

Description

Background of the invention

This invention relates generally to memory control circuits and, more particularly, to an on chip WRITE STROBE signal generator utilizing a unique level detector in combination with standard logic elements.

It is well known that for clock synchronized, pipe-line operated memories, a properly timed WRITE STROBE signal must be generated so as to avoid writing information into erroneous locations of memory. In the past, however, such signals have been generated off-chip (i.e. external to the integrated circuit chip on which the memory is implemented) in accordance with the memory's write enable timing specification. To make clock synchronized memories easier to use and to free the user from the awkward task of providing the appropriate WRITE STROBE signal, it would be desirable to provide circuitry on the memory chip itself which will produce the required signal solely from the system clock regardless of the frequency and duty cycle of the clock.

From US-A-3619793 there is known a circuit for generating a plurality of output pulses each in response to one of a plurality of input pulses and occurring at a predetermined period of time thereafter including a flip flop receiving the plurality of input pulses and generating therefrom a symmetrical pulse train having a reduced frequency, and additional circuitry responsive to the symmetrical pulse train.

Summary of the invention

It is an object of the present invention to provide a circuit which may be implemented on-chip for generating a WRITE STROBE signal for controlling the writing of information into memory.

It is a further object of the present invention to provide a circuit for on-chip memory control for generating a correct WRITE STROBE signal regardless of the frequency or duty cycle of the system clock.

It is a still further object of the present invention to provide a circuit for on-chip memory control for generating a proper WRITE STROBE signal which receives the system clock as its only input.

According to the present invention there is provided a circuit for generating a plurality of output pulses each in response to one of a plurality of input pulses and occurring at a predetermined period of time thereafter including a flip flop receiving the plurality of input pulses and generating therefrom a symmetrical pulse train having a reduced frequency, and additional circuitry responsive to the symmetrical pulse train, characterized by:

a detector circuit including first delay means coupled to an output of the flip flop for generating trigger pulses at an output thereof a first predetermined duration at every transition of

said symmetrical pulse train and said first delay means having a delay time corresponding to said first predetermined duration;

a second delay means coupled to said output of said detector circuit for delaying each of said trigger pulses; and

an asynchronous flip-flop having a first input coupled to said output of said detector circuit and having a second input coupled to said second delay means for receiving therefrom said trigger pulses and said delayed trigger pulses to generate therefrom the plurality of output pulses.

The above and other objects, features and advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Brief description of the drawings

Fig. 1 is a schematic diagram of the inventive WRITE STROBE generation circuit;

Fig. 2 is a schematic diagram illustrating how the delay circuits of Fig. 1 may be implemented; and

Fig. 3 is a timing diagram illustrating various waveforms as they appear during the operation of the circuit of Fig. 1.

Description of the preferred embodiment

Referring to Fig. 1, the system clock (CL) is applied to a first input (c) of a delay type flip-flop 2 having Q and $\bar{Q}$ outputs. The $\bar{Q}$ output is fed back to the delay input such that the flip-flop will change states each time the leading edge of the clock pulse appear at the (c) input. Thus, the signal at the Q output of delay flip-flop 2 (CL/2) is a symmetrical pulse train having a frequency one half that of the system clock. The system clock (CL) and the divided system clock (CL/2) are shown in lines A and B respectively of Fig. 3.

The Q output of delay flip-flop 2 is applied to the input of a level shift detector which comprises inverter 4, P-type field effect transistors 6, 8, 16, and 18, N-type field effect transistors 10, 12, 20, and 22, and delays 14 and 24 each of which imparts a delay D₁ to the signal which appears at its input. The Q output of delay flip-flop 2 is applied to the input of inverter 4, to the gate of transistor 12, to the gate of transistor 16, and to the input of delay 24. The output of inverter 4 is applied to the gate of transistor 6, to the gate of transistor 20, and to the input of delay 14. The output of delay 14 is coupled to the gates of transistors 8 and 10, and the output of delay 24 is coupled to the gates of transistors 18 and 22. The drain electrodes of transistors 6 and 16 are coupled to a source of supply voltage (V_{DD}) while their sources are coupled respectively to the drain electrodes of transistors 8 and 18. The source electrodes of transistors 8 and 18 are coupled respectively to the drain electrodes of transistors 10 and 20 which are in turn coupled together. The source electrodes of transistors 12 and 22 are each coupled to a second source of supply voltage (ground) and their drain elec-

tródes are coupled together and to the source electrodes of transistors 10 and 20.

