MANUAL

MODEL 635-002

STRAIN GAGE AMPLIFIER

INDEX

2.....DESCRIPTION
3.....I. SPECIFICATIONS: AMPLIFIER MODULE
5.....II. SPECIFICATIONS: RACK ADAPTER ASSEMBLY
6.....III. SPECIFICATIONS: POWER SUPPLY
7.....PCB JUMPER ASSIGNMENTS
8.....BRIDGE MODES, FIGURE 1
9.....CIRCUIT DESCRIPTION
10-13.....PIN-OUT TABLES
14.....SET-UP PROCEDURE
16.....ACCEPTANCE TEST PROCEDURE
17.....ACCEPTANCE TEST DATA SHEET
19.....SCHEMATIC: AMPLIFIER MODULE D13555
20.....SCHEMATIC: POWER SUPPLY C13597
21.....FRONT RACK: ASSEMBLY 4007-137
22.....REAR RACK: ASSEMBLY 4007-137

Reviewed 3.24.03 mbz

MODEL 635

DESCRIPTION

FUNCTION: The Model 635 Strain Gage amplifier is used to condition strain gage signals and to provide precise, low-noise excitation voltages to the strain gage(s).

CONSTRUCTION: The amplifier uses modular construction. Seven modules can be accommodated in a rack adapter, Encore Model 4007-137. The rack also accommodates a Model 843 power supply module. This module provides unregulated +,-24VDC for the amplifier circuitry, plus seven isolated +,-24VDC outputs for the bridge excitation circuits.

FEATURES: A number of parameters and operating modes are selectable with the front panel controls. Automatic bridge balance with battery backup is standard. Selectable parameters include cal-select resistors, gain, frequency response, internal bridge-completion components, and bridge excitation voltage. Selectable modes include AC/DC coupling, internal DC CAL, external CAL, and ZERO. The ZERO position allows the operator to null the amplifier and to evaluate noise attributable to the amplifier. An ON/OFF switch for bridge excitation enables the operator to evaluate noise pick-up attributable to gauge installation (Switch Off) and signal (Switch On).

A mode switch is provided to select the bridge configuration, including 1/4 static, 1/2 static, 1/4 dynamic, and full bridge. An additional position selects the EMF input mode for operation of the amplifier as a high-performance, general purpose differential amplifier.

Each module front panel provides two LED indications, one for output signal limit and the other for auto-balance status. The balance LED will light during a balance cycle, and will remain lit if an unbalanceable condition exists. It will also light on power-up if the back-up battery is weak.

The auto-balance can be initiated for all channels with a push-button on the power supply module or with a zero-level on a BNC located on the rear panel of the rack adapter. Also, modules can be individually auto-balanced with a recessed front panel push-button.

Another major feature of the amplifier is that it provides two channels. One is a MAIN AC/DC channel whose parameters are controlled from the module front panel. The other channel is a DC auxiliary channel with fixed parameters, although the gain is jumper-selected from 1 to 500. The main channel is generally used for low-level dynamic strain measurement, while the auxiliary channel monitors the static strain.

Detailed specifications describing the module, rack assembly and power supply are included in this manual. Also included are outline drawings and schematics.

I. SPECIFICATIONS: AMPLIFIER MODULE

MECHANICAL: The amplifier plug-in module is 7"H x 2"W x 12"D and weighs 16 oz.

BRIDGE EXCITATION: Front panel adjustable, +1.0 to +15VDC with ON/OFF switch. A separate transformer-isolated, unregulated + ,-24VDC power source is provided to each module.

BRIDGE CONFIGURATION: Front panel switch selectable for 1/4 STATIC, 1/2 STATIC, 1/4 DYNAMIC, FULL and EMF as follows:

1/4 STAT POSITION: Single active gage in a bridge configuration.

1/2 STAT POSITION: Two active gage in a bridge configuration.

1/4 DYN POSITION: Single gage in series with CV excitation source. An internal 400 ohm resistor is in series with the gage to induce gage-voltage variations with strain.

