

BOGEN®

COMMUNICATIONS, INC.

AUTOMATIC FAILURE DETECTOR AND SUBSTITUTOR

AFDS-2

DESCRIPTION

The Bogen Model AFDS-2 Automatic Failure Detector and Substitutor is an electronic unit which continuously supervises the operation of the main and standby power amplifiers in a sound system. Should the main amplifier's output level drop by as little as 2dB, the AFDS-2 substitutes the standby power amplifier. The changeover is nearly instantaneous with virtually no loss of signal.

The AFDS-2 injects a set level of a supersonic frequency (40kHz) into the inputs of the main and standby power amplifiers and continuously samples their outputs. If the 40kHz level from either amplifier should fall below 2dB*, a fault alert tone will sound, indicating a failure. Front-panel-mounted LEDs indicate whether the main amplifier or standby amplifier failed. The fault alert tone may be silenced by momentarily pressing the Silence button; however, the LED will stay on for the duration of the malfunction. The Silence button will automatically reset when the failure is corrected.

The AFDS-2 may be used in either 25V or 70V systems. Booster output may be balanced or unbalanced; but, in a balanced system, two accessory input isolation transformers (Model TL100) are required.

The AFDS-2 input impedance from the preamplifier is 10,000 ohms. In applications where the preamplifier is located away from the amplifier, the AFDS-2 input can be converted to 600 ohms with the accessory WMT-1A Line-Input-Matching Transformer. Screwdriver-adjustable controls for setting the oscillator level and the detector sensitivities are provided on the rear panel.

The AFDS-2 operates from a 120VAC/60Hz or 12VDC source. Line power consumption is 15 watts. All connections are made at screw terminals and phono receptacles on the rear chassis. The unit has a standard 19-inch wide panel, 3-1/2 inches high (48.26 cm x 8.89 cm) and is suitable for either rack or cabinet installation. The front panel is made of #16 gauge cold-rolled steel finished with baked enamel in Bogen sand with mocha-colored lettering.

*Threshold is adjustable

UNPACKING

The AFDS-2 has been carefully checked before leaving the factory. Inspect both the AFDS-2 and its shipping container for indications of improper handling. Report any equipment damage immediately to the distributor from whom the unit was purchased. If the unit was shipped to you, notify and place your claim with the shipping company without delay.

EQUIPMENT CONNECTIONS

AC Power Connections: The AC line cord has a three-prong plug which should be plugged into a three-wire grounded 120-volt, 60Hz outlet. This will automatically ground the chassis.

Auxiliary DC Power Connections: The unit may be powered from a 12-volt DC supply. The positive lead must be connected to the EXT PWR terminal on the chassis and the negative lead to the GND terminal (See Figure 1).

Input Connections: The input impedance of the AFDS-2 is 10,000 ohms, accepting any unbalanced input capable of supplying a signal at least 10% greater than that needed to drive the power amplifiers (which must have an input impedance of 10,000 ohms or greater). Provisions are incorporated for mounting an accessory Model WMT-1A transformer to match the input from a 600-ohm balanced line.

System Connections: Figure 1 shows a typical installation of the AFDS-2. Single-conductor, low-capacity shielded wire should be used for all input connections. These leads should be as short as possible. The remaining connections can be made with either double-conductor shielded wire or #20AWG hookup wire.

NOTE

Input cables should be routed separately from output cables.

Balanced System Applications: In a balance 25V or 70V constant voltage system, two accessory input isolation transformers (Model TL100) are required. To install the transformers, remove the cover, plug the transformers into the nine-pin sockets T1 and

TECHNICAL SPECIFICATIONS

Supervision Frequency: 40kHz

Supervision Frequency Level: 5mV to 50mV into 47 kilohms

Input Impedance: Medium-Z 10 kilohms

Detector Input Signal @ 40kHz: 2V

Detector Supervision Range: 2dB (min.) to 12dB (max.)