The output (θ_p) of the level shift detector which appears at node 28 (shown in line C of Fig. 3) is applied to the input of delay 26 and to a first input of asynchronous flip-flop 30. Delay 26 imparts a delay D_2 to θ_p to provide a signal θ_{pd} which is applied to a second input of asynchronous flip-flop 30. Asynchronous flip-flops are well known to those skilled in the art and may comprise first and second NAND gates 32 and 34 each having an output which is connected to the second input of the other. The desired WRITE STROBE signal appears in an inverted form at the output of NAND gate 34 (shown in line E of Fig. 3) and is applied to the input of inverter 36. WRITE STROBE signal (WS) appears at the output of inverter 36 and is shown in line F of Fig. 3.

Before describing the operation of the circuit shown at Fig. 1, it should be clear that the delay units 14, 24, and 26 may be implemented in a variety of ways which are well known to those skilled in the art. One such approach is shown in Fig. 2 wherein the delay is implemented by a series of inverter gates 38, 40, 42, 44, 46 and 48. That is, the signal appearing at the input of inverter 38 will appear in a delayed form at the output of inverter 48, the amount of delay being determined by the propagation delay of each inverter and the number of inverters used in the chain. It should be clear that the length of the delays are a matter of design choice. One need only insure that an even number of series coupled inverter gates be employed in each delay string to avoid an unwanted signal inversion. For the purposes of the circuit shown in Fig. 1, delays 14 and 24 each in part a substantially identical delay D1 and may, for example, be produced through the use of six series inverters. Delay D2 may be produced by a series of eight inverters.

The operation of the circuit will now be described in conjunction with Figs. 1 and 3. The reader is reminded that an N channel field effect transistor will be turned on when a logical high voltage appears at its gate electrode, while a P-channel field effect transistor will be turned on when a logical low voltage appears at its gate electrode. With the above in mind, the discussion of operation shall begin at a point and time t_1 (shown in Fig. 3) which trails the trailing edge of the divided clock (CL/2) by an amount which exceeds the delay (D_1) imparted by delays 14 and 24. At this point and time (t_1), transistors 6, 8, 12 and 22 are off and transistors 10, 16, 18 and 20 are on. Thus, transistors 16 and 18 supply current to node 28 causing the voltage thereat to rise since there is no path to ground (i.e. transistors 12 and 22 are off). Thus, θ_p at time t_1 is a logical high.

When the divided clock signal (CL/2) rises at time t_2 , transistors 6 and 12 turn on while transistors 16 and 20 turn off. The states of transistors 8, 10, 18 and 22 remain unchanged due to the delaying action of delays 14 and 24. Now, since both transistors 10 and 12 are on, there is a completed path to ground from node 28 and

therefore θ_p will go low. Furthermore, since transistor 16 is off, there is no current supplied to node 28.

After a period of time corresponding to delay D, has elapsed (time t_3 in Fig. 3) transistors 8 and 22 will turn on and transistors 10 and 18 will turn off. In this case, with transistors 6 and 8 on, current is supplied to node 28. However, since transistors 10 and 20 are off, there is no path to ground and the voltage at node 28 (θ_p) rises to a logical high voltage.

When a divided clock signal (CL/2) again goes low (t_4), transistors 6 and 12 turn off and transistors 16 and 20 turn on. In this case, transistors 20 and 22 supply a path to ground causing the voltage at node 28 (θ_p) to drop to a logical low value. Since transistor 6 is off no current is supplied to node 28.

Finally, after a period of time equivalent to D, (i.e. at t_5), transistors 8 and 22 turn off and transistors 10 and 18 turn on. Transistors 16 and 18 supply current to node 28 causing the voltage to rise again since there is no path to ground (i.e. transistors 12 and 22 are off).

The output signal θ_p (line c of Fig. 3) is applied to a first input of asynchronous flip-flop 34 and to the input of a delay 26. The output of delay 26 (θ_{pd}) is shown in line D of Fig. 3 and is applied to a second input of asynchronous flip-flop 30. Delay 26 imparts a delay D_2 and may be implemented in a manner similar to that shown in Fig. 2. The output of asynchronous flip-flop 30 (WS) appears at the output of NAND gate 34 and is shown in line E of Fig. 3. As can be seen, this output goes high on the trailing edge of θ_p and goes low on the trailing edge of θ_{pd} . The desired WRITE STROBE signal (WS) appears at the output of inverter gate 36 and is shown in line F of Fig. 3. As can be seen, the WRITE STROBE signal pulses occur at a time sufficiently delayed from the system clock so as to permit the address bits to settle down and avoid writing information into erroneous locations and memory.