FULL POSITION: Four externally connected active gages in bridge configuration.

EMF POSITION: For GENERAL PURPOSE differential amplifier. Input signal is applied to +S and -S terminals of the bridge/amplifier connector.

BRIDGE COMPLETION: Front panel toggle selects either 120 ohm or 350 ohm completion resistors in the 1/4 and 1/2 STATIC modes.

AUTO-BALANCE: The AUTO-BALANCE function is remotely activated for all modules simultaneously with a zero-level on a rear panel BNC or a push-button on the power supply module. Individual modules can be activated with a front panel push-button.

Resolution: +, -2.1 mV/V of excitation at G=1000. (RTO)

A front panel LED indicates an unbalanceable condition.

AMPLIFIER CONFIGURATION: The input signal is applied to two parallel amplifier channels, as follows:

MAIN AC/DC CHANNEL #1: A front panel adjustable amplifier.

DC ONLY CHANNEL #2: A fixed gain of 100, DC coupled, with a fixed frequency response of 11Hz (-3dB). Output is rated to +, -10V at 10mA. Gains of 1, 100, 200 or 500 can be selected with a PCB jumper (J6), within a 1% tolerance.

MODE: Front panel mode switch selects either EXTERNAL CAL, AC coupled, DC coupled, DC CAL, or ZERO, as follows:

EXTERNAL CAL: 0 to +,-2V is connected to all of the amplifier inputs through EXT.CAL BNC at rear of rack assembly.

AC: The input circuit is AC coupled down to 12Hz (-3dB).

Continued on next page

DC: The input circuit is DC coupled.

DC CAL: A front-panel-selected internal calibration resistor is connected from -P to +S or -P to -S (Jumper Selectable).Values are 11.88K, 19.88K, 49.00K and 99.00K.

ZERO: Used with front panel trimpot to null the amplifier with zero-input signal.

INPUT SIGNAL: The sum of the DC and AC signals should not exceed +,-10Vdivided by the gain setting.

GAIN: Front panel gain switch selects fixed gains from 1 to 5000 +,-2% in log steps. A front panel gain vernier adjusts between fixed gains.

FREQUENCY RESPONSE: Front panel switch selects 3-pole Butterworth low pass filter with nominal -3dB points at 200, 500, 5000, 16000 and 32000Hz. Frequency response in the filter "OUT" position is 100KHz. The frequency response of the DC channel is 11Hz nominal.

COMMON MODE VOLTAGE: +,-10V Max.

CMRR: 100dB, DC to 70Hz, DC coupled.
80dB, 70Hz, AC coupled.
80dB, 1KHz, DC coupled.

MONITOR OUTPUT: +,-10V Max., 0 to 100 mA PK.

TAPE OUTPUT: +,-10V Max., 2K ohm minimum load.

NOISE: 2.5 microvolts RMS, RTI at G=1000.

DRIFT: Within +,-10 microvolts, RTI at G=1000 for 24 hrs after a one hour warm up.

LIMIT INDICATOR: LED lights whenever output signal exceeds 1.0V RMS (factory preset).

II. SPECIFICATIONS: MODEL 4007-137 RACK ADAPTER ASSEMBLY

RACK CONFIGURATION: The rack adapter assembly is 19"W x 16 1/2"D x 7"H. It accommodates one Model 843 power supply module and seven Model 635 amplifier modules.

REAR PANEL CONNECTORS: There are five types of termination on the rear of the rack, as follows:

> **TAPE OUTPUT:** One insulated BNC per amplifier channel. These are low power, buffered outputs for tape recorders, oscilloscopes and other high impedance instrumentation.
>
> **MONITOR OUTPUT:** One 18-pin bulkhead connector per rack for the high- power output circuit of each amplifier module. These outputs are used for driving low impedance loads with high shunt capacitance cables, ie: 50 ohms, .056uf.

DC OUTPUTS: Seven 3-pin bulkhead connectors per rack connect to the output of the fixed DC channels.

