CONTROL DATA
169
AUXILIARY MEMORY UNIT
INSTALLATION

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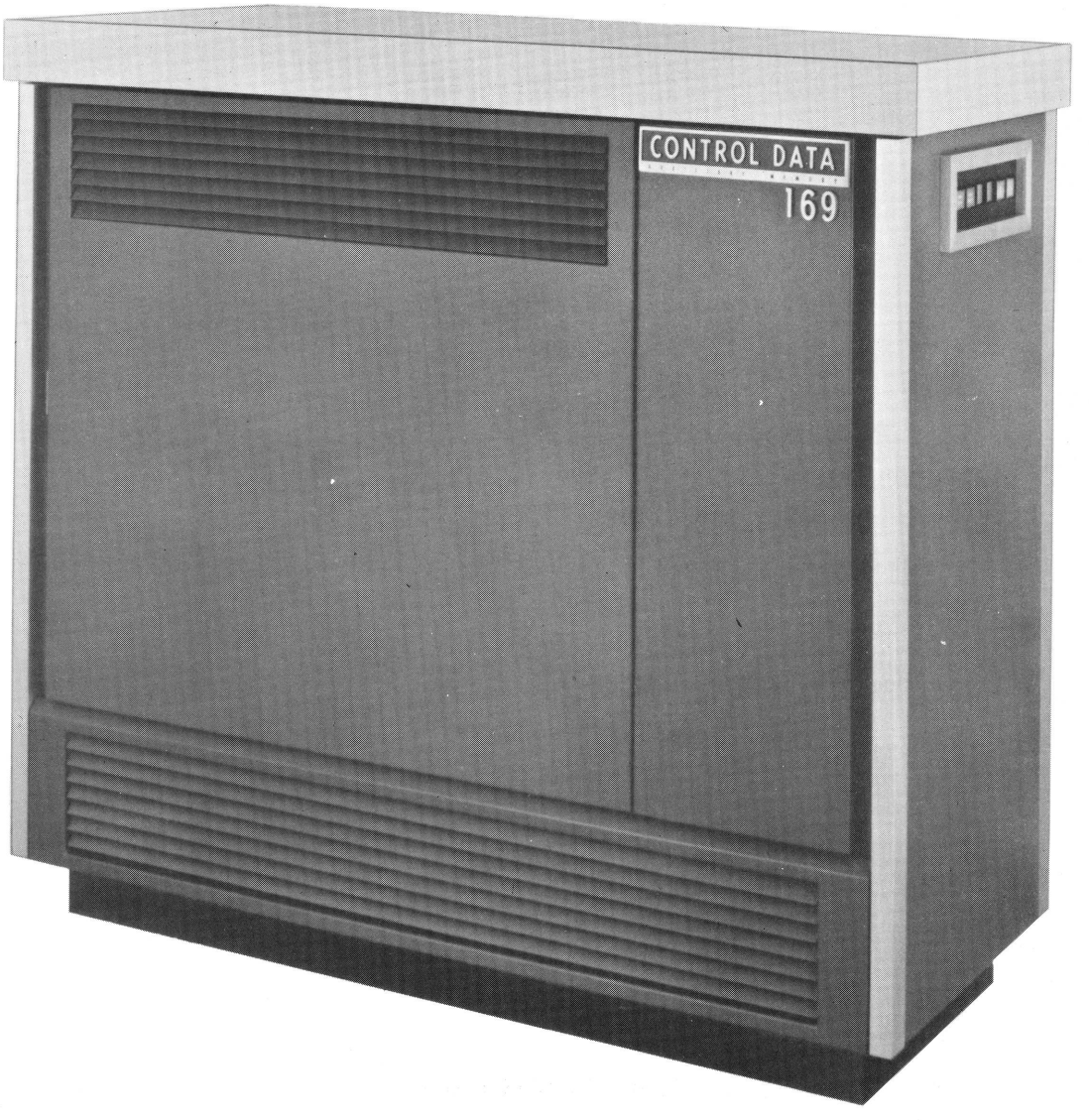
CONTROL DATA
169

The Control Data 169 Auxiliary Memory Unit is designed to provide additional memory facilities for the 160-A computer system. The 169 may be connected to one or two 160-A computers and to a maximum of five units of peripheral equipment. This manual includes electrical and physical information to aid in the installation of the 169. Tables 3 and 4 give the special adjustment procedure which must be completed prior to placing the 169 in service. For special installation information, Control Data Corporation should be consulted.

