"DATASPEED*" 40 POWER SUPPLY UNITS

DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL

1.01 This section provides description and operation for both the DATASPEED 40 Power Supply (40PSU101) (Fig. 1) and the Synchronous DATASPEED 40 Power Supply (40PSU102) (Fig. 2). Refer to 5. REFERENCES of this section for other documents associated with the power supplies.

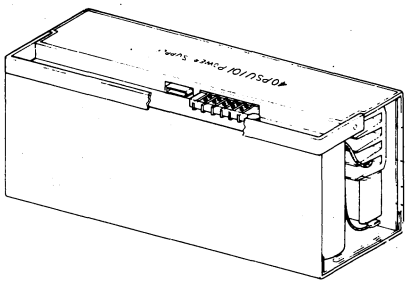

Fig. 1—DATASPEED 40 Power Supply (40PSU101)

1.02 This section has been reissued to add description and operation of the 40PSU102 power supply.

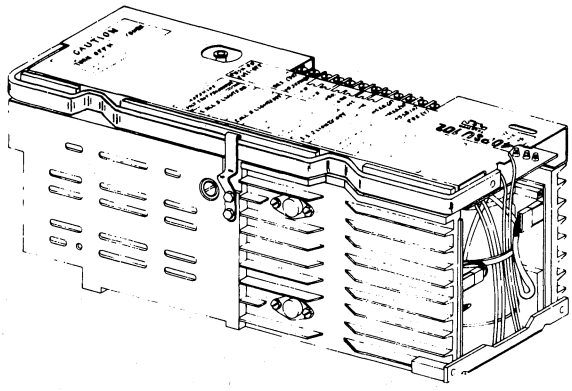

Fig. 2—Synchronous DATASPEED 40 Power Supply (40PSU102)

Note: When ordering replacement parts, prefix each part number with the letters "TP" (ie, TP123456), unless specified otherwise.

1.03 The 40PSU101 and 40PSU102 power supplies generate the proper working voltages and currents to their respective controllers and also to the associated keyboards connected to each controller. In addition, the 40PSU102 power supply provides a power-on-reset (POR) signal to the 40C400 controller.

1.04 When supplied with a 15 V ac ±10 percent line voltage, the 40PSU101 and 40PSU102 power supplies will deliver the voltage and current ranges as shown in Fig. 3.

2. DESCRIPTION

A. 40PSU101 Power Supply

2.01 The electrical components that make up the 40PSU101 power supply are a step-down transformer, a full-wave rectifier, two filter capacitors, three fuses and a regulator circuit card. Also included are a chassis, wiring, a cover with carrying handle, heat sink, and associated brackets and hardware.

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POWER SUPPLY	NOMINAL VOLTAGE (V dc)	VOLTAGE LIMITS (V dc)	CURRENT LIMITS (Amps)	MAXIMUM RIPPLE (Peak-to Peak)
40PSU101	+5	4.9 to 5.1	2 to 4.5	0.3 V
	+12	11.64 to 12.36	1 to 4	0.3 V
	-12	-11.64 to -12.36	1 to 4	0.3 V
40PSU102	+5	4.9 to 5.1	5 to 25	0.25 V
	+12	11.58 to 12.42	0.4 to 4	0.24 V
	-12	-11.58 to -12.42	0.4 to 4	0.24 V

Fig. 3—Voltage and Current Ranges

2.02 The 40PSU101 power supply features a light emitting diode at the output of each regulator circuit. (See Fig. 4.) These diodes are clearly visible when the power supply is in its normal operating position within the DATA-SPEED 40 cabinetry. When these diodes are lit, it signifies that the power supply is on and the +5 V dc and ±12 V dc circuits are active.

2.03 The 40PSU101 power supply ac input connector, dc output terminal block, and 5 ampere (SLO-BLO) ac line fuse are all located on top of the supply (Fig. 4). All dc voltages for the DATASPEED 40 logic are supplied from the output terminal block. The "Sense" terminal on the block permits the monitoring of the +5 V dc under actual load conditions.