BRIDGE/AMPLIFIER INPUT: One 6-pin bulkhead connector per amplifier channel for interfacing the strain gages to their respective amplifiers.

CAL: One insulated BNC per rack, accepts external calibration signal.

AUTO-BAL: One insulated BNC per rack accepts external auto-balance command.

REMOTE: One insulated BNC per rack, through which a circuit closure, either switched or from a computer, disconnects the normal inputs of each amplifier module and replaces it with the "EXT. CAL" signal.

LINE CORD RECEPTACLE: Accepts 3-wire cord to plug into 115VAC, +,-10%,50/60Hz power line.

III. SPECIFICATIONS

MODEL 843 POWER SUPPLY MODULE

DESCRIPTION: Both the input and output connections are made with a PC edge connector at the rear of the module. A fully shielded, toroidal power transformer allows the PS module to operate adjacent to a high-gain amplifier module without inducing 60Hz pick-up noise. Rectifiers and electrolytic capacitors complete the circuit which provides the +,-24VDC (nominal), unregulated output voltages. These voltages are routed through the PC connector to each amplifier module, where they are regulated as needed.

MECHANICAL: The power supply module is 7"H x 2.8"W x 12"D and weighs 4.5 lbs.

ELECTRICAL:

INPUT: 115V +,-10%, 50/60 Hz @ 0.8A Max.

OUTPUT: Eight unregulated, transformer isolated DC outputs, as follows:

1@ +24VDC at nominal line and full load; 1.2A MAX.

1@ -24VDC at nominal line and full load; 0.6A MAX.

7@ +24VDC @ 0.08A@ (.56A total)

Ripple: 1.5V PK/PK Max. per output

CONTROLS:

Power "ON" switch and Indicator lamp.

Front Panel 1A, SLO-BLO line fuse.

Front Panel toggle switch for grounding power supply common.

Front panel push-button to actuate AUTOBALANCE.

PCB JUMPER ASSIGNMENTS

MODEL 635

J1-J2 Selects whether the DC-ONLY auxiliary channel or the AC/DC main channel is connected to the autobalance input signal. (Typically connected to the channel with the highest gain or the one being used for "static" strain.)

J3-J4 Remain connected at all times, except to remove the external CAL signal.

J5 Remains connected, except to disable the external CAL command.

J6 Gain-Select jumper for DC-ONLY auxiliary channel.

