

# CUSTOM MODIFIED PRODUCTS

PRODUCT	MOD	DESCRIPTION
PS 501-1	730E	+5V supply deleted; connectors, BAL, CAL facilities for strainage type transducers.
PS 501-1	730F	Unit redesigned to drive a ROTATIONAL FUNCTION GENERATOR (Tek P/N 015-0108-01) when serving as part of an ENGINE ANALYZER SYSTEM TRANSDUCER kit, (Tek P/N 015-0126-01). Special controls & input/put connectors added. Variable power-supply output deleted, but the fixed +5V supply output is retained.



# INSTRUCTION MANUAL

MODIFICATION INSERT

Serial Number \_\_\_\_\_

PS 501-1  
MOD 730E

This insert is provided as a supplement to the instruction manual furnished with this modified instrument. The information given in this insert supersedes that given in the manual.

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PS 501-1  
MOD 730E



PS 501-1  
MOD 730E

This manual insert describes the features of MOD 730E as it applies to the PS 501-1 Power Supply plug-in unit.

+5 V DC SUPPLY. The output connectors and associated circuits have been deleted.

TRANSDUCER FACILITIES. The 0-20V supply has been adapted for powering an external strain-gage bridge as follows:

TRANSDUCER INPUT. A six-pin female connector, installed in the left side of the front panel, has input connections as follows:

<u>CONNECTOR CONTACT</u>	<u>FUNCTION</u>
A	Power Supply +
B	Transducer Output + and BAL
C	Transducer Output -
D	Power Supply
E	} CAL Switch
F	

TRANSDUCER OUTPUT. The 0-20V binding posts have been deleted. Two BNC connectors and two 5-way insulated binding posts have been installed in the right side of the front panel, connected to contacts B and C of the Transducer Input connector as follows:

<u>CONNECTOR</u>	<u>POSITION IN PATTERN</u>	<u>FUNCTION</u>
BNC	Upper Left	Transducer Output -
Binding Post (Dark Gray)	Lower Left	Transducer Output -
BNC	Upper Right	Transducer Output +
Binding Post (Red)	Lower Right	Transducer Output +

CAL PUSHBUTTON. A normally-open momentary-action CAL pushbutton is installed in the front panel above the TRANSDUCER INPUT connector. This switch provides a closure between contacts F and E of the connector for use with transducers equipped with a calibrating resistor.

TRANSDUCER BAL. A front-panel screwdriver TRANSDUCER BAL adjustment has been added to the front panel above the CAL pushbutton. This screwdriver adjustment provides up to  $\pm 40$  k $\Omega$  shunt imbalance on the Transducer Output + side of the transducer bridge.

CURRENT LIMIT. This control has been changed from a front panel to an internal adjustment, and preset to 75 mA.

### CHARACTERISTICS

APPLICATION. This plug-in unit is intended for use with strain-gage-bridge transducers having all four bridge arms and the full calibrating resistance incorporated in the transducer. For transducers not incorporating all bridge elements, the strain-gage adapter (Tektronix Part Number 015-0169-00 - not furnished) is recommended. Compatible transducers include:

PRESSURE.	0-3000 psig	Tektronix Part Number 119-0246-00
	0-300 psig	Tektronix Part Number 119-0245-00
FORCE.	3000 lb	Tektronix Part Number 119-0243-00*
	50 gram/50 lb	Tektronix Part Number 119-0250-00*

\*Additional accessories required - see current Tektronix catalog for complete packages and adapter lists.

CURRENT LIMIT. The 75 mA preset current limit is intended for use with 350 $\Omega$  transducers such as those listed above. Normal and maximum bridge-volts settings for lower impedance transducers are as follows:

<u>TRANSDUCER</u> <u>IMPEDANCE</u>	<u>VOLTS SETTING</u>	
	<u>NOMINAL</u>	<u>MAX</u>
50 $\Omega$	0-3 V	3.6
100 $\Omega$	0-6 V	7.1
120 $\Omega$	0-7 V	8.4
200 $\Omega$	0-12 V	13.5
$\geq 350 \Omega$	0-20 V	20

The current limit may be reset internally to other values up to 400 mA (390 mA at 20 V) if required.

POLARITIES. Polarity marking on the front panel TRANSDUCER OUTPUT are for an external transducer wired to provide an increase of resistance between connector pins A and C or between pins B and D, and/or a decrease of resistance between pins A and B or between pins C and D for a positive-going change in the parameter being studied.