In summary, the desired WRITE STROBE signal is produced by generating a symmetrical clock with half the frequency of the system clock (CL/2) by feeding the system clock (CL) into the C input of a standard master slave delay type flip-flop having its $\bar{Q}$ output fed back to its D input. Next, a negative going pulse train θ_p is generated which includes a negative going pulse at every transition of the divided clock (CL/2). This is accomplished by applying CL/2 to a level change detector which generates a pulse of a desired width whenever a level change at its input is detected. Next, a delayed pulse train θ_{pd} is produced from θ_p . The amount of delay is a design choice and depends upon the speed of the memory. Finally, θ_p and θ_{pd} are applied to the clear and set inputs respectively of an asynchronous flip-flop. The output of the flip-flop is inverted to produce the desired WRITE STROBE signal.

The above description is given by way of example only. Changes in form and details may be made by one skilled in the art without depart-

ing from the scope of the invention as defined by the appended claims.

Claims

1. A circuit for generating a plurality of output pulses each in response to one of a plurality of input pulses and occurring at a predetermined period of time thereafter including a flip flop (2) receiving the plurality of input pulses and generating therefrom a symmetrical pulse train having a reduced frequency, and additional circuitry responsive to the symmetrical pulse train, characterized by:

a detector circuit (6, 8, 10, 12, 16, 18, 20, 22) including first delay means (14, 24) coupled to an output of the flip flop (2) for generating trigger pulses at an output thereof of a first predetermined duration at every transition of said symmetrical pulse train and said first delay means having a delay time corresponding to said first predetermined duration;

a second delay means (26) coupled to said output of said detector circuit for delaying each of said trigger pulses; and

an asynchronous flip-flop (30) having a first input coupled to said output of said detector circuit and having a second input coupled to said second delay means for receiving therefrom said trigger pulses and said delayed trigger pulses to generate therefrom the plurality of output pulses.

2. A circuit according to claim 1 wherein said detector circuit comprises a level change detector which receives said symmetrical pulse train and issues in response thereto a pulse of said first predetermined duration whenever a level change in said symmetrical pulse train is detected.

3. A circuit according to claim 2 wherein said level change detector is characterized by:

a first inverter (4) having an input coupled to receive said symmetrical pulse train and having an output;

a first delay circuit (14) having an input coupled to said output of said first inverter (4) and having an output;

a second delay circuit (24) having an input coupled to receive said symmetrical pulse train and having an output;

a first P-channel field effect transistor (6) having a drain adapted to be coupled to a first source (V_{DD}) of supply voltage, a gate coupled to the output of said first inverter and having a source;

a second P-channel field effect transistor (8) having a drain coupled to the source of said first P-channel field effect transistor, a gate coupled to the output of said first delay circuit, and having a source;

a first N-channel field effect transistor (10) having a drain coupled to the source of said second P-channel field effect transistor, a gate coupled to the output of said first delay circuit, and having a source;

a second N-channel field effect transistor (12) having a drain coupled to the source of said first N-channel field effect transistor, a gate coupled to

receive said symmetrical pulse train, and a source adapted to be coupled to a second source of supply voltage (ground);

a third P-channel field effect transistor (16) having a drain adapted to be coupled to said first source of supply voltage, a gate coupled to receive said symmetrical pulse train, and having a source;

a fourth P-channel field effect transistor (18) having a drain coupled to the source of said third P-channel field effect transistor, a gate coupled to the output of said second delay circuit and having a source;

a third N-channel field effect transistor (20) having a drain coupled to the source of said fourth P-channel field effect transistor and to the source-drain junction of said second P-channel field effect transistor and said first N-channel field effect transistor, a gate coupled to the output of said first inverter and a source coupled to the source-drain junction of said first and second N-channel field effect transistor; and

a fourth N-channel field effect transistor (22) having a drain coupled to the source of said third N-channel field effect transistor, a gate coupled to the output of said second delay circuit (24) and a source adapted to be coupled to said second source of supply voltage, said trigger pulses appearing at the source-drain junction of said second P-channel field effect transistor and said first N-channel field effect transistor and at the source-drain junction of said fourth P-channel field effect transistor and said third N-channel field effect transistor.