GENERAL REQUIREMENTS

FLOOR

Cables may be brought in through the cable opening in the bottom of the cabinet or by removing the metal strip located immediately below the control panel door. If the bottom cable opening is used, it is recommended that raceways for the interconnecting cables be built into the floor as described in the installation manual for the 160-A computer system.

TEMPERATURE

Blowers cool the unit by drawing air through reuseable filters at the bottom of the cabinet. Air is exhausted through the louvres in the unit doors.

The unit is designed to operate in an ambient air temperature not exceeding $80^{o}F$. Although it is not critical, the humidity should be maintained at between 40% and 60%.

FIRE PRECAUTIONS

Fire extinguishers should be located near the computer system and normal fire precautions observed.

SPACE AND LAYOUT REQUIREMENTS

The unit should be positioned so the operator may observe the indicators. There should be a minimum three-foot clearance surrounding the unit to facilitate movement of maintenance test equipment. Cabinet dimensions and door swings are given in figure 1. Dimensions and weight are in table 1.

TABLE 1. SPECIFICATIONS

Height	43 inches
Width	47 3/4 inches
Depth	20 1/4 inches
Weight	600 pounds with two chassis, 800 pounds with 4 chassis
BTU/Hour	4700 BTU/hr maximum (upper ambient limit for cooling by internal blowers is 80°F)
Power Requirement	169-1, 12 amp (1380 w) 169-2, 15 amp (1725 w) 169-3, 17 amp (1955 w)

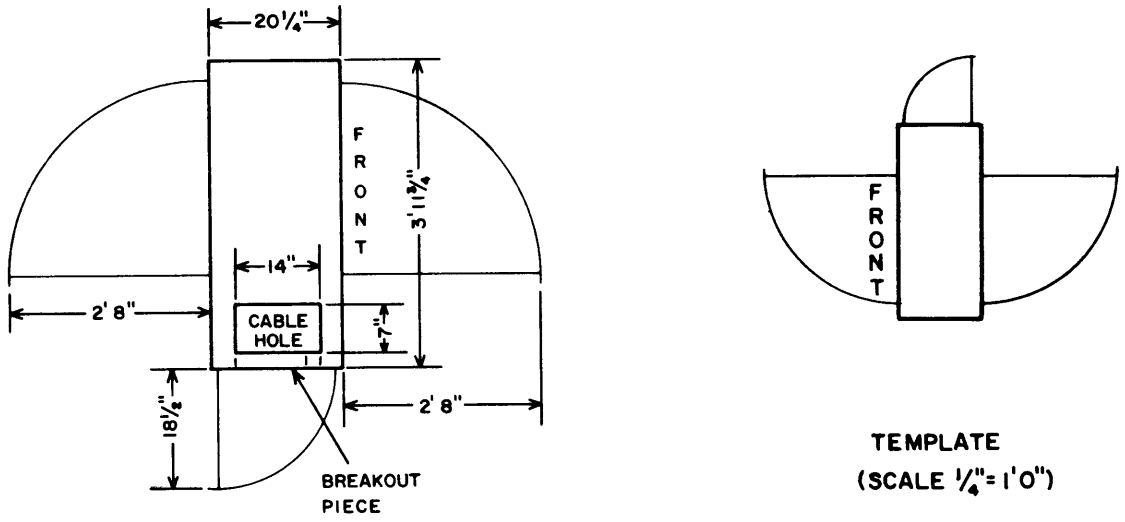

Figure 1. Space Requirements

POWER REQUIREMENTS

POWER SERVICE

The primary power requirement is 115v, 60 cycle, single phase. Current requirements are listed in table 1. The unit may be connected to any normal convenience outlet in the computer area. At the customer's option, the single phase power may be derived from one leg of a three phase Y connected source.

Power to the 169 is normally controlled by the On-Off switch on the indicator panel. However, power to the 169 may be controlled from the computer by connecting the controlled a-c line from the 160-A to the controlled a-c line of the 169 at an external power panel. If this is done, the 169 Power switch must be left in the OFF position, and care must be taken to connect the 160-A and 169 to the same phase of the a-c line.

INTERCONNECTING CABLES

INPUT-OUTPUT CABLES

The cables which connect the unit to the computer will be delivered at the time of installation (figure 2, table 2). The cables carrying the memory transfer signals may be a maximum of 10 feet long. Interface logic signal cables may be a maximum of 75 feet long.

Control Data Corporation should be advised of any unusual cabling requirements no later than two months prior to shipment. Any unusual cable lengths may be purchased from Control Data Corporation. Sufficient cable length should be allowed to accommodate minor changes in the location of the unit.