GROUNDING. The shell of the TRANSDUCER INPUT connector is connected to chassis ground. Either pin A or pin D (but not both) may be grounded to the connector shell externally in the transducer. If no bridge connection is grounded, centering resistors which have been added in the power supply (1 k $\Omega$  each side) set the + and - outputs near 0 V with respect to chassis ground.

## CALIBRATION

### NOTE

The +5V supply has been deleted. Transducer input and output connectors and balance and calibrate facilities for use with strain-gage-bridge type transducers has been added. The Current Limit control is now an internal adjustment.

Calibration will be similar to standard.

1. +5V DC supply is deleted.
2. Current limit control is to be preset at 75 mA.
3. The 0-20V supply has been adapted for powering an external strain-gage-bridge.
4. Transducer input connector.

<u>Connector Contact</u>	<u>Function</u>
A	Power +
B	Transducer Output + and Bal
C	Transducer Output -
D	Power Supply -
E	Cal Switch*
F	Cal Switch*

\*A CAL pushbutton has been installed to provide a closure between contacts F and E for use with transducers equipped with a calibrating resistor.

5. The transducer bal control has been added to provide up to  $\pm 40 \text{ k}\Omega$  shunt imbalance on the transducer output + side of the transducer bridge.

## PARTS LIST

### Electrical

#### CAPACITORS

C2	Delete
C3	Delete

#### RESISTORS

R3	Delete		
R65	Delete		
R70	Add	311-0467-00	100 k $\Omega$ , $\pm 10\%$ , Var
R71	Add	321-0347-00	40.2 k $\Omega$ , 1/8 W, 1%
R72	Add	315-0102-00	1 k $\Omega$ , 1/4 W, 5%
R73	Add	315-0102-00	1 k $\Omega$ , 1/4 W, 5%

#### SWITCHES

S70	Add	260-0735-00	CAL
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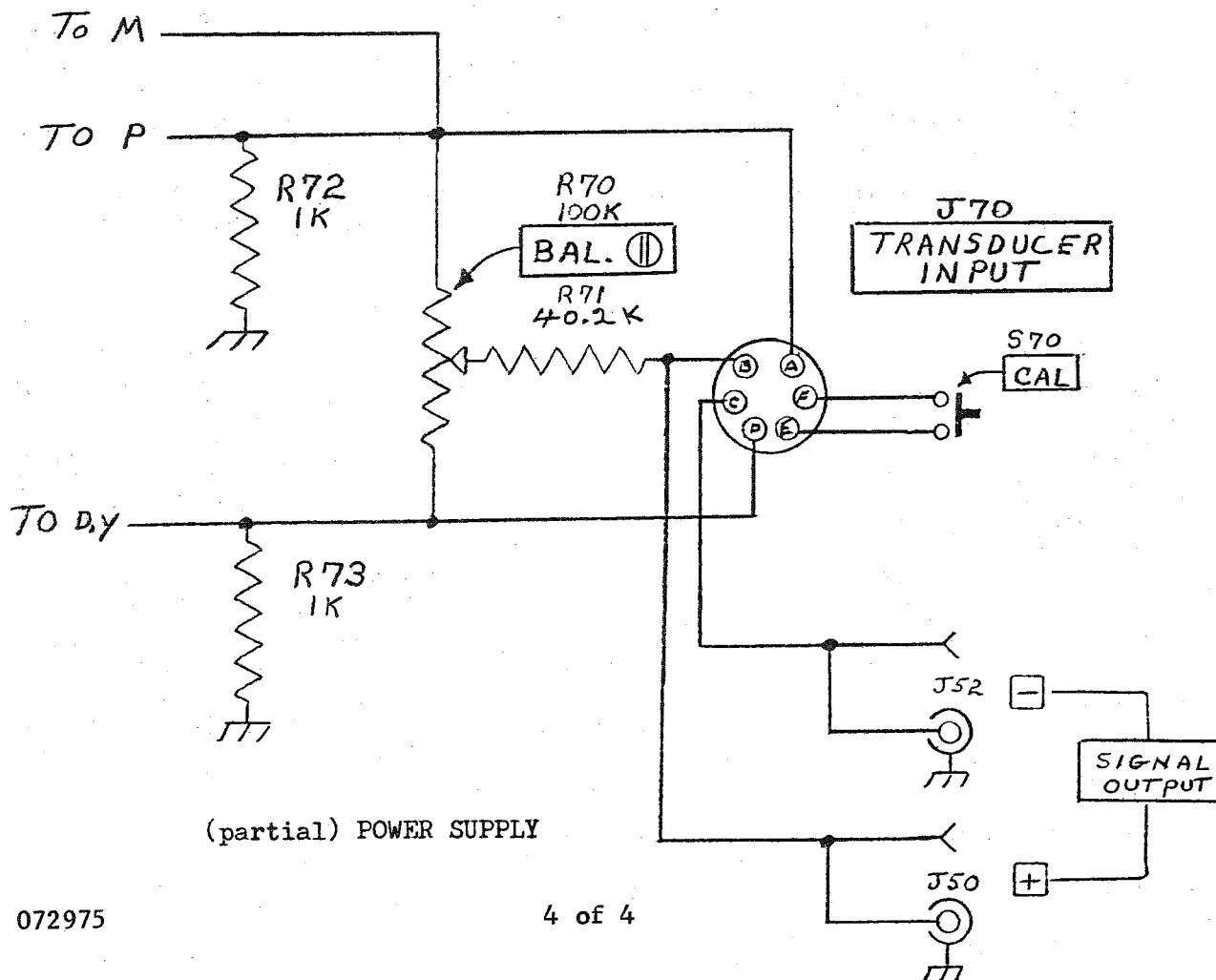
#### INTEGRATED CIRCUITS