4. A circuit according to claim 2 characterized in that the flip-flop is a delay flip-flop having its Q output coupled to its D input.

5. An on-chip memory control circuit for use on a clock synchronized integrated circuit memory chip comprising a circuit in accordance with any of the above claims for generating a WRITE STROBE signal corresponding to plurality of output pulses generated from said switch circuit (30).

Patentansprüche

1. Schaltung zum Erzeugen mehrerer auszugebender Impulse, die eine vorgegebene Zeitspanne nach jeweils einem von mehreren eingehenden Impulsen auftreten, jeweils in Abhängigkeit von einem eingehenden Impuls mit einem Flip-flop (2) zur Aufnahme der eingehenden Impulse und für eine Erzeugung eines symmetrischen Impulszuges mit einer verminderten Frequenz aus den eingehenden Impulsen und mit einer zusätzlichen, auf den symmetrischen Impulszug ansprechenden Schaltung, gekennzeichnet durch:

eine Detektorschaltung (6, 8, 10, 12, 16, 18, 20, 22), die eine erste Verzögerungsschaltung (14, 24) enthält, und die an eine Ausgangsklemme des Flipflop (2) angeschlossen ist, um bei einem abgegebenen Signal Auslöseimpulse von einer ersten vorgegebenen Dauer bei jedem Übergang des symmetrischen Impulszuges zu erzeugen,

ing from the scope of the invention as defined by the appended claims.

Claims

1. A circuit for generating a plurality of output pulses each in response to one of a plurality of input pulses and occurring at a predetermined period of time thereafter including a flip flop (2) receiving the plurality of input pulses and generating therefrom a symmetrical pulse train having a reduced frequency, and additional circuitry responsive to the symmetrical pulse train, characterized by:

a detector circuit (6, 8, 10, 12, 16, 18, 20, 22) including first delay means (14, 24) coupled to an output of the flip flop (2) for generating trigger pulses at an output thereof of a first predetermined duration at every transition of said symmetrical pulse train and said first delay means having a delay time corresponding to said first predetermined duration;

a second delay means (26) coupled to said output of said detector circuit for delaying each of said trigger pulses; and

an asynchronous flip-flop (30) having a first input coupled to said output of said detector circuit and having a second input coupled to said second delay means for receiving therefrom said trigger pulses and said delayed trigger pulses to generate therefrom the plurality of output pulses.

2. A circuit according to claim 1 wherein said detector circuit comprises a level change detector which receives said symmetrical pulse train and issues in response thereto a pulse of said first predetermined duration whenever a level change in said symmetrical pulse train is detected.

3. A circuit according to claim 2 wherein said level change detector is characterized by:

a first inverter (4) having an input coupled to receive said symmetrical pulse train and having an output;

a first delay circuit (14) having an input coupled to said output of said first inverter (4) and having an output;

a second delay circuit (24) having an input coupled to receive said symmetrical pulse train and having an output;

a first P-channel field effect transistor (6) having a drain adapted to be coupled to a first source (V_{DD}) of supply voltage, a gate coupled to the output of said first inverter and having a source;

a second P-channel field effect transistor (8) having a drain coupled to the source of said first P-channel field effect transistor, a gate coupled to the output of said first delay circuit, and having a source;

a first N-channel field effect transistor (10) having a drain coupled to the source of said second P-channel field effect transistor, a gate coupled to the output of said first delay circuit, and having a source;

a second N-channel field effect transistor (12) having a drain coupled to the source of said first N-channel field effect transistor, a gate coupled to

receive said symmetrical pulse train, and a source adapted to be coupled to a second source of supply voltage (ground);

a third P-channel field effect transistor (16) having a drain adapted to be coupled to said first source of supply voltage, a gate coupled to receive said symmetrical pulse train, and having a source;

a fourth P-channel field effect transistor (18) having a drain coupled to the source of said third P-channel field effect transistor, a gate coupled to the output of said second delay circuit and having a source;

a third N-channel field effect transistor (20) having a drain coupled to the source of said fourth P-channel field effect transistor and to the source-drain junction of said second P-channel field effect transistor and said first N-channel field effect transistor, a gate coupled to the output of said first inverter and a source coupled to the source-drain junction of said first and second N-channel field effect transistor; and

a fourth N-channel field effect transistor (22) having a drain coupled to the source of said third N-channel field effect transistor, a gate coupled to the output of said second delay circuit (24) and a source adapted to be coupled to said second source of supply voltage, said trigger pulses appearing at the source-drain junction of said second P-channel field effect transistor and said first N-channel field effect transistor and at the source-drain junction of said fourth P-channel field effect transistor and said third N-channel field effect transistor.