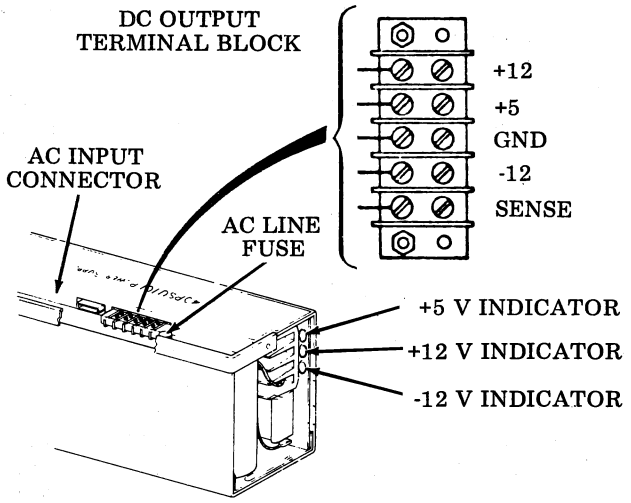

Fig. 4—40PSU101 Power Supply Features

B. 40PSU102 Power Supply

2.04 The electrical components that make up the 40PSU102 power supply are a step-down transformer, two full-wave bridge rectifiers, three filter capacitors, a circuit breaker, three fuses, a 5 V dc regulator circuit card, a ±12 V dc regulator circuit card and an ac/dc converter circuit card. Also included is the wiring, two heat sinks, cover with carrying handle and associated brackets and hardware.

2.05 The 40PSU102 power supply features a light emitting diode at the output of each of the regulator circuits (see Fig. 5). These diodes are visible from the top of the power supply. When lit, these diodes indicate that the power supply is on and that the 5 V dc and ±12 V dc circuits are active.

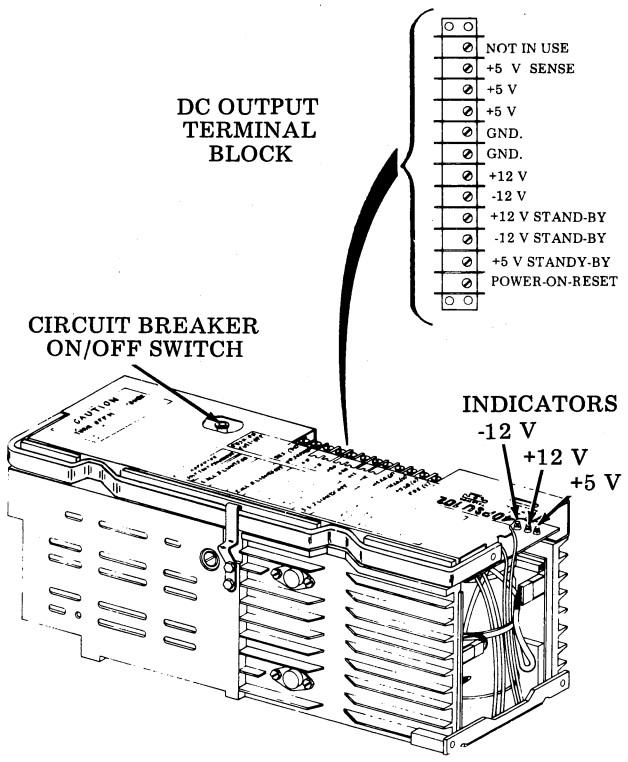

Fig. 5—40PSU102 Power Supply Features

2.06 The 40PSU102 ac input connector is located at the rear of the power supply. The circuit breaker which also functions as an on/off switch is accessible at the top of the supply (Fig. 5). The dc output terminal block (part of the ac/dc converter circuit card) is also accessible at the top of the power supply. All dc voltages and the power-on-reset (POR) signal for the controller logic are supplied from the output terminal block. A "Sense" terminal on the terminal block permits the monitoring of the +5 V dc under actual load conditions.

3. TECHNICAL DATA

Physical Characteristics

	40PSU101	40PSU102
Height	5.703 inches	5.703 inches
Width	5.210 inches	5.579 inches
Length	14.000 inches	14.000 inches
Weight	21 pounds	25 pounds

Environmental Operating Conditions (Both Supplies)

Ambient Temperature . . . . . 0 to 55°C
Ambient Humidity . . . . . 2% to 95% (no condensation)
Altitude . . . . . 0 to 10,000 feet

Line Input (Both Supplies)

Input Voltage . . . . . 115 V ac ±10%
Line Frequency . . . . . 49 to 52 Hertz

Serial Number Location

40PSU101 — stamped into ID plate affixed to area of the voltage indicators.

40PSU102 — stamped into ID plates affixed to left side heat sink (visible from rear of power supply).