J7* Connects +P CAL to +P

J8* Connects +S CAL to +S

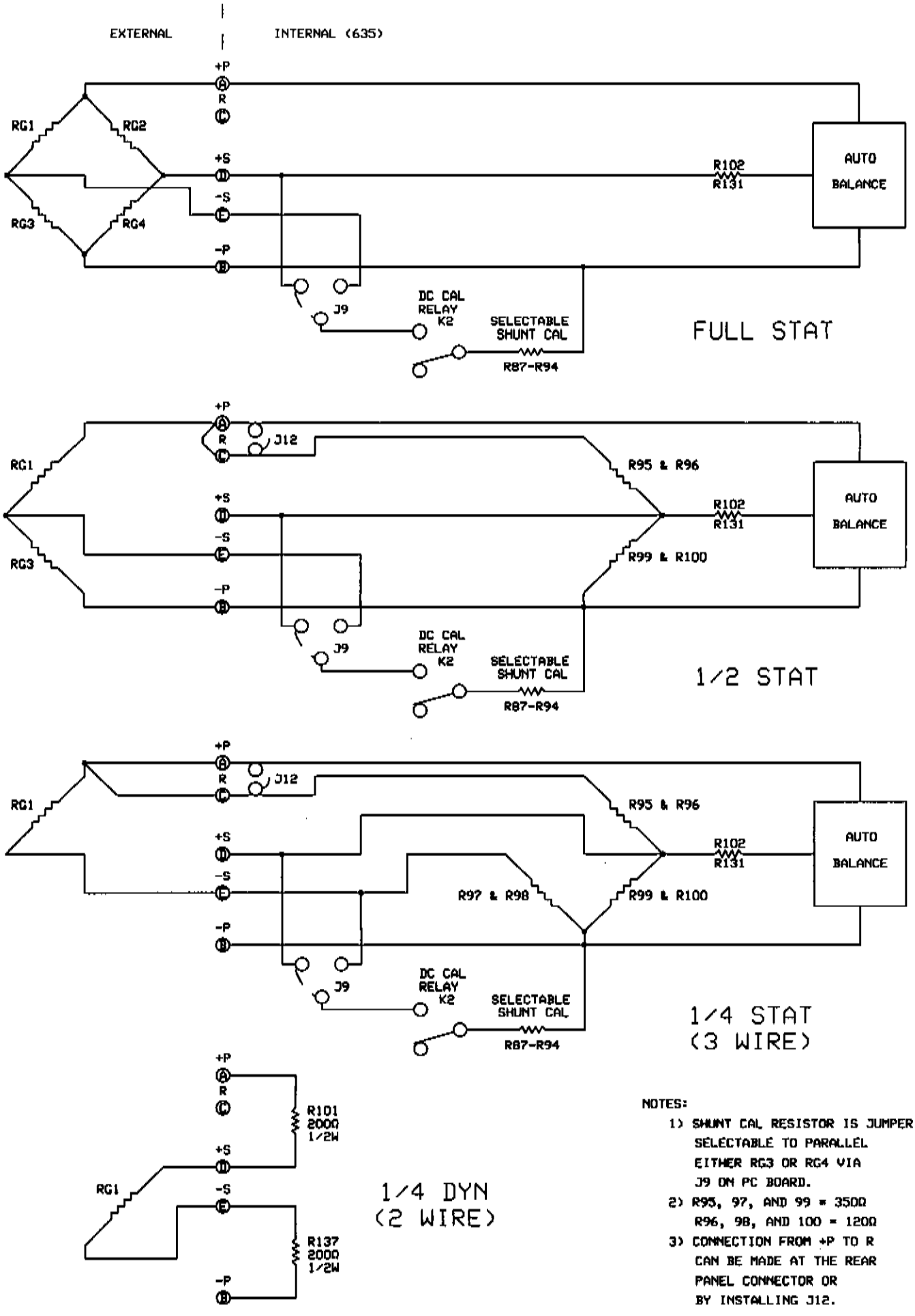
J9 Selects "positive" or "negative" going shunt CAL output signal.

J10* Connects -S CAL to -S

J11* Connects -P CAL to -P

J12 Connects +P to R for 1/4 or 1/2 STAT modes when using 2-wire gages. Remove for 3-wire gages.

*Disconnect J7, 8, 10 and 11 to allow for remote sensing and calibration. (Use Encore Model 4007-139 Rack Adapter which is fitted with 10-pin bridge-input connectors.)



NOTES:

1) SHUNT CAL RESISTOR IS JUMPER SELECTABLE TO PARALLEL EITHER RG3 OR RG4 VIA J9 ON PC BOARD.
2) R95, 97, AND 99 = 350Ω
   R96, 98, AND 100 = 120Ω
3) CONNECTION FROM +P TO R CAN BE MADE AT THE REAR PANEL CONNECTOR OR BY INSTALLING J12.

FIGURE 1
MODEL 635 BRIDGE MODES

CIRCUIT DESCRIPTION

MODEL 635

Reference is made to the circuit schematic D13555. The amplifier module provides both a main AC/DC channel and an auxiliary DC channel. Each channel incorporates a precision monolithic instrumentation amplifier in the first stage.

The first stage of the main amplifier (U1) is followed by gain adjust stages (U2,U3), filter stage (U4) and output buffer stages U5, U6, and U7. The MONITOR output is provided through U6, a high-current (150mA) voltage follower. The TAPE output is derived from U6, through the low-current buffer U7 (5mA). The output of U7 is also applied to the comparator circuit which activates the voltage-limit LED. Retriggerable one shot (U9) times-out and extinguishes the LED after the over-voltage condition no longer exists.