4. A circuit according to claim 2 characterized in that the flip-flop is a delay flip-flop having its Q output coupled to its D input.

5. An on-chip memory control circuit for use on a clock synchronized integrated circuit memory chip comprising a circuit in accordance with any of the above claims for generating a WRITE STROBE signal corresponding to plurality of output pulses generated from said switch circuit (30).

Patentansprüche

1. Schaltung zum Erzeugen mehrerer auszugebender Impulse, die eine vorgegebene Zeitspanne nach jeweils einem von mehreren eingehenden Impulsen auftreten, jeweils in Abhängigkeit von einem eingehenden Impuls mit einem Flip-flop (2) zur Aufnahme der eingehenden Impulse und für eine Erzeugung eines symmetrischen Impulszuges mit einer verminderten Frequenz aus den eingehenden Impulsen und mit einer zusätzlichen, auf den symmetrischen Impulszug ansprechenden Schaltung, gekennzeichnet durch:

eine Detektorschaltung (6, 8, 10, 12, 16, 18, 20, 22), die eine erste Verzögerungsschaltung (14, 24) enthält, und die an eine Ausgangsklemme des Flipflop (2) angeschlossen ist, um bei einem abgegebenen Signal Auslöseimpulse von einer ersten vorgegebenen Dauer bei jedem Übergang des symmetrischen Impulszuges zu erzeugen,



wobei die erste Verzögerungsschaltung eine Verzögerungszeit aufweist, die der ersten vorgegebenen Dauer entspricht,

eine zweite Verzögerungsschaltung (26), die an der Ausgangsklemme der Detektorschaltung angeschlossen ist, um die Auslöseimpulse zu verzögern,

und ein asynchrones Flipflop (30), dessen erste Eingangsklemme mit der Ausgangsklemme der Detektorschaltung und dessen zweite Eingangsklemme mit der zweiten Verzögerungsschaltung zum Empfang der Auslöseimpulse bzw. der verzögerten Auslöseimpulse verbunden sind, um die auszugebenden Impulse hervorzubringen.

2. Schaltung gemäß Anspruch 1, bei der die Detektorschaltung einen eine Niveauänderung wahrnehmende Schaltung enthält, die den symmetrischen Impulszug empfängt und in Abhängigkeit von diesem einen Impuls von einer vorherbestimmten Dauer jedesmal dann ausgibt, wenn eine Niveauänderung in dem symmetrischen Impulszug wahrgenommen wird.

3. Schaltung gemäß Anspruch 2, bei der die Niveauänderung wahrnehmende Schaltung gekennzeichnet ist:

durch eine erste Umkehrschaltung (4) mit einer Eingangsklemme, die zum Empfang des symmetrischen Impulszuges angeschlossen ist, und mit einer Ausgangsklemme,

durch eine erste Verzögerungsschaltung (14) mit einer Eingangsklemme, die mit der Ausgangsklemme der ersten Umkehrschaltung (4) verbunden ist, und mit einer Ausgangsklemme,

durch eine zweite Verzögerungsschaltung (24) mit einer Eingangsklemme, die zum Empfang des symmetrischen Impulszuges angeschlossen ist, und mit einer Ausgangsklemme,

durch einen ersten Feldeffekt-Transistor (6) mit einem p-Kanal, dessen Zugelektrode an einer ersten Versorgungs-Spannungsquelle (V_{DD}) und dessen Torelektrode an der Ausgangsklemme der ersten Umkehrschaltung angeschlossen ist, und der eine Quellenelektrode aufweist,

durch einen zweiten Feldeffekt-Transistor (8) mit einem p-Kanal, dessen Zugelektrode an der Quellenelektrode des ersten Feldeffekt-Transistors mit einem p-Kanal und dessen Torelektrode an der Ausgangsklemme der ersten Verzögerungsschaltung angeschlossen ist, und der eine Quellenelektrode aufweist,

