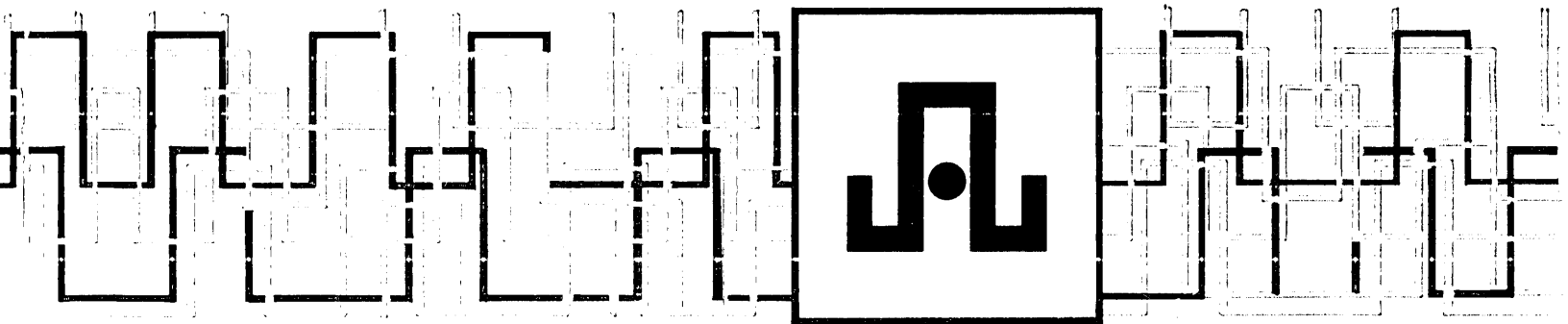


**A 242/AD 342
ACOUSTIC
COUPLERS
OPERATING
MANUAL**



**ANDERSON
JACOBSON, INC.**



ANDERSON JACOBSON, INC.

OPERATOR MANUAL

A 242 ORIGINATE ACOUSTIC DATA COUPLER

AD 342 ORIGINATE/ANSWER ACOUSTIC DATA ACCESS COUPLER

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

3543172, 3628165, and 3733437.



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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.

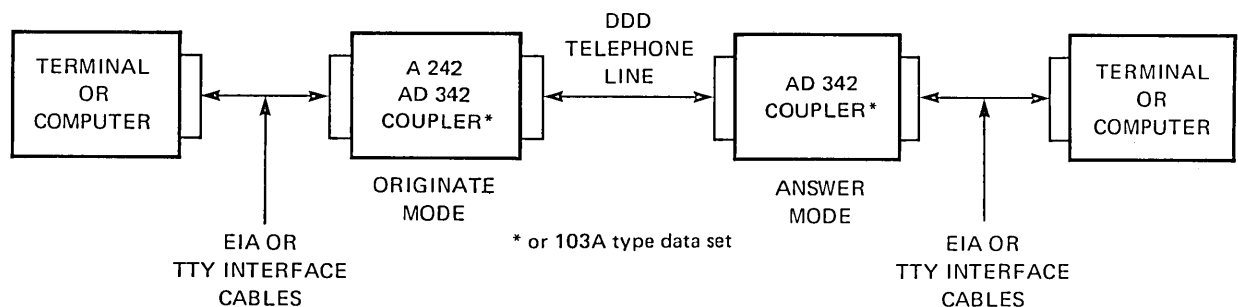


Figure 1.2 Coupler Usage Simplified Block Diagram

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

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 ($\pm 0.1\%$)	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 44 Teletype and EIA "Y" Cable	C 43 Teletype 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 ^o F to 120 ^o F (5 ^o C to 50 ^o C)	40 ^o F to 120 ^o F (5 ^o C to 50 ^o 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.

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.

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).