Failure Indicators: LEDs (visual) and tone module (aural)

Controls: Screwdriver-adjustable controls for oscillator level and detector sensitivity

Remote Annunciation: Status terminal provides 12VDC/500mA in the failure mode

Operating Temperatures: 14°F to 149°F (-10°C to 65°C)

Power Consumption: 120VAC, 15W or 12VDC @ 0.5A

Dimensions: 19" wide x 3-1/2" high x 7-1/2" deep (48.3 x 8.9 x 19.1cm)

Weight: 8 lbs. (3.6kg)

Finish: Bogen sand with mocha lettering; baked enamel

Accessories: Two TL100 transformers for 25V or 70V balanced systems; WMT-1A Line-Matching Transformer to match the input from a 600-ohm balanced line

Fuse Replacement: The AC line fuse is located on the rear apron of the AFDS-2. It is a 1/10A slo-blo fuse. Replace with a fuse of the same type and rating.

CAUTION

There are no user-replaceable parts within the unit. Have all internal servicing done by qualified service personnel.

Schematic Reference	Part No.	Description	Schematic Reference	Part No.	Description
--	45-7058-05	PC board assembly	Q3, 4, 7	96-5290-01	Transistor, MPSA05
C1	79-009-044	Cap., Elect., 2000 μ F, 25V	R2, 33	77-001-743	Control, 200-kilohm
C2, 14	78-405-127	Cap., Dura Mica, 75pF, 2%	R3, 10, 23, 29	75-262-103	Resistor, 10-kilohm, 1/2W
C3, 15, 18-20	78-404-168	Cap., Dura Mica, 3600pF, 5%	R6, 28	75-262-105	Resistor, 1-megohm, 1/2W
C4	79-005-039	Cap., Elect., 1000 μ F, 16V	R7, 8	75-154-103	Resistor, 10-kilohm, 1/4W, 1%
C8	78-404-138	Cap., Dura Mica, 240pF, 5%	R11, 18, 26, 27	75-262-472	Resistor, 4.7-kilohm, 1/2W
C9	79-405-138	Cap., Dura Mica, 250pF, 2%	R12, 30	75-262-152	Resistor, 1.5-kilohm, 1/2W
C10, 22, 23	78-404-143	Cap., Dura Mica, 390pF, 5%	R14	75-154-472	Resistor, 4.7-kilohm, 1/4W, 1%
C12, 21	79-008-047	Cap., Elect., 100 μ F, 25V	R15	75-154-102	Resistor, 1-kilohm, 1/4W, 1%
C16	79-005-052	Cap., Elect., 500 μ F, 25V	R16	77-007-006	Trimpot, 1-kilohm
CR1, 2, 4, 6-9	96-5333-01	Diode, 400prv @1A	R17	75-154-104	Resistor, 100-kilohm, 1/4W, 1%
CR3	96-5344-01	Diode, Zener, 10V, 2W	R19, 35	75-262-682	Resistor, 6.8-kilohm, 1/2W
CR5, 10	96-5118-01	Diode, Germanium, S262	R20	75-262-102	Resistor, 1-kilohm, 1/2W
IC1	96-5386-01	IC, CA3094E	R21	77-001-788	Control, 10-kilohm
L1-3	96-5193-01	Coil	R24, 25	75-262-104	Resistor, 100-kilohm, 1/2W
Q1, 5	96-5422-01	Transistor, 2N5458	R36	75-154-403	Resistor, 40-kilohm, 1/4W, 1%
Q2, 6	96-5213-01	Transistor, 2N5089	SCR1	96-5214-01	SCR, 2N5060
					Chassis
			CR101, 102	96-5333-01	Diode, 400prv @1A
			D101, 102	96-5403-01	LED
			F101	94-0001-13	Fuse, Slo-Blo, 1/10A
			RY101	90-0182-01	Relay
			SW101	81-004-083	Switch, Pushbutton
			T101	83-762-000	Transformer, Power
			Y101	94-1361-02	Sonalert