U2	Delete
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Mechanical

Shield, electrical, rear subpanel  
Subpanel, front  
Panel, front, film #7407-1  
Post, standoff  
Connector, 6-pin, female  
Connector, BNC, 3/8" mounting  
Washer, internal lock, 1/4"  
Post, metallic, 1/4-32 x .594" long  
Nut, hex, 1/4-32 x .312  
Washer, flat, 1/4"  
Nut, hex, .562-24 x .688  
Nut, plain knurled, 1/4-28  
Stud, binding post  
Bushing, .312 aluminum, .250 x 32 x .352" long  
Binding post, red  
Binding post, white  
Post, terminal  
Socket, transistor  
Socket, pin terminal  
Heat Sink

Change	1	030-0787-03
Change	1	030-0788-03
Change	1	034-0590-00
Add	2	131-0403-00
Add	1	131-0609-00
Add	2	131-0955-00
Add	2	210-0046-00
Add	1	210-0471-00
Add	1	210-0583-00
Add	1	210-0940-00
Add	1	220-0504-00
Add	1	220-0633-00
Add	1	355-0170-00
Add	1	358-0342-00
Delete	1	129-0064-01
Delete	1	129-0064-02
Delete	2	131-0847-00
Delete	1	136-0361-00
Delete	2	136-0384-00
Delete	1	214-1713-00





# TEKTRONIX®

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**PS 501-1  
MOD 730F**

## MODIFICATION INSERT



This manual insert describes the features of MOD 730F as it applies to the Tektronix PS 501-1 DC Power Supply plug-in unit. The unit has been redesigned to drive a ROTATIONAL FUNCTION GENERATOR (RFG), Tektronix Part Number 015-0108-01, when serving as part of an ENGINE ANALYZER SYSTEM TRANSDUCER kit, Tektronix Part Number 015-0126-01. Special controls and input/output connectors have been added to serve as a power supply and interconnection adapter between the RFG and a general-purpose oscilloscope in Engine Analyzer applications. Variable power-supply output facilities have been deleted, but the fixed +5 V supply output is retained.

Details on applications, auxiliary parts, and repair not covered in the PS 501-1 Instruction Manual or its addendum can be found in the Engine Analyzer System Instruction Manual (Tektronix Part Number 070-0890-00).

### REQUIREMENTS

**RFG Facilities.** The following have been added to the plug-in unit for providing power and interconnection to the RFG:

**RFG INPUT Connector.** Female, 6-pin connector added in the PS 501-1 panel, mating with the power/signal cable connector of the RFG, and having contact connections as follows:

Contact Function	PS 501-1 Connection
A	Sinewave from RFG Selector Switch
B	Sawtooth from RFG Selector Switch
C	-12 V from RFG SECONDARY Board
D	Ground Chassis Ground
E	Markers from RFG MARKERS OUT
F	-12 V to RFG -12 V Power Supply
Shell	Ground Chassis Ground

**Power Supply.** The PS 501-1 is internally wired to provide -12 V (with respect to chassis ground) at 300 mA for operation of the lamps and circuits of the RFG, via pin F of the RFG INPUT connector.