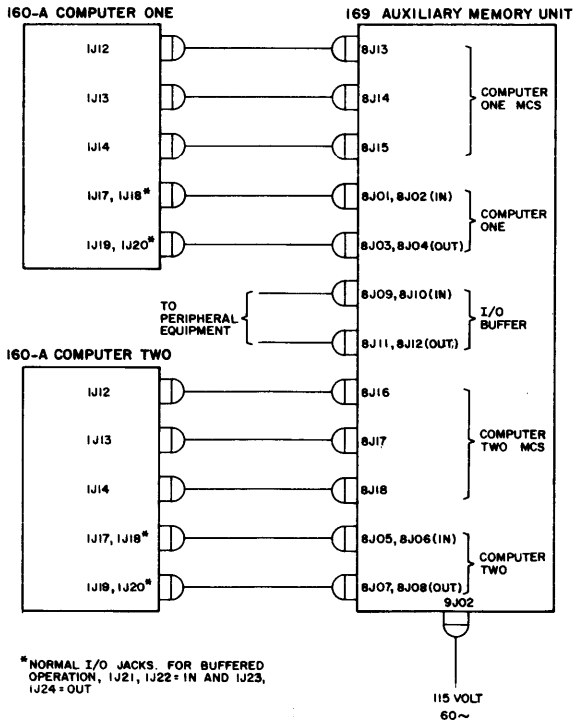

Figure 2. Cabling Diagram

TABLE 2. CABLE CONNECTIONS, INPUT-OUTPUT

Function	169 Jack	160-A Jack
60 Cycle Power Input	9J02	
Memory Transfer (coaxial)	8J13	1J12 (computer one)
Memory Transfer (coaxial)	8J14	1J13 (computer one)
Memory Transfer (coaxial)	8J15	1J14 (computer one)
Memory Transfer (coaxial)	8J16	1J12 (computer two)
Memory Transfer (coaxial)	8J17	1J13 (computer two)
Memory Transfer (coaxial)	8J18	1J14 (computer two)
Normal/Buffer Input	8J01-8J02	1J17-1J18 (computer one)
Normal/Buffer Output	8J03-8J04	1J19-1J20 (computer one)
Normal/Buffer Input	8J05-8J06	1J17-1J18 (computer two)
Normal/Buffer Output	8J07-8J08	1J19-1J20 (computer two)
Peripheral Equipment Input	8J09-8J10	
Peripheral Equipment Output	8J11-8J12	

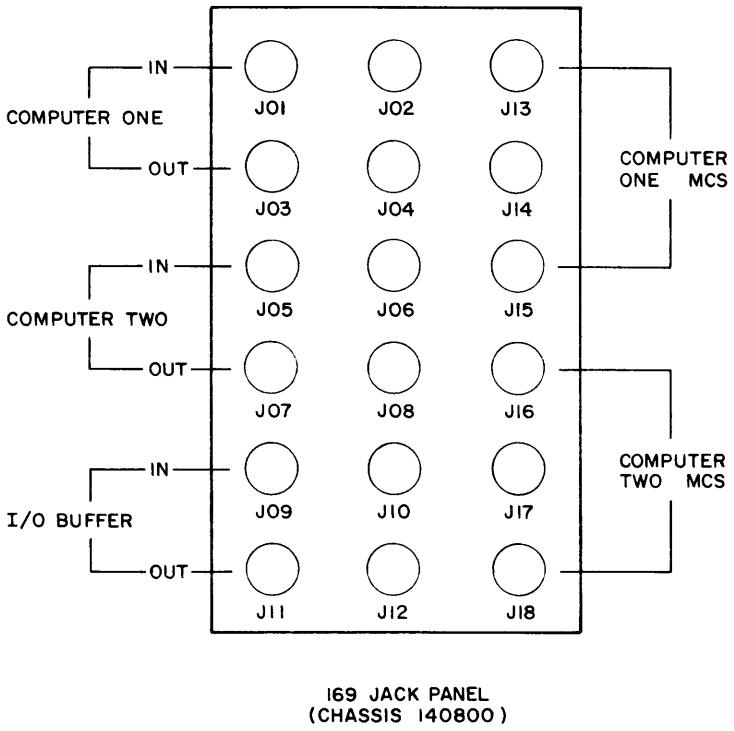

Figure 3. Cable Connections

INSTALLATION ADJUSTMENT PROCEDURE

The adjustment procedure for the 169 when used with a single computer is given in table 3. This adjustment must be made to synchronize the master clocks of the 169 and the computer.