Unregulated +,-24VDC referred to the amplifier common is applied to three-terminal regulators U24 and U25, which provide regulated +,-15VDC for the amplifier's op-amps. Another set of +,-24VDC, referred to an isolated common, is applied to three-terminal regulators U22 and U23. These regulated +19V and -16V for the auto-balance circuits. The floating +24VDC is also applied to the adjustable-output regulator U21 and Q7 to supply the module's bridge excitation voltage.

Relay switching is used to control the various modes and resistor values. Relay K1 selects EXT. CAL while K2 connects the DC shunt CAL resistor, the completion resistors. Front panel rotary switching is used to select gain (S3) amplifier mode (S2) and bridge configuration. (S5)

The AUTOBALANCE circuit is an electronic circuit which simulates the function of a balance pot by driving the balance resistor with the voltage output of a DAC (U18). This output spans the range from -P to +P with a resolution of 1 part in 4096. When the rear panel AUTOBALANCE BNC is shorted, the 12 bit DAC is set to zero, (-P) and then counts up until bridge balance is achieved. The counter is then stopped and retains its status until another balance request occurs. An on-board lithium cell, BT1, prevents loss of this status when the amplifier is off. If the battery is weak, the BAL LED will light when the amplifier is turned on. This does NOT mean the balance has been lost, but the battery is due for replacement.

When an autobalance cycle is initiated, the BAL LED will light until balance is achieved and then it extinguishes. If the LED remains on after 2.5 seconds, an unbalanceable condition exists and must be corrected. Some common causes are defective gages, wrong completion resistor setting, and no excitation voltage. It should also be noted that the gages must be in a static (unloaded) condition during autobalance to prevent an erroneous setting. Also, if autobalance is attempted in a non-bridge mode such as 1/4 DYN or EMF, the BAL LED will light and remain on.

Either the main channel or the auxiliary DC channel may be selected via the BALANCE REF SELECT jumper on the PCB as the input to the balance comparator. (U16) The normal setting is on the DC channel, which is valid for all static bridge modes, even when the main channel is in the AC or ZERO mode.

In order to maintain the isolation of the bridge excitation, an optical coupler (U12) is provided between the auto-balance command and the auto-balance control circuit. Retriggable one-shot U13 reset the up-counter (U17) and the dual flip-flop U14 turns on the Balance-Fault LED-1 if the bridge does not balance before U13 time-out.

Op-amp U26 provides a buffered reference voltage to the DAC (U18). The analog bridge-balance signal from U18 is filtered and buffered by U19 and U20. The bridge-balance voltage at U20 is applied to the +S segment of the bridge through balancing sensitivity resistors. (R131, R102) The primary operating voltage for the counter and the DAC is applied through decoupling diode D12, R124 and zener regulator D17. If this voltage is lost during shut-down, BT1supplies back-up voltage through decoupling diodes. (D13,14,15,16) This allows the counter and the DAC to hold their digital status until power is restored.

MODEL 635

RACK BRIDGE/AMPLIFIER INPUT CONNECTOR
(PT02A-10-6S)

PIN	ASSIGNMENT
A	+P BRIDGE
B	-P BRIDGE
C	R BRIDGE/SHIELD
D	+S BRIDGE
E	-S BRIDGE
F	CHASSIS GROUND

*MATES WITH PT06A-10-6P (SR)

DC CHANNEL OUTPUT CONNECTOR

PIN	ASSIGNMENT
A	DC OUTPUT
B	COMMON
C	SHIELD GROUND

*MATES WITH PT06A-8-3S (SR)