**Deflection Preamplifier.** The unit is equipped with a direct-coupled deflection preamplifier, providing signal gain and DC offset correction for the Sawtooth and Sinewave outputs of the RFG. An added BNC, female HORIZ OUT connector provides output signals suitable for introduction into the External Horizontal channel of most general-purpose oscilloscopes.

**Selector Switch.** A front-panel toggle switch added to select either the Sinewave or the Sawtooth signal from the RFG (controls A and B respectively of the RFG INPUT connector) for amplification.

**HORIZONTAL POSITION Control.** Located on the front panel for varying the DC offset correction and providing an auxiliary means of positioning the display on the oscilloscope.

**GAIN Control.** One-turn, concentric with the HORIZONTAL POSITION control, this provides continuously variable output amplitude control to match the horizontal deflection factors of various oscilloscope types.

**MARKERS OUT.** A front-panel, BNC, female connector to provide AC-coupled output of the RFG Markers signal.

**Rotary Transducer Supply Switch.** Controls all power to the plug-in unit.

### CHARACTERISTICS

#### RFG Output Signals.

**Amplitude.** Output amplitude for the Sinewave and Sawtooth output signals via the HORIZ OUT connector is adjustable from <0.5 V to >5 V, using the front-panel GAIN control. The amplitude is suitable for an oscilloscope or monitor providing 0.05 V/div to 0.5 V/div sensitivity in the Horizontal Axis.

**Source Impedance.** The Deflection Preamplifier output source impedance is 100  $\Omega$ ,  $\pm 10\%$ , for loading which does not exceed  $\pm 5$  mA.

**Positioning.** The HORIZONTAL POSITION range is designed to accommodate a wide range of signal DC offset values from the RFG, as well as facilitate display positioning. The range is sufficient under most circumstances to set either peak of the HORIZ OUT waveform to 0 V. An internal balance adjustment is provided to minimize interaction between the GAIN and POSITION controls and center the positioning range.

**Markers.** The MARKERS OUT signal is 30 mV peak to peak (tallest markers), and suitable for use in Vertical deflection channels having 50 mV/div or better sensitivity. The MARKERS OUT signal is intended to work into load impedances of 100 k $\Omega$  or higher.

### CALIBRATION

Calibrate the PS 501-1 MOD 730F according to the procedure in the PS 501-1 Instruction Manual, including the following steps.

#### D.C. BAL Adj

The PS 501-1 MOD 730F has an internal D.C. BAL adjustment to allow its circuitry to be balanced to the D.C. offset present in the ROTATIONAL FUNCTION GENERATOR's (RFG) output signal.

This adjustment (R111) is located on the lower front edge of the SECONDARY circuit board between the two mounting screws.

Balance may be adjusted as follows:

1. Set up the RFG display to observe a ramp output with markers. The RFG can be turned by hand for this purpose, if necessary.

2. Set the GAIN of the ROTARY TRANSDUCER SUP-PLY (PS 501-1 MOD 730F) to minimum (ccw), and set the POSITION control so that the center marker on the pedestal (top dead center) is centered.

3. Set GAIN to maximum (cw), and re-center the TOP DEAD CENTER marker using the D.C. Balance Adj (R111).

4. Repeat steps 2 and 3 until the shift of the TOP DEAD CENTER marker is negligible when changing GAIN from minimum to maximum.

### ADJUST 12 VOLT SUPPLY

1. Connect a dummy load resistor (50  $\Omega$  10 watt) between pins "D" and "F" of the six pin RFG connector.

2. Set multi-meter on range suitable to measure  $-12$  V dc and connect between pin "F" of RFG connector and ground (white binding post on front panel).