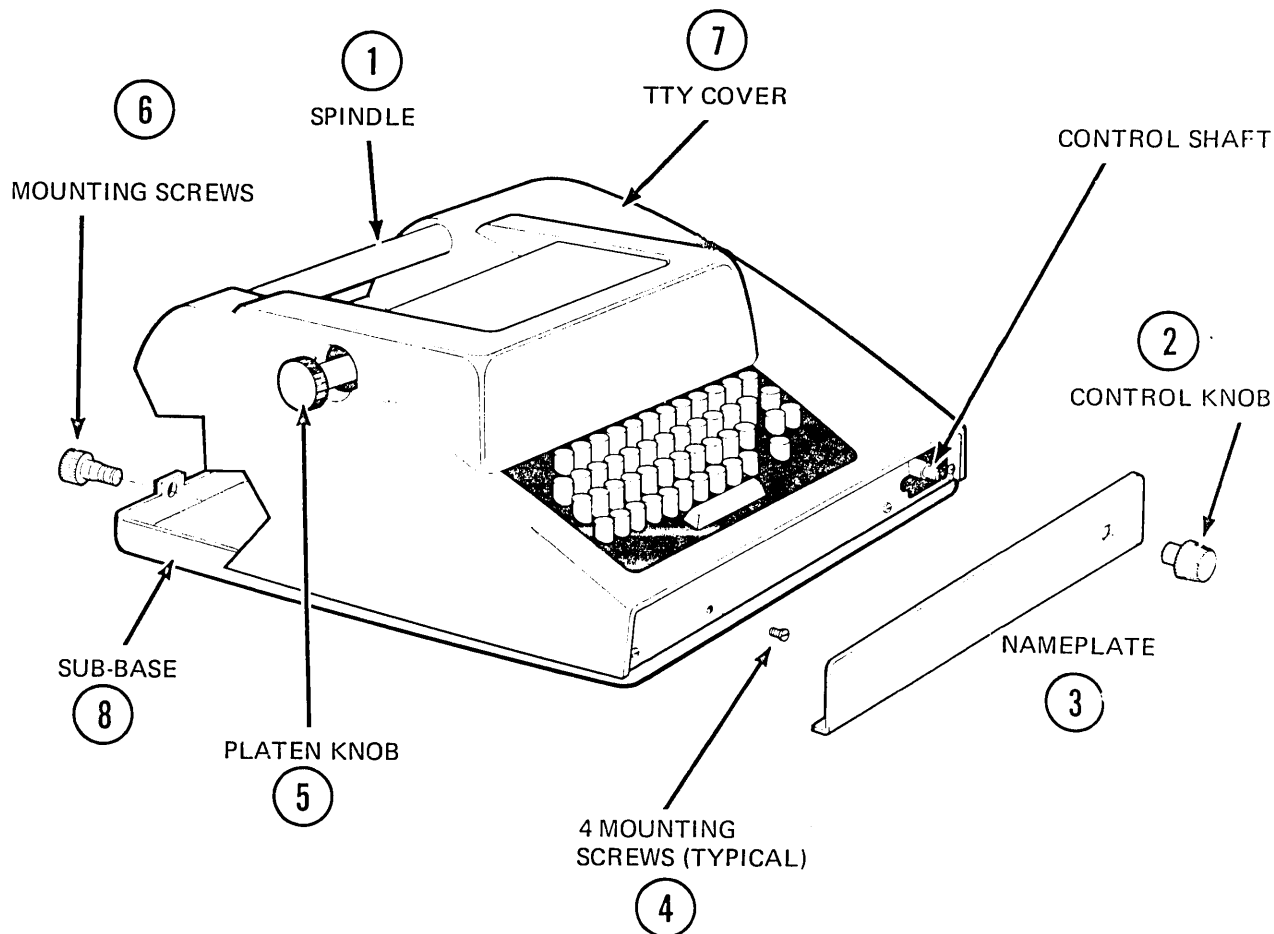


Figure 2.3 Model 33 Teletypewriter Cover Removal

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 1450 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 in Section 2.3.1.

Note

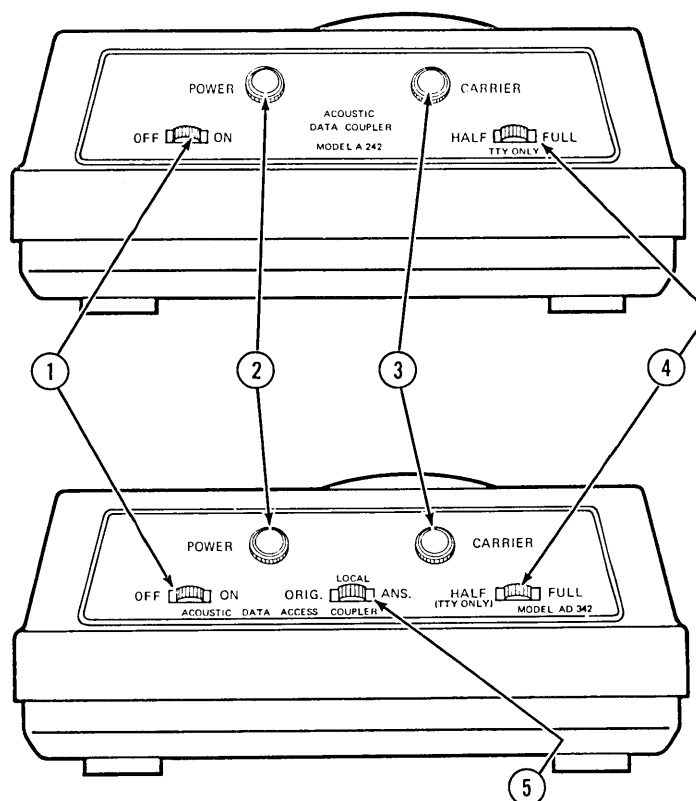
To replace the cover of TTYs that have a low-paper alarm switch, first replace the paper roll and spindle, and then follow the reverse of Section 2.3.1.

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

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.

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

Effective September 6, 1974

WARRANTY FOR AJ COUPLERS AND MODEMS

Anderson Jacobson, Inc., (AJ) warrants its acoustic data couplers and modems to be free from defects in workmanship and material for a period of six (6) months from date of shipment from the factory or regional distribution center. This warranty covers the adjustment or replacement, without charge, at AJ's factory or cognizant regional service center* of any coupler or modem returned, transportation paid, which in AJ's judgment shall disclose to be inoperative. This warranty does not apply to any AJ equipment that has, in the sole judgment of AJ, been subject to neglect, misuse, improper installation or maintenance by other than AJ personnel or accident.

AJ's liability, under this warranty, shall be limited to the repair or replacement of the AJ equipment or other AJ materials which in AJ's judgment are found to be defective. AJ shall not be liable for loss or damage to persons or property caused either directly or indirectly by the use of this product.

This warranty supersedes and is in lieu of all other warranties expressed or implied, including the warranty of merchantability. No other liabilities may be assumed unless expressly authorized in writing by AJ.

*Customer is to obtain address of cognizant regional service center from AJ. Some equipment can only be serviced at the factory.