durch einen ersten Feldeffekt-Transistor (10) mit einem n-Kanal, dessen Zugelektrode an der Quellenelektrode des zweiten Feldeffekt-Transistors mit einem p-Kanal und dessen Torelektrode an der Ausgangsklemme der ersten Verzögerungsschaltung angeschlossen ist, und der eine Quellenelektrode aufweist,

durch einen zweiten Feldeffekt-Transistor (12) mit einem n-Kanal, dessen Zugelektrode an die Quellenelektrode des ersten Feldeffekt-Transistor mit einem n-Kanal und dessen Torelektrode zum Empfang des symmetrischen Impulszuges angeschlossen ist, und dessen Quellenelektrode

an einer zweiten Versorgungs-Spannungsquelle (Erde) anschließbar ist.

durch einen dritten Feldeffekt-Transistor (16) mit einem p-Kanal, dessen Zugelektrode an die erste Versorgungs-Spannungsquelle anschließbar und dessen Torelektrode zur Aufnahme des symmetrischen Impulszuges angeschlossen ist, und der eine Quellenelektrode aufweist.

durch einen vierten Feldeffekt-Transistor (18) mit einem p-Kanal, dessen Zugelektrode an der Quellenelektrode des dritten Feldeffekt-Transistors mit einem p-Kanal und dessen Torelektrode an der Ausgangsklemme der zweiten Verzögerungsschaltung angeschlossen ist, und der eine Quellenelektrode aufweist.

durch einen dritten Feldeffekt-Transistor (20) mit einem n-Kanal, dessen Zugelektrode an der Quellenelektrode des vierten Feldeffekt-Transistors mit einem p-Kanal und an der Verbindung der Quellen- und Zugelektrode des zweiten Feldeffekt-Transistors mit einem p-Kanal und des ersten Feldeffekt-Transistors mit einem n-Kanal und dessen Torelektrode an der Ausgangsklemme der ersten Umkehrschaltung und dessen Quellenelektrode an der Verbindung von Quellen- und Zugelektrode des ersten und zweiten Feldeffekt-Transistors mit einem n-Kanal angeschlossen sind,

und durch einen vierten Feldeffekt-Transistor (22) mit einem n-Kanal, dessen Zugelektrode mit der Quellenelektrode des dritten Feldeffekt-Transistors mit einem n-Kanal und dessen Torelektrode an der Ausgangsklemme der zweiten Verzögerungsschaltung (24) angeschlossen ist, und dessen Quellenelektrode an die zweite Versorgungs-Spannungsquelle anschließbar ist, wobei die Auslöseimpulse an der Verbindung der Quellen- und Zugelektrode des zweiten Feldeffekt-Transistors mit einem p-Kanal und des ersten Feldeffekt-Transistors mit einem n-Kanal und an der Verbindung der Quellen- und Zugelektrode des vierten Feldeffekt-Transistors mit einem p-Kanal und des dritten Feldeffekt-Transistors mit einem n-Kanal erscheinen.

4. Schaltung gemäß Anspruch 2, dadurch gekennzeichnet, daß das Flipflop ein Verzögerungsflipflop ist, dessen Ausgangsklemme (Q) mit seiner Eingangsklemme (D) verbunden ist.

5. Steuerschaltung für einen Speicherchip, die für einen eine taktsynchronisierte, integrierte Schaltung aufweisenden Speicherchip verwendet wird, und die eine Schaltung gemäß einem beliebigen obigen Anspruch zur Erzeugung eines Einblendsignals zum Einschreiben ist oder enthält, das den vom elektronischen Schalter (30) erzeugten, ausgegebenen Impulsen entspricht.