3. Adjust R42 (upper trim pot on secondary board) for a reading of  $-12$  volts at pin "F".

## PARTS LIST

### I. Circuit Board Assembly, SECONDARY

#### Electrical

	037-6269-00	1	CIRCUIT BOARD, SECONDARY, M1153A
C103	283-0059-00	1	CAPACITOR, FXD, CER, 1 $\mu$ F
CR102	152-0066-00	1	SEMICOND DEVICE, SILICON, 400 V, 750 mA, 1N4004
R42	311-1558-00	1	RESISTOR, VAR, 20 k $\Omega$
R106	315-0333-00	1	RESISTOR, FXD, CMPSN, 33 k $\Omega$ , 5%, 0.25 W
R107	315-0103-00	1	RESISTOR, FXD, CMPSN, 10 k $\Omega$ , 5%, 0.25 W
R108	315-0104-00	1	RESISTOR, FXD, CMPSN, 100 k $\Omega$ , 5%, 0.25 W
R109	315-0223-00	1	RESISTOR, FXD, CMPSN, 22 k $\Omega$ , 5%, 0.25 W
R110	315-0473-00	1	RESISTOR, FXD, CMPSN, 47 k $\Omega$ , 5%, 0.25 W
R111	311-1559-00	1	RESISTOR, VAR, 10 k $\Omega$
R112	315-0103-00	1	RESISTOR, FXD, CMPSN, 10 k $\Omega$ , 5%, 0.25 W
R113	315-0183-00	1	RESISTOR, FXD, CMPSN, 18 k $\Omega$ , 5%, 0.25 W
R114	315-0513-00	1	RESISTOR, FXD, CMPSN, 51 k $\Omega$ , 5%, 0.25 W
R115	315-0101-00	1	RESISTOR, FXD, CMPSN, 100 $\Omega$ , 5%, 0.25 W
R117	308-0553-00	1	RESISTOR, FXD, WW, 680 $\Omega$ , 1%, 3 W
U101A,B	156-0158-00	1	MICROCIRCUIT, LI, DUAL OP-AMP, MC1458
VR101	152-0168-00	1	SEMICOND DEVICE, ZENER, 0.4 W, 12 V, 5%

#### Mechanical

131-0608-00	11	TERMINAL, PIN, (on board)
136-0514-00	1	SOCKET, IC, 8-CONTACT

### II. Chassis

#### Electrical

Add:

C101	290-0215-00	1	CAPACITOR, FXD, ELCTLT, 100 $\mu$ F, 25 VDC
C102	283-0059-00	1	CAPACITOR, FXD, CER, 1 $\mu$ F, 25 VDC
CR101	152-0066-00	1	SEMICOND DEVICE, SILICON, 400 V, 1A, selected from 1N3194

J101	131-0955-00	1	CONNECTOR, FEMALE, BNC
J102	131-0955-00	1	CONNECTOR, FEMALE, BNC
P103	131-0617-00	1	CONNECTOR, FEMALE, 6-PIN
R101	315-0103-00	1	RESISTOR, FXD, CMPSN, 10 k $\Omega$ , 5%, 0.25 W
R102A,B	311-1581-00	1	RESISTOR, VAR, NONWIRED, 2 x 10 k $\Omega$ CONCENTRIC
R103	315-0102-00	1	RESISTOR, FXD, CMPSN, 1 k $\Omega$ , 5%, 0.25 W
R105	315-0272-00	1	RESISTOR, FXD, CMPSN, 2.7 k $\Omega$ , 5%, 0.25 W
S101	260-0613-00	1	SWITCH, SPDT, TOGGLE
Delete:			
CR70	150-1001-01	1	LAMP, LED, RED, 2 V, 100 mA
R65	311-1369-00	1	RESISTOR, VAR, NONWIRED, 1 k $\Omega$ , 20%, 1 W

