum reliability, and thus no regular maintenance program is necessary. If a malfunction is suspected, the procedures below will isolate the problem quickly and will enable the operator to determine whether or not a service call is required.

## 4.1 TROUBLE DIAGNOSIS

If the coupler does not work properly, make these checks:

- **IS THE RED POWER LIGHT ON?** Check to see that the coupler is plugged into an active ac outlet and the POWER switch is on. Check the coupler fuse on the rear panel to see that it is good (the metal connection inside the fuse is not broken).

- **IS THE GREEN CARRIER LIGHT ON?** Listen to the telephone handset for the carrier tone (originate mode only). Make sure the handset is seated in the acoustic cups properly and the handset cord is at the end with the cup labeled CORD. Check that the tone stays on long enough to activate the CARRIER light.

- **IS THE ORIG/LOCAL/ANS SWITCH (AD 342 only) IN CORRECT POSITION?** Check and see if the ORIG/LOCAL/ANS switch is set to the correct position, and if using DAA, check that the LEVEL switch setting matches that of the DAA (Section 2.5) and that the DAA telephone button is set to the data mode.

- **ARE THE INTERFACE CABLES CONNECTED CORRECTLY?** See Figure 2.1 for correct connections. Be sure you are using the right cable, Figure 2.2.

- **IS THE DUPLEX SWITCH IN CORRECT POSITION?** Check the operator's manual of the timeshare service or data system being used. Remember that the duplex switch works only with a TTY. See Section 3.3.3.

- **IS THE DATA TERMINAL COMPATIBLE WITH THE TIMESHARE SERVICE OR DATA SYSTEM BEING USED?** Check the operator's manual of the terminal and the service to ensure that the same character code (ASCII, EBCD or Correspondance) and data rate are being used for both. Make sure that the data rate being used is within the rating of the coupler (between zero and 450 baud).

- **IS THE TIMESHARE SERVICE IN OPERATION?** Check the operator's manual for the hours of the computer. Call the timeshare service to make sure they are operating. Check operation with another service.

## 4.2 SERVICE CENTERS

If the trouble is not solved by checking any of the above steps, call the nearest AJ Sales/Service Office listed on the inside front cover of this manual. There, trained personnel familiar with

couplers, terminals, and timesharing, are able to suggest further testing, or give a verbal diagnosis of a fault elsewhere in the system, or suggest return of the coupler for repair.

If the coupler is within warranty (see inside back cover of this manual), no charge will be made. Otherwise charges are made on a time and material basis plus transportation.