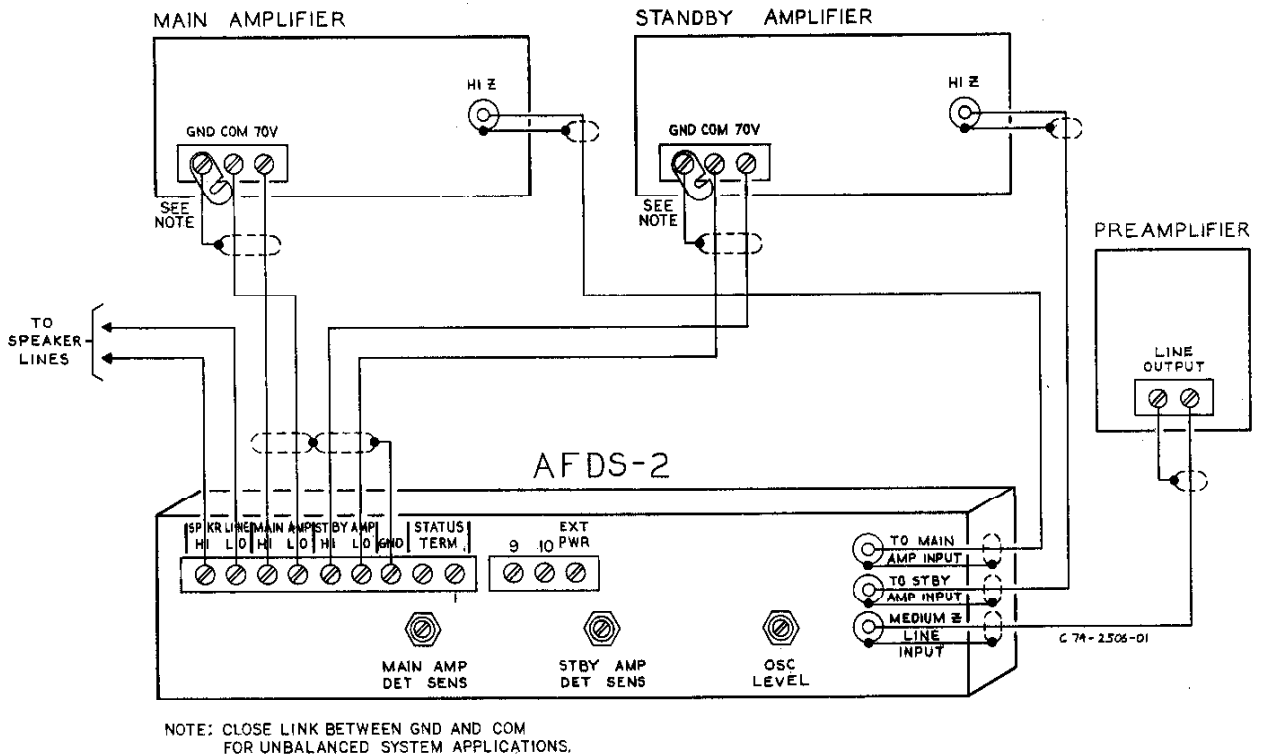
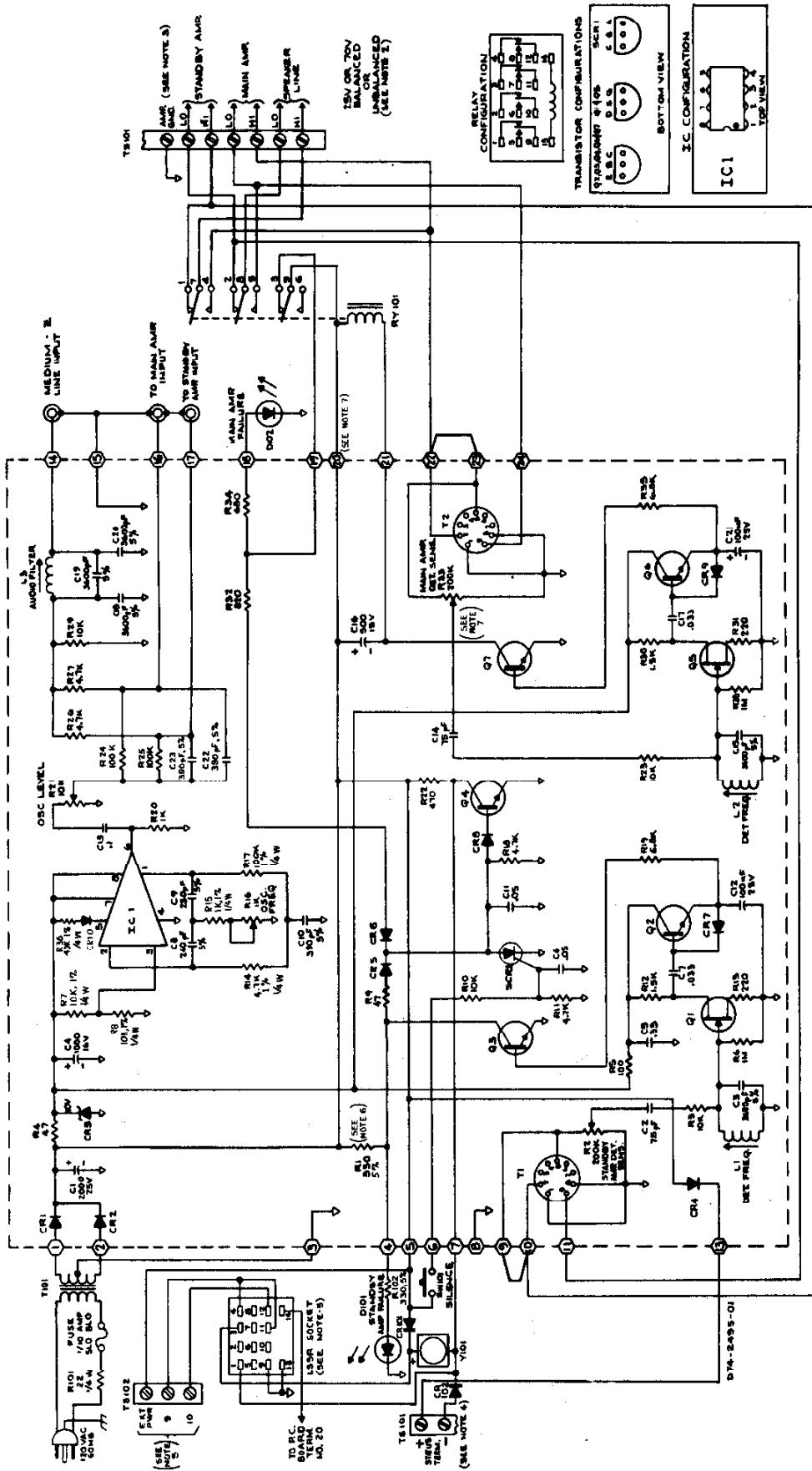


