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| **北 京 邮 电 大 学**  **实 验 报 告**  **课程名称\_\_\_\_\_\_\_\_\_\_计算机组成原理\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **实验名称\_\_\_\_\_\_\_\_\_\_\_运算器组成实验\_\_\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_计算机\_\_\_学院\_\_\_314\_\_\_班 姓名\_\_\_王小龙\_\_\_**  **教师\_\_\_\_赵学达\_\_\_\_ 成绩\_\_\_\_\_\_**  **\_\_2022\_\_年\_\_4\_\_月\_\_23\_\_日** |

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| **一．实验目的**  ⑴熟悉逻辑测试笔的使用方法；  ⑵熟悉TEC-8模型计算机的节拍脉冲T1、T2、T3；  ⑶熟悉双端口通用寄存器组的读写操作；  ⑷熟悉运算器的数据传送通路；  ⑸验证74LS181的加、减、与、或功能；  ⑹按给定的数据，完成几种指定的算术、逻辑运算运算。  **二．实验原理**  ⑴ 双端口寄存器组由1片EPM7064组成，内部包含4 个8位寄存器R0-3，4选1选择器A、B和1个2-4译码器。根据信号RD1-0的值选择寄存器送往ALU的A端口，根据信号RS1-0的值选择寄存器送往ALU的B端口，当DRW信号为1时，则在T3的上升沿，将数据总线DBUS上的数写入相应寄存器。  ⑵ ALU由2片74LS181、1片74LS74、1片74 LS 244、1片74 LS 245和1片74LS30构成。74LS181完成算术逻辑运算，加法和减法同时影响C标志和Z标志，与操作和或操作只影响Z标志。  **三．实验步骤**  1.先按如下参考图将运算器模块与实验台操作板上的线路进行连接;   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **数据**  **通路** | **RD0** | **RD1** | **RS0** | **RS1** | **DRW** | **LDC** | **LDZ** | **S0** | **S1** | | **电平**  **开关** | K0 | K1 | K2 | K3 | K4 | K5 | K6 | K7 | K8 |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **数据**  **通路** | S2 | S3 | M | ABUS | SBUS | CIN | MBUS | | **电平**  **开关** | K9 | K10 | K11 | K12 | K13 | K14 | GND |   **2.接好线后（如下图所示）,控制转换开关拨到“独立”位置，编程开关拨到正常位置，开关DP拔到向上位置，合上电源。**    **3.然后依次将数据F0H、50H、A1H、24H写入R0、R1、R2、R3中。**  **具体操作如下：**  **将K13（SBUS），K4（DRW）拨置1，将K0（RD0），K1（RD1）拨置0，再将数据开关（SD7-SD0）拨至F0H；按下QD，即把F0H写入寄存器R0中。**  **同理，可将50H、A1H、24H写入R1、R2、R3中。如下图所示：**    **4.进行ALU算术逻辑运算功能验证：**  **（1）将K11（M）置0，进行算术运算**  **“加运算”**  **先将K13（SBUS）和K4(DRW)置0，避免数据被重新写入而覆盖。**  **置K1(RD1)=0,K0(RD0)=0;K3(RS1)=0,K2(RS0)=1;K12(ABUS)=1,K5(LDC)=1,**  **K6(LDZ)=1;K14(CIN)=1;K10(S3)=1,K9(S2)=0,K8(S1)=0,K7(S0)=1;然后能在数据总线上观察到加运算后的值“0100 0000”，在按一下QD，能看到进位C=1以及Z=0；**  **如下图所示：**    **接着，只改变K10,K9,K8,K7四个开关的值，可得到“减运算”的结果，记录数据。**  **（2）将K11（M）置1，进行逻辑运算**  **“与运算”**  **继续将K13(SBUS)和K4(DRW)置0，避免数据被重新写入而覆盖。**  **置K1(RD1)=0,K0(RD0)=0;K3(RS1)=0,K2(RS0)=1;K12(ABUS)=1,K5(LDC)=0,**  **K6(LDZ)=1;K14(CIN)=1;K10(S3)=1,K9(S2)=0,K8(S1)=1,K7(S0)=1;然后能在数据总线上观察到与运算后的值“0101 0000”，在按一下QD，能看到Z=0；**  **如下图所示：**    **接着，只改变K10,K9,K8,K7四个开关的值，可得到“或运算”的结果，记录数据。**  注：可改变通过改变K1，K0；K3，K2的值来实现不同数据间的运算，从而得到更多的实验数据。  **四．实验数据**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 实验数据 | | 实验结果 | | | | | | | | | | | | | 数A | 数B | 加 | | | 减 | | | 与 | | | 或 | | | | 结果 | C | Z | 结果 | C | Z | 结果 | C | Z | 结果 | C | Z | | **F0H** | **50H** | 0100 0000 | 1 | 0 | 1010 0000 | 1 | 0 | 0101 0000 | x | 0 | 1111 0000 | x | 0 | | **A1H** | **24H** | 1100 0101 | 0 | 0 | 0111 1101 | 1 | 0 | 0010 0000 | x | 0 | 1010 0101 | x | 0 | | **F0H** | **24H** | 0001 0100 | 1 | 0 | 1100 1100 | 1 | 0 | 0010 0000 | x | 0 | 1111 0100 | x | 0 | | **F0H** | **A1H** | 1001 0001 | 1 | 0 | 0100 1111 | 1 | 0 | 1010 0000 | x | 0 | 1111 0001 | x | 0 | | **A1H** | **50H** | 1111 0001 | 0 | 0 | 0101 0001 | 1 | 0 | 0000 0000 | x | 1 | 1111 0001 | x | 0 | | **F0H** | **F0H** | 1110 0000 | 1 | 0 | 0000 0000 | 1 | 1 | 1111 0000 | x | 0 | 1111 0000 | x | 0 |   注：因为在“与”、“或”运算中，进位C没有意义，故用字母x表示 |
| **五．运行结果分析**  **所得实验结果与理论运算结果一致，说明实验过程大体正确。**  **六．总结提升**  **实验中有不知道下一步该做什么的情况出现，这时我通过查阅有关资料解决了问题，并对实验过程有了更深的理解。** |

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