MODEL 635 MODULE

PCB EDGE CONNECTOR

FINGER ASSIGNMENT		FINGER ASSIGNMENT	
1	CHASSIS GND (F.P.) BUSS----------	A	
2	R	B	
3	-P	C	GND PLANE
4	+S	D	
5	-S	E	
6	-S	F	
7	+S SENSE	H	
8	+P SENSE	J	
9	-P SENSE	K	
10	MONITOR OUT	L	
11	DC OUT	M	
12	----------BUSS----------	N	GND PLANE (AMP COM)
13	BAL.	P	
14	TAPE OUT	R	
15	-24 AMP BUSS----------	S	
16	COM AMP BUSS----------	T	
17	+24 AMP BUSS----------	U	
18	+24 ISO	V	+BATT. BACK-UP
19	EXT CAL COMMAND BUSS----------	W	
20	-24 ISO	X	ISO 24V. COM
21	EXT CAL HI	Y	EXT CAL LO
22	+P	Z	N.C.

RACK MONITOR OUTPUT CONNECTOR
PT02A-14-18S

PIN	ASSIGNMENT
A	CHANNEL 1 MONITOR OUTPUT HIGH
B	" 2 " " "
C	" 3 " " "
D	" 4 " " "
E	" 5 " " "
F	" 6 " " "
G	CHANNEL 7 MONITOR OUTPUT HIGH
H	OUTPUT COMMON
J	CHASSIS GROUND
K	CHANNEL 1 BRIDGE +P
L	" 2 " "
M	" 3 " "
N	" 4 " "
P	" 5 " "
R	" 6 " "
S	CHANNEL 7 BRIDGE +P
T	COMMON
U	CHASSIS GROUND

MATING CONNECTOR PT06A-14-18P (SR)

COMBINATION RACK OUTPUT CONNECTORS

PIN	ASSIGNMENT
A	OUTPUT HIGH
B	OUTPUT COMMON
C	CHASSIS GROUND

MODEL 843 POWER SUPPLY MODULE
(USED IN 635 RACK)

FINGER	ASSIGNMENT
1	AC HOT
2	
3	PWR GND
4	ISO -24 (1)
5	ISO -24 (2)
6	
7	ISO -24 (3)
8	
9	
10	
11	ISO -24 (4)
12	
13	
14	ISO -24 (5)
15	
16	ISO -24 (6)
17	
18	ISO -24 (7)
19	+24V
20	
21	
22	-24V

FINGER	ASSIGNMENT
A	
B	AC NEUT
C	ISO +24 (1)
D	ISO COM (1)
E	ISO +24 (2)
F	ISO COM (2)
H	ISO +24 (3)
J	ISO COM (3)
K	
L	
M	ISO +24 (4)
N	ISO COM (4)
P	COM.GND SW.
R	ISO +24 (5)
S	ISO COM (5)
T	ISO +24 (6)
U	ISO COM (6)
V	ISO +24 (7)
W	ISO COM (7)
X	24 COM
Y	24V COM
Z	

MODEL 635

SET-UP PROCEDURE

1. Allow the amplifier (RACK) to warm-up for at least one-half hour.

2. Connect bridge and select the BRIDGE configuration, ie: 1/4 STAT, with the front panel rotary switch. Select the required bridge completion resistors, either 120Ω or 350Ω with the front panel toggle. Refer to FIGURE 1.

3. The following table show the relationship between strain and Rcal for both 120Ω and 350Ω gages and for one, two and 4 gage bridge configurations, assuming a GF of 2: *

Rcal	ACTIVE GAGES (N)					
	1		2		4	
	120	350	120	350	120	350
99K	605	1761	1210	3522	2420	7044
49K	1221	3546	2442	7092	4884	14,184
19.88K	3000	8650	6000	17,300	12,000	34,600
11.88K	5000	14,309	10,000	28,618	20,000	57,236

$$*\text{MICROSTRAINS (S)} = \frac{Rg \times 10^6 \times N}{GF\,(Rcal + Rg)}$$

4. Set the excitation voltage to the desired value. The higher the voltage level, the higher the sensitivity, but the greater the likelihood of thermal instability from bridge heating.