Figure 1 — AFDS-2 Interconnection Diagram



- NOTES:
- 1 - UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2W \pm 10%, CAPACITORS ARE IN MFD.
 - 2 - FOR BALANCED APPLICATIONS ONLY: CUT JUMPER BETWEEN PINS 9 & 10 AND PINS 22 & 23. INSERT TWO TL100 TRANSFORMERS FOR A 70V BALANCED LINE OR FOR A 25V BALANCED LINE
 - 3 - AMPLIFIER GROUND MUST BE CONNECTED TO THIS TERMINAL
 - 4 - MAXIMUM RATING OF STATUS TERMINAL IS 12VDC/500MA
 - 5 - RELAY ISSR, TERMINALS 9, 10 AND EXT PWR USED ONLY IN AUDIO EVACUATION AND PANIC CONTROL SYSTEM APPLICATION
 - 6 - FOR SINGLE AMPLIFIER SUPERVISION, REMOVE R1, AND TURN R2 COUNTERCLOCKWISE.
 - 7 - FOR SINGLE AMPLIFIER SUPERVISION, STANDBY ONLY, REMOVE WIRE FROM PIN 20 AND TURN R3 COUNTERCLOCKWISE.

Figure 2 — AFDS-2 Schematic Diagram

T2 on the PC board and cut the jumpers between terminals 9 and 10 and between terminals 22 and 23 (see schematic diagram, Figure 2).

Status Terminal Connection: Remote indication of failure of the main amplifier and/or standby amplifier can be obtained by connecting a pair of wires and an annunciator to the Status Terminal. Twelve volts DC @ 500mA (maximum) are provided in the failure mode.

ADJUSTMENTS

Internal Controls (Factory Set): Oscillator Frequency control R16, Detector Frequency variable inductors L1 and L2, and Audio Filter variable inductor L3 are factory set and should not require adjustment unless repairs have been made to the AFDS-2.

External Controls: Oscillator Level control R21 and Detector Sensitivity controls R2 and R33 must be set at the time of installation.