Revendications

1. Circuit qui engendre un ensemble d'impulsions de sortie en réponse à un ensemble d'impulsions d'entrée et qui se produisent après un intervalle de temps prédéterminé, comprenant une bascule (2) qui reçoit l'ensemble des impul-



sions d'entrée et qui engendre à partir de là un train d'impulsions symétriques à fréquence réduite, et une partie complémentaire sensible au train d'impulsions symétriques, caractérisé par: un circuit de détection (6, 8, 10, 12, 16, 18, 20, 22) comprenant les moyens du premier retard (14, 24) reliés à la sortie de la bascule (2) afin d'engendrer des impulsions de déclenchement d'une première durée prédéterminée à chaque transition dudit train d'impulsions symétriques et lesdits moyens du premier retard ayant un temps de retard correspondant à ladite première durée prédéterminée;

le moyen du deuxième retard (26) relié à ladite sortie dudit circuit de détection pour retarder chacune desdites impulsions de déclenchement; et

une bascule asynchrone (30) dont la première entrée est reliée à ladite sortie dudit circuit de détection et ayant une deuxième entrée reliée audit moyen du deuxième retard pour recevoir à partir de là lesdites impulsions de déclenchement et lesdites impulsions de déclenchement retardées pour y engendrer l'ensemble des impulsions sortie.

2. Circuit selon la revendication 1, où ledit circuit de détection comprend un détecteur de changement de niveau qui reçoit ledit train d'impulsions symétriques et qui par réaction délivre une impulsion de ladite première durée prédéterminée à chaque fois qu'un changement de niveau dans ledit train d'impulsions symétriques est détecté.

3. Circuit selon la revendication 2, où ledit détecteur de changement de niveau est caractérisé par:

un premier inverseur (4) ayant son entrée reliée pour recevoir ledit train d'impulsions symétriques et comportant une sortie;

un premier circuit de retard (14) dont l'entrée est reliée à ladite sortie dudit premier inverseur (4) et comportant une sortie;

un deuxième circuit de retard (24) dont l'entrée est reliée pour recevoir ledit train d'impulsions symétriques et comportant une sortie;

un premier transistor à effet de champ à canal P (6) ayant son drain apte à être connecté à une première source de tension d'alimentation (VDD), sa grille reliée à la sortie dudit premier inverseur, et comportant une source;

un deuxième transistor à effet de champ à canal P (8) ayant son drain relié à la source dudit premier transistor à effet de champ à canal P, sa grille reliée à la sortie dudit premier circuit de retard, et comportant une source;

un premier transistor à effet de champ à canal N

(10) ayant son drain relié à la source dudit deuxième transistor à effet de champ à canal P, sa grille reliée à la sortie dudit premier circuit de retard, et comportant une source;

un deuxième transistor à effet de champ à canal N (12) ayant son drain relié à la source dudit premier transistor à effet de champ à canal N, sa grille reliée afin de recevoir ledit train d'impulsions symétriques, et sa source apte à être connectée à une seconde source de tension d'alimentation (masse);

un troisième transistor à effet de champ à canal P (16) ayant son drain apte à être connecté à ladite première source de tension, sa grille reliée afin de recevoir ledit train d'impulsions symétriques, et comportant une source;

un quatrième transistor à effet de champ à canal P (18) ayant son drain relié à la source dudit troisième transistor à effet de champ à canal P, sa grille reliée à la sortie dudit deuxième circuit de retard et comportant une source;

un troisième transistor à effet de champ à canal N (20) ayant son drain relié à la source dudit quatrième transistor à effet de champ à canal P, à la source dudit deuxième transistor à effet de champ à canal P et au drain dudit premier transistor à effet de champ à canal N, sa grille reliée à la sortie dudit premier inverseur et sa source reliée à la source dudit premier transistor à effet de champ à canal N et au drain du deuxième transistor à effet de champ à canal N; et

un quatrième transistor à effet de champ à canal N (22) ayant son drain relié à la source dudit troisième transistor à effet de champ à canal N, sa grille reliée à la sortie dudit deuxième circuit de retard (24) et sa source apte à être connectée à ladite deuxième source de tension d'alimentation, lesdites impulsions de déclenchement apparaissant au point de jonction de la source dudit deuxième transistor à effet de champ à canal P et du drain dudit premier transistor à effet de champ à canal N et au point de jonction de la source dudit quatrième transistor à effet de champ à canal P et du drain dudit troisième transistor à effet de champ à canal N.

4. Circuit selon la revendication 2, caractérisé en ce que la bascule est une bascule à retard dont la sortie Q est reliée à l'entrée D.

5. Circuit sur puce pour commande de mémoire utilisé sur une pastille mémoire à circuit intégré et synchronisé par horloge qui comprend un circuit conforme avec l'une quelconque des revendications au-dessus afin d'engendrer un signal WRITE STROBE qui correspond à l'ensemble des impulsions de sortie engendrées à partir dudit circuit de commutation (30).

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* C L M S *