SPECIFICATIONS
MADDIDA 44A COMPUTER

A. <u>Type</u>:

Digital differential analyzer capable of solving any type of ordinary differential equation consistent with the capacity of the computer as listed below:

B. <u>Capacity</u>:

This computer will contain:

1. 44 integrators (one reserved for stopping computation after desired interval).

2. 29 binary digits (maximum) per integrator.

3. 12 input channels. Each input channel can be directed to any or all integrators.

4. 12 output channels. These may be outputs from any 12 of the 44 integrators.

The machine can be connected to an external device so that either the incremental output of an integrator or the total number stored may be made available to that external device in any single drum revolution.

External digitalizing and synchronizing circuits are required with input and output devices. Since the character of these circuits depends on the type of input-output device used, the circuits are not included in the basic computer.

C. <u>Physical Appearance</u>:

1. The computer will be contained in a metal cabinet occupying not over 20 cubic feet of volume.

2. A horizontal control and filling panel will be provided.

D. <u>Electrical Characteristics</u>:

1. Computer will contain approximately 100 vacuum tubes exclusive of power supply and read out equipment.

2. Power required will be approximately 30 amperes at 110 volts, 60 cycles, single phase.

E. <u>Material and Workmanship</u>:

Material and workmanship will be in accordance with such standards as will insure dependable operation with a minimum of maintenance required.

F. <u>Accessories</u>:

The computer is normally supplied with one Type 511AD Tektronix oscilloscope. The oscilloscope is calibrated for reading binary numbers stored in the computer memory. Problems may be filled into the computer, and solutions read out using only the oscilloscope. However, auxiliary equipment such as plotters and tabulators greatly reduce computation time when a large number of points are to be read out.

AUXILIARY EQUIPMENT FOR MADDIDA 44A COMPUTER

A. Tabulator and Tabulator Scaler:

The Tabulator is a modified, electrically operated, decimal adding machine. The Tabulator Scaler accumulates incremental output signals from any one of the 12 MADDIDA output channels, and passes on a scaled down output to the Tabulator which, in turn, accumulates this output.

When the accumulation is to be printed, computation in MADDIDA stops, the Tabulator Scaler transfers its contents into the Tabulator and the total accumulation is then printed in the decimal system. The Tabulator prints true negative as well as positive numbers.

B. Plotter Scaler:

This unit receives two output channels from MADDIDA, scales down the rate of the outputs and converts them to a form suitable for driving the Plotter.

C. Graph Follower-Plotter:

The Graph Follower-Plotter is a single unit which can be used alternately, (a) for transferring graphical information to punched tape for feeding into MADDIDA and, (b) for automatic plotting from MADDIDA.

As a Graph Follower the unit is operated manually in conjunction with a Tape Perforator.

As a Plotter it accepts suitably scaled outputs from two MADDIDA output channels and plots an ink curve of the relationship between the two outputs.

D. Tape Reader and Tape Input Translator:

The Tape Reader is a standard telegraph tape transmitter modified to scan perforated paper tape either forward or backward as dictated by the MADDIDA computer.

The Tape Input Translator receives from one of the 12 MADDIDA output channels incremental changes in an independent variable and causes the Tape Reader to make corresponding forward or backward movements of the tape. Dependent variable changes scanned from the tape are fed back into MADDIDA through one of its 12 input channels.

E. **Tape Perforator:**

The Tape Perforator is a standard telegraph perforator modified so that it may be coupled to the Graph Follower and the graphical information thereby transferred to standard telegraph tape.

When computation involves empirical functions this data may be fed into the computer by use of the Tape Perforator equipment.

F. **Six Channel Interconnector:**

When two or more MADDIDAS are to be combined for the solving of a very large problem the information to be transferred from one machine to the other must be amplified and synchronized with the receiving computer. The Six Channel Interconnector contains six independent amplifiers which can couple any six outputs to any six inputs with the exception that the coupled output and input channels not be immediately adjacent in time sequence.

G. **Digital to Analog Converter:**

This unit accumulates the incremental output from one MADDIDA output channel and converts it into an analog equivalent in the form of a variable resistance. The accumulator has a capacity of 1,024 steps, hence the accuracy of the analog output is 0.1% of the maximum range. Having the output in the form of a variable resistance provides versatility in that any desired voltage swing may be obtained from the output.

H. **Analog to Digital Converter:**

This unit provides a means of feeding analog information in the form of a variable resistance or variable voltage into MADDIDA. The normal range of input voltage is ±100 volts; however, the input can be matched to an analog source of any specified range. The accuracy of this converter is 0.1% of full range.

I. **Tape Perforator Keyer:**

The Keyer is used with the perforator to transfer tabulated data to perforated tape. Three keys permit an operator to punch holes in three tape channels corresponding to positive increments in an independent variable and to positive and negative increments in a dependent variable. Two electrically operated counters indicate an algebraic total of the perforations punched such that the counter readings will correspond directly to the tabulated data.

J. **Decimal Read-out:**

A mechanical counter, operating at the full MADDIDA rate, accumulates and indicates the output function on any one of the twelve MADDIDA output channels. Multiple channel units can also be provided.