SETUP PROCEDURE – MAIN AMPLIFIER

1. Connect an AC DVM across the output terminals of the main amplifier on the constant voltage setting being used (25V or 70V).

NOTE

Make certain that the AFDS-2 is fully loaded by connecting the amplifier rated load across the Speaker Line (Hi and Lo) terminals. Turn the Main Amp Detector Sensitivity control R33 and the Standby Amp Detector Sensitivity control R2 fully clockwise. If the DVM reads zero, rotate the 40kHz Oscillator Level control R21 clockwise until the Speaker Line switches to the main power amplifier.

2. Set the preamplifier and main amplifier volume controls to their normal settings for maximum level of required program material. Record the settings. Use a tone generator, tuner, tape or phono input as the program input source.
3. Disconnect the preamplifier input to the AFDS-2 and set the Oscillator Level control R21 so that the DVM reads approximately 2 volts. This control requires no further adjustment.
4. Main Amplifier Detector Sensitivity Adjustment
 - a. The AFDS-2 will annunciate failure and switch in the standby power amplifier for any gain change in the main power amplifier from 2dB to total failure. To determine this switchover point, observe the DVM reading. The following table shows this relationship between the DVM reading and this gain change for switchover.

DVM READING	SUPERVISION GAIN CHANGE
1.60V	-2dB
1.42V	-3dB
1.26V	-4dB
1.12V	-5dB
1.00V	-6dB
0.80V	-8dB
0.62V	-10dB

- b. Turn down the main power amplifier gain control while observing the DVM reading. Refer to the table for the desired setting.

- c. Turn the Main Amplifier Detector Sensitivity control R33 *very slowly* counterclockwise until the critical point (the switchover point to the standby amplifier) is reached. This point is indicated by an aural signal from the internal Son-alert and a visual signal from the LED monitoring the main amplifier. Advance the control clockwise just enough to return the main amplifier. The Main Amplifier Detector Sensitivity control threshold is now set. **RETURN THE MAIN AMPLIFIER GAIN CONTROL TO ITS ORIGINAL SETTING.**

NOTE

If the internal relay of the AFDS-2 switches operation back and forth between the main and standby amplifiers, this indicates poor regulation of the amplifier output with greater than the supervision gain change level between full load and no load conditions. In this case, advance the Main Amplifier Detector Sensitivity control R33 for a greater gain-change for switchover.

SETUP PROCEDURE – STANDBY AMPLIFIER

1. Disable the main amplifier and push in the Silence button on the AFDS-2.
2. Set the amplifier volume control to its normal setting for maximum level of required program material. Record this setting.
3. Standby Amplifier Detector Sensitivity adjustment.
 - a. Connect a DVM across the output terminals of the standby amplifier.
 - b. Turn down the standby amplifier gain control while observing the DVM reading. Refer to the table for the desired setting.
 - c. Turn the Standby Amplifier Detector Sensitivity control R2 counterclockwise *very slowly* until the standby power amplifier LED lights. Advance the control clockwise just enough to turn off the LED. The Standby Amp Detector Sensitivity control threshold is now set. **RETURN THE STANDBY AMPLIFIER GAIN CONTROL TO ITS ORIGINAL SETTING. RECONNECT THE PREAMPLIFIER INPUT TO THE AFDS-2. RESTORE THE MAIN AMPLIFIER TO FULL OPERATION.**

MAINTENANCE

BOGEN SERVICE

We are interested in the maintenance of your Bogen equipment. If trouble ever develops, do not hesitate to ask our advice or assistance. Information may be obtained by writing to: Service Department, Bogen Communications, Inc., P.O. Box 575, Ramsey, NJ 07446.

When communicating with us, give the model and series designation of your unit. Describe the difficulty and include details on the electrical connections to associated equipment, such as preamplifiers, speakers, etc. We will send you service information if the trouble appears simple. If the equipment requires servicing, we will send you the name and address of the nearest authorized Bogen service agency.

When shipping, pack well, using the original shipping carton or similar container and filler material to prevent damage in transit. Remove any plug-in transformer from the printed circuit board before shipping. Send the unit, fully insured and freight prepaid via responsible carrier. The repaired unit will be returned to you freight prepaid while in warranty.