5. Monitor the amplifier output at the appropriate tape-output BNC on the rear of the rack adapter. With the mode switch at ZERO, null the amplifier output with the ZERO trimpot.

6. Monitor the output noise" in the zero mode. This indicates the electrical noise attributable to the amplifier. Switch the operating mode to DC.

7. Monitor the output "noise" in the DC mode with the bridge excitation voltage "OFF." This indicates the combined noise attributable to the amplifier and to the strain gage hook-up wiring.

Continued on next page

8. With the excitation ON, press the auto-balance button. The BAL LED should extinguish and the DC outputs of both the main and DC channels should be zero volts. (Not applicable in the 1/4 DYN mode.)

9. With the amplifier in the DC CAL mode and the excitation set to the selected level, adjust the gain for the desired full-scale output voltage. (Gain settings are calibrated with the gain-vernier fully CW) Relate this voltage to the appropriate strain level shown in step 3 and reset the gain pot until the desired scale is achieved. Return the mode switch to the operating position. (DC or AC coupled)

10. Select the desired frequency response (-3dB) with the FILTER switch. Choose a setting just high enough for the required data frequency band. This will minimize "white" noise at the output.

11. The amplifier is now zeroed, the bridge (if applicable) is balanced and the gain is calibrated. The operating mode, gage excitation, frequency response and the bridge configuration have been selected. The system is ready to make strain measurements.

NOTE 1: Set the GAIN for steps 6, 7 and 8 to an arbitrary level. After the gain is calibrated in step 9, it is desirable to re-do steps 6,7 and 8 with the actual gain setting.

NOTE 2: The amplifier must be in the AC coupled mode for 1/4 DYN operation. Internal DC CAL does not apply, however the amplifier should be zeroed per step 5.

NOTE 3: For the EMF mode, place the amplifier in EXT. CAL and apply the signal to be amplified to the EXT. CAL input on the rack adapter. If different signals to more than one amplifier are required, then these signals must be applied to +S (D) and -S(E) amplifier input terminals.

ACCEPTANCE TEST PROCEDURE FOR MODEL 635

TURN-ON: With the bridge excitation voltage set to 5V & on, the bridge mode switch at "FULL," gain at X1000, gain-trim fully CW, and a 120 ohm full bridge connected to the bridge-input connector and monitor the OUTPUT BNC with an oscilloscope and DVM. Allow the unit to warm-up for 1/2 hour. Then actuate the AUTO-BALANCE function. The balance LED should light and then extinguish within 2.5 sec.

1. NOISE: With the 120 ohm dummy bridge still connected, excitation "ON, main channel gain at 1000, the RMS noise levels for the main channel monitor output, main tape output, and DC channel output should not exceed 2.5mVRMS. (Typical 1mV RMS)

2. ZERO: With the MODE switch in the ZERO position and the excitation switch OFF, null the output of the main channel with the front panel trimpot. The output of the DC channel should be within 1mV.

3. AUTO-BALANCE: Short "AUTO-BALANCE" BNC to ground, output should balance to within 15 millivolts and the LED should extinguish indicating a successful balance cycle.

Introduce a severe unbalance by shorting or opening one bridge resistor. Initiate a balance cycle and note that the LED lights, indicating that the bridge cannot be balanced electronically. Remove the fault, then initiate a new balance cycle and the LED should extinguish.

4. GAIN: Place the amplifier in the EXT CAL mode, the gain vernier fully CW, and the FILTER at 32KHz. Connect an external 1KHz signal source to the EXT CAL BNC at the rear of the rack adapter. At each gain, the level of the input signal should be set for a +,-10V output. (7.07V RMS) Monitor the output waveform on an oscilloscope for clipping and/or slew-rate limiting. Calculate the gain for each gain switch setting. Gain should be within 2% of indicated value.

For the DC channel apply +,-100MVDC to the EXT CAL BNC. The gain should be X100, within 1%.