AC Line Fuse

40PSU101 — 5 amperes (SLO-BLO)
40PSU102 — 7.5 ampere circuit breaker

4. OPERATION

A. 40PSU101 Power Supply (Fig. 6)

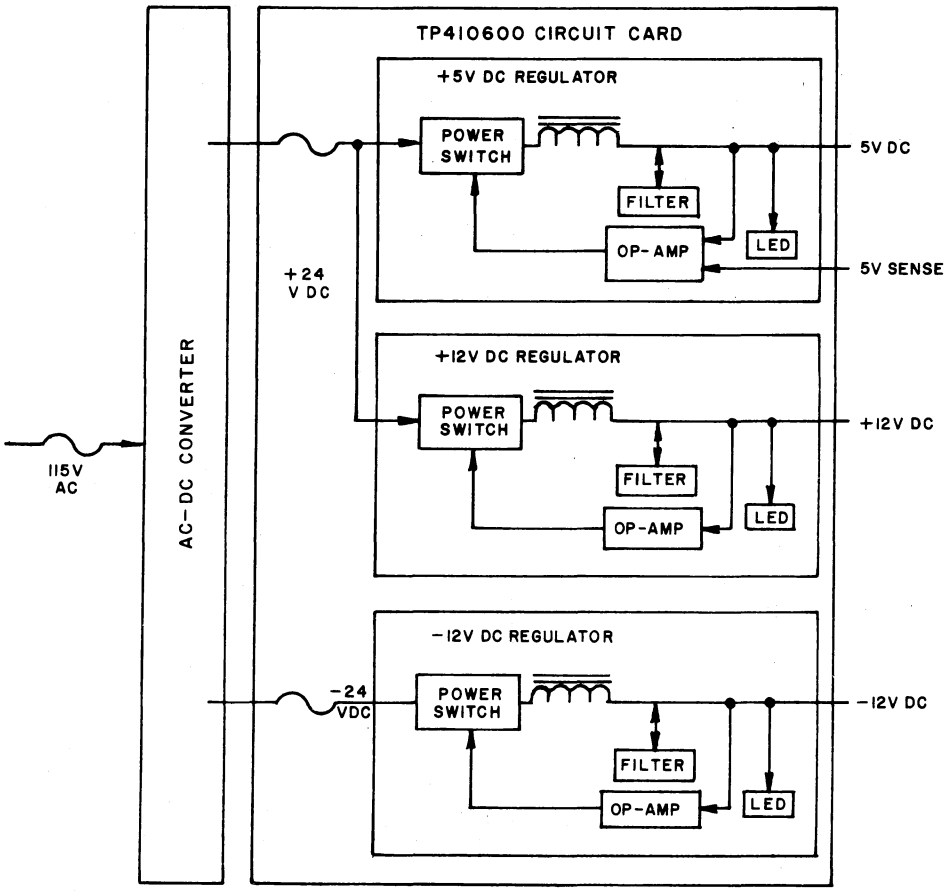

Fig. 6—Block Diagram of 40PSU101 Power Supply

4.01 The 40PSU101 power supply is composed of two basic sections: an ac to dc converter and a +5 V dc and ±12 V dc regulator circuit card.

4.02 The ac to dc converter is a typical full-wave rectifying circuit which uses a linear transformer to drop the input line voltage to 20 V ac relative to its center tap. This output voltage is then rectified by a full-wave bridge and filtered by two electrolytic capacitors to provide ±24 V dc to the 410600 regulator circuit card.

4.03 The +5 V dc, -12 V dc and +12 V dc regulators all use a transistorized input switch, a storage inductor, an output filter capacitor and an op-amp which is part of a voltage sense circuit. When a power switch is turned on, energy is transferred into a storage inductor. When it is turned off, energy is transferred from the storage inductor to the output filter capacitor. With the input voltage turned off, the output voltage will tend to decrease with time. At a predetermined point, the output voltage will turn the op-amp off which in turn will turn the input switch on allowing energy to again enter the storage inductor. This increases the output voltage and the cycle is repeated. There are also voltage protection and current limiting circuits on the output of each regulator.

4.04 The power supply shall be operated so as to assure that 30 cubic feet of air per minute flows uniformly through the rear open area of the unit.