When the 169 is shared by two computers, the master clocks of both computers must be synchronized (table 4). Either computer master clock may be used as a reference standard. In the computer not used as the reference standard, one master clock oscillator card must be changed from a fixed oscillator card (type 01) to a variable oscillator card (type 02). This variable oscillator card provides the adjustment necessary to synchronize the master clocks of the two computers.

An oscilloscope with a differential input and a card extender (Control Data No. 6167) is required for these adjustments. A Tektronix 543A oscilloscope equipped with a type CA plug-in unit and two 10X attenuator probes is recommended.

If an oscilloscope with a differential input is not available, these adjustments may be accomplished with an oscilloscope having a single input. A Tektronix 317 oscilloscope is recommended. In order to use an oscilloscope with a single input, it is necessary to connect two 10X attenuator probes (Tektronix type P6000) to a "T" coaxial adapter (Amphenol type 83-1T, UHF "T" adapter). This "T" coaxial adapter is then attached to the single vertical input of the oscilloscope. With both probes connected to the "T" coaxial adapter, each probe must be frequency compensated.

The 169 adjustment procedures are essentially the same as given in tables 3 and 4 except where reference is made to figure 4 and to channels A and B. Where figure 4 is referenced, figure 5 should be consulted. Where channels A and B are referenced, they may be ignored because the attenuator probe may be used interchangeably.

TABLE 3. SYNCHRONIZATION OF THE 169 AND 160-A

STEP	OPERATION
1	Connect all necessary cables between the unit and the computer as shown in figure 2. NOTE If two computers are used in the system, the procedure outlined in table 2 must be completed prior to this adjustment.
2	Remove the clock disconnect card (type 00) at location A41, chassis 140200, of the 169 and replace it with an empty card extender (Control Data No. 6167).
3	Place the oscilloscope controls to the position shown in figure 4. Make certain the Variable controls are in the fully clockwise or calibrated position.
4	Turn on all units in the system. Allow several hours for the system to stabilize. A preliminary adjustment may be made after ten minutes of warm up time.
5	Connect the oscilloscope vertical input channels to the card extender at pin 1 (channel A) and pin 3 (channel B), using a 10X attenuator probe for each channel. Make certain there is a good ground connection between the oscilloscope and the 169.
6	Adjust the Triggering Level and Stability controls on the oscilloscope to the point where the oscilloscope is sweeping and a stable pattern is obtained.
7	Adjust the master clock variable oscillator card, located at B25, chassis 140200, of the 169 to zero beat (no modulation on the oscilloscope pattern).

TABLE 3 (Cont'd)

STEP	OPERATION
8	Turn the variable oscillator adjustment (step 7) counter-clockwise until the oscilloscope pattern shows one peak per centimeter (see scope pattern on figure 4). The tolerance on this adjustment is -0%, +100%. This adjustment sets the master clock on the 169 control chassis to between 10kc and 20kc higher than the master clock of the reference computer.
9	Connect channel A of the oscilloscope to pin 2 of the card extender and adjust the variable oscillator card located at A02, chassis 140100, of the 169 following the procedure outlined in steps 7 and 8.
10	(16K and 24K units only) Connect channel A of the oscilloscope to pin 5 of the card extender and adjust the variable oscillator card located at A02, chassis 140400, following the procedure outlined in steps 7 and 8.
11	(24K units only) Connect channel A of the oscilloscope to pin 6 of the card extender and adjust the variable oscillator card located at A02, chassis 140300, following the procedure outlined in steps 7 and 8.
12	Remove the card extender and replace the clock disconnect card at location A41, chassis 140200.
13	Using the oscilloscope, measure the clock amplitude at either test point A or C of the clock disconnect card (location A41, chassis 140200). The waveform should be a 2.5 megacycle sine wave with an amplitude of 15 volts $\pm$ 10%, peak to peak. No detectable modulation should be present.
14	Clear all Timing Faults indicated on the control panel before attempting any operation.

TABLE 4. SYNCHRONIZATION OF TWO 160-A COMPUTERS

STEP	OPERATION
1	Connect all necessary cables between the 169 and the two computers as shown in figure 2.
2	In the computer to be synchronized, replace the master clock oscillator card (type 01) located at A05 with a variable oscillator card (type 02).
3	Remove the clock disconnect card at location A41, chassis 140200, of the 169 unit, and replace it with an empty card extender (Control Data No. 6167).
4	Place oscilloscope controls to the positions shown in figure 4. Make certain the Variable controls are in the fully clockwise or calibrated position.
5	Connect the oscilloscope vertical input channels to the card extender at pin 3 (channel A) and pin 4 (channel B), using a 10X attenuator probe for each channel. Make certain there is a good ground connection between the 169 and the oscilloscope.
6	Turn on both computers and the 169. Allow several hours for the system to stabilize. A preliminary adjustment may be made after ten minutes of warm up.
7	Adjust the Triggering Level and Stability controls on the oscilloscope to the point where the oscilloscope is sweeping and a stable pattern is obtained.
8	Adjust the master clock variable oscillator card (step 2) until the oscilloscope pattern shows no modulation (zero beat).
9	Starting at step 5 of table 1, continue the adjustment procedure.