5. CMRR: With the BRIDGE EXCITATION OFF and the Power Supply in its grounded position connect a short between +S and -S, and apply 20V PK/PK from the shorted junction to ground (Pin F). At 70Hz, the output voltage should be less than 0.2V PK/PK (-100dB) and at 1KHz it should be less than 0.7V PK/PK (-80dB) remove the short between +S and -S.

6. FREQUENCY RESPONSE: Apply a signal between +S and -S. With the main channel gain at 100, and the front panel filter in its "OUT" position the -3dB point should be 100KHz. Check the main channel frequency response for all the FILTER settings.

Set the MAIN amplifier mode switch to AC and check the low frequency cutoff. Should be 12Hz nominal.

With the MAIN channel gain at 100, its mode switch DC coupled, apply a 1KHz signal. Monitor both the MAIN channel output and the DC channel output on an oscilloscope. Decrease the frequency until the DC output rises to X.707 of the MAIN output. At this point the signal frequency should be 11Hz, nominal.

7. EXCITATION VOLTAGE RANGE: The excitation voltage shall vary from +1 to +15VDC MIN. as the excitation trimpot is adjusted from fully CCW to CW. Reset to 5VDC.

8. OVERVOLTAGE TRIP: Monitor the tape output voltage. The LIMIT LED should light when the output signal exceeds 2.8V PK/PK.

9. DC CAL RESISTOR VALUE CHECK: With the bridge configuration switch in its FULL position, excitation OFF and the mode switch at DC CAL, the CAL resistor values at each DC CAL select position can be measured between -P(B) and -S(E). Check for proper values at the 11.88K position, the 19.88K position, the 49K position and the 99K position.

10. GAIN VERNIER: Turn gain-vernier trimpot fully CCW and note that the indicated gain is attenuated 10dB. (3:1). Return to CCW position.

11. MECHANICAL INSPECTION: Check the module for conformance to outline specification and workmanship standards.

MODEL 635

ACCEPTANCE TEST DATA SHEET

SN:_____

BY:_____

DATE :_____

1.0 NOISE:

2.0 ZERO: OK

MONITOR OUTPUT:_____ _____ [ ]

TAPE OUTPUT:_____ _____ [ ]

DC OUTPUT:_____ _____ [ ]

3.0 AUTO-BALANCE CHECK:

TURN-ON POWER PRESET [ ]

AMPLIFIER AUTO-BALANCES [ ]
UNSUCCESSFUL BALANCE INDICATION [ ]
AUTO-BALANCE WITHIN _____mV [ ]

4.0 GAIN: 1 2 5 10 20 50 100 200 500 1K 2K 5K
MAIN CHANNEL: : : : : : : : : : : : [ ]

DC CHANNEL: : : : : : : : : : : : [ ]

5.0 CMRR:

FREQUENCY	:	Vo PK/PK	
70Hz	:	_____	[ ]
1KHz	:	_____	[ ]

6.0 FREQUENCY RESPONSE: 200 500 5K 16K 32K OUT OK

MAIN CHANNEL: (LOW PASS) : : : : : : : [ ]

MAIN CHANNEL (AC, HIGHPASS) _____ [ ]

DC CHANNEL: (LOWPASS) _____ [ ]

7.0 EXCITATION VOLTAGE RANGE: _____VDC MIN. TO ____VDC MAX [ ]

8.0 OVERVOLTAGE TRIP: _____V PK/PK [ ]

Continued on next page

9.0 BRIDGE COMPLETION VALUES:

120 OHM POSITION:_____ [ ]
350 OHM POSITION:_____ [ ]

10.0 CAL RESISTOR VALUES:*

11.88K POSITION: _____ [ ]

19.88K POSITION: _____ [ ]

49.00K POSITION: _____ [ ]

99.00K POSITION: _____ [ ]

*MAY VARY SLIGHTLY DUE TO OTHER CIRCUITRY

11.0 GAIN VERNIER:

GAIN CW 0dB _____ [ ]

GAIN CCW dB _____ [ ]

12.0 MECHANICAL INSPECTION: [ ]