B. 40PSU102 Power Supply (Fig. 7)

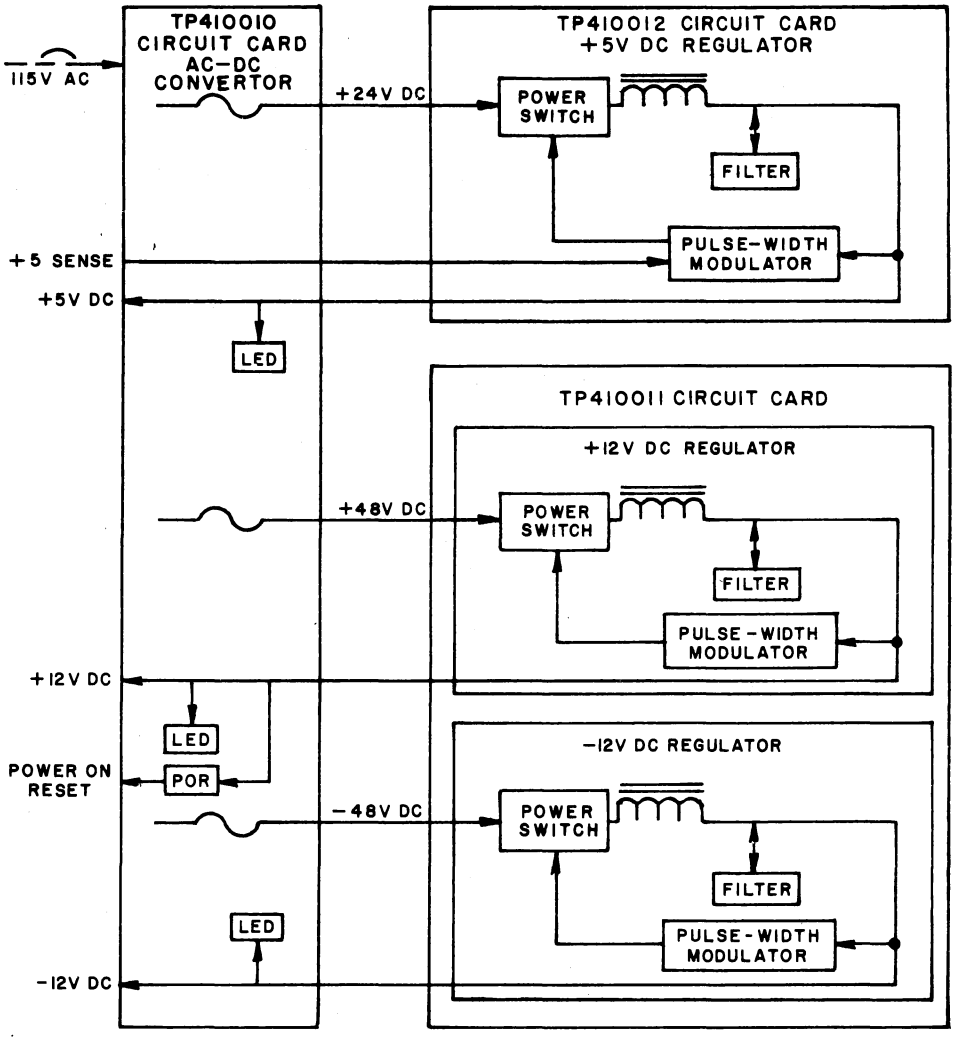

Fig. 7—Block Diagram of 40PSU102 Power Supply

4.05 The 40PSU102 power supply is composed of three basic sections: an ac to dc converter, a +5 V dc regulator circuit and a ±12 V dc regulator circuit.

4.06 The ac to dc converter uses a linear transformer to drop the input line voltage to output voltages of 20 and 70 V ac. The 20 V ac is rectified by a full-wave bridge and then filtered with an electrolytic capacitor to provide +24 V dc to the +5 V dc regulator circuit. The 70 V ac is similiarly rectified and filtered to provide ±48 V dc to the ±12 V dc regulator circuits. A circuit on the ac to dc circuit card also provides a power-on-reset (POR) to the controller logic when power is first turned on.

4.07 The +5 V dc and ±12 V dc regulator circuits all use a transistorized input switch, a storage inductor, an output filter capacitor, and a pulse width modulator. Regulation is accomplished by controlling the on-off time of the transistorized input switch. With a constant load, the pulse width assumes some steady state value determined by input voltage, output voltage and modulator frequency. A dynamic increase in load will cause more current to be pulled from the output filter capacitor, thus decreasing output voltage. When output voltage decreases, the pulse width of the modulator increases, thus causing the transistorized switch to be turned on for a longer period of time, allowing more energy to be transferred to the storage inductor. A converse of this description is true for a dynamic decrease in load. The three regulators also employ voltage protection and current limiting circuits and essentially operate on the same principle.

4.08 The 40PSU102 power supply has been designed around the forced ventilation characteristics of the controller package with a circuit card in the first position. If the temperature of the heat sink exceeds 110°C, a thermal sensor mounted on the heat sink will turn down the +5 V dc supply.

5. REFERENCES

5.01 To remove a 40PSU101 power supply from a set or station, refer to Section 579-505-350, Field Installation and Maintenance Practice.

5.02 To remove a 40PSU102 power supply from a set or station, refer to Section 582-200-701, Synchronous DATASPEED 40/4 Disassembly, Reassembly and Parts.

5.03 The following list of literature pertains to the DATASPEED 40 power supply units.

BSP Sections	Title
582-214-100	Description and Operation
582-214-400	Wiring Diagrams
582-214-500	Testing and Troubleshooting
582-214-700	Disassembly, Reassembly and Parts