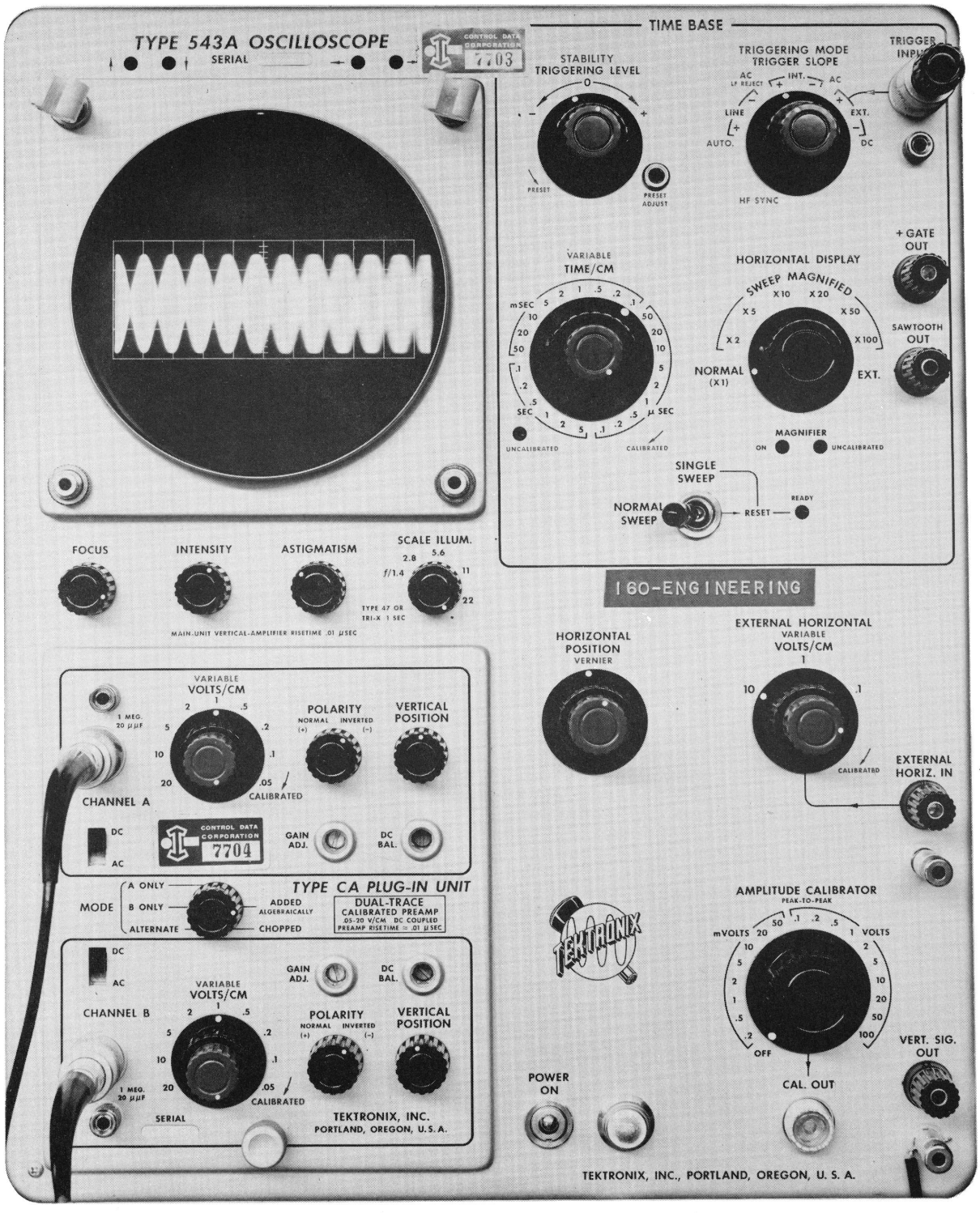

Figure 4. Oscilloscope Control Positions

Figure 5. Alternate Oscilloscope Control Positions

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