**Mechanical**

## Add:

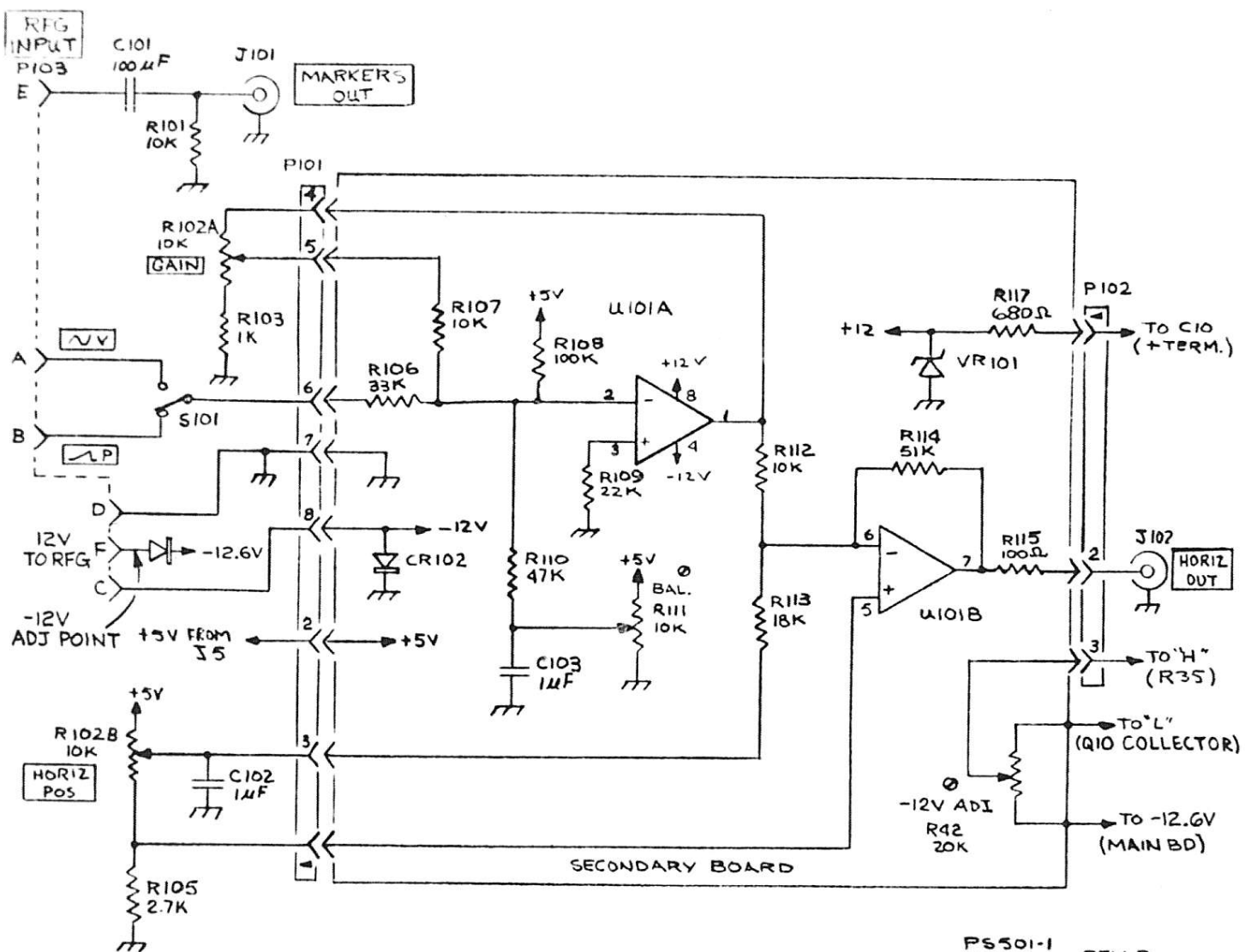
162-0008-00	1	SLEEVING, 1.25 INCHES LONG
210-0201-00	1	TERMINAL, LUG, SE #4
210-0255-00	1	TERMINAL, LUG, 0.391 ID
210-0586-00	4	NUT, KEPS, 4-40 x 0.250 INCH
211-0101-00	4	SCREW, MACHINE, 4-40- x 0.250 INCH, 100°, FHS
214-1840-00	1	PIN, KNOB SECURING, 0.094 OD x 0.120 INCH
366-1077-00	1	KNOB, GREY, 0.50 INCH OD, FOR 0.125 SHAFT
366-1391-00	1	KNOB, GREY, for 0.079 SHAFT

## Change:

030-0844-03	1	SUBPANEL, FRONT
030-0845-03	1	SHIELD, ELECTRICAL, FRONT
034-0671-00	1	PANEL, FRONT

## Delete:

129-0064-00	1	POST, BDG, ELEC, RED, 5-WAY MINIATURE
129-0064-01	1	POST, BDG, ELEC, CHARCOAL, 5-WAY MINIATURE
210-0457-00	2	NUT, KEPS, 6-32 x 0.312 INCH, STL
331-0310-00	1	DIAL, CONTROL, 10 TURNS, DIGITAL COUNTS
352-0338-00	1	HOLDER, DIAL
358-0181-00	1	INSULATOR, BUSHING, CHARCOAL
358-0181-00	1	INSULATOR, BUSHING, RED
366-0494-00	1	KNOB GREY
366-1402-40	1	KNOB, PUSHBUTTON, 10-20
384-1101-01	1	EXTENSION SHAFT, 4.13 INCH
401-0189-00	1	GEAR, SECTOR, 19 TEETH, PLASTIC
401-0190-00	1	GEAR, SECTOR, 7 TEETH, PLASTIC
426-0941-00	1	FRAME, INDICATOR
670-2089-00	1	SECONDARY BOARD ASSEMBLY

PS 501-1  
MOD 730F REV. B

