CLAIMS

1. An ultrasonic probe apparatus connected to a main body of an ultrasonic inspection apparatus having a first display unit, comprising:

a probe holder in a shape of a box;

~~an ultrasonic probe apparatus provided with~~ an ultrasonic transducer including~~constituted of~~ a plurality of piezoelectric vibrators incorporated in the probe holder;

a drive element selecting section that is connected to the plurality of piezoelectric vibrators of the ultrasonic transducer and is adopted to select a required piezoelectric vibrator based on a drive signal from a signal generator;

a signal detector~~ing~~ circuit that causes an ultrasonic wave emitted from ~~the piezoelectric vibrator selected by the drive element selecting section to be~~ incident via an acoustic propagation medium on an inspection object and received~~s~~ a reflected echo thereof to detect an electric signal dependent on the reflected echo; ~~and~~

a signal processing section that applies a parallel arithmetic process to the detected electric signal dependent on the reflected echo and produces data on an internal image of the inspection objection; ~~,~~

~~wherein the ultrasonic probe apparatus includes~~ a second display unit incorporated in the probe holder

whichthat displays an image based on the image data produced by the signal processing section and configured to receive at least one of an inspection-starting command or an inspection-terminating command;, and

an input unit, forused to inputting, an operation command such as a command to start or terminate an inspection, or to set inspection conditions, incorporated in the probe holder,

wherein the ultrasonic transducer, the second display unit and the input unit are integrally assembled within the probe holder;

wherein the display units are configured to display that the ultrasonic transducer properly faces an inspected surface in an inspection region by a cross-sectional image in the inspection region of at least the inspection object as an image based on the internal image of the inspection object produced in the signal processing unit, and the input unit is configured to set the inspection condition including the inspection-starting command, an inspection-terminating command and position adjustment of image-starting-position at a time of producing the cross-sectional image.

2. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 1, wherein the image displayed in the display unit includes an echo waveform image of the reflected echo from the inspection

object.

~~3. The ultrasonic inspection apparatus according to claim 1, wherein the image displayed in the display unit includes a cross sectional image of the inspection object.~~

34. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 1, wherein the image displayed in the display unit includes an image produced by extracting an echo peak value in a depth direction of the inspection object.

45. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 1, wherein the image displayed in the display unit includes an image produced by extracting depth data of the reflected echo from the inspection object.

56. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 1, wherein the image displayed in the display unit includes a display of a result of extracting data on the inspection object from the reflected echo from the inspection object and then performing an arithmetical operation on the data.

67. An ultrasonic probe apparatus connected to a main body of an ultrasonic inspection apparatus, comprising:

a probe holder in a shape of a box;

an ultrasonic transducer including a plurality of piezoelectric vibrators incorporated in the probe holder;

a display unit incorporated in the probe holder; and

an input unit incorporated in the probe holder, the input unit being configured to receive at least one of an inspection-starting command or an inspection-terminating command,

wherein the ultrasonic transducer, the display unit and the input unit are integrally assembled within the probe holder, and

wherein the display unit is configured to display that the ultrasonic transducer properly faces an inspected surface in an inspection region by a cross-sectional image in the inspection region of at least the inspection object as an image based on the internal image of the inspection object produced in the signal processing unit, and the input unit is configured to set the inspection condition including the inspection-starting command, an inspection-terminating command and position adjustment of image-starting-position at a time of producing the cross-sectional image.

78. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 67, wherein an image displayed in the display unit includes an echo waveform image of a reflected echo from an inspection

object.

8~~9~~. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 6~~7~~, wherein the image displayed in the display unit includes a cross-sectional image of the inspection object.

9~~10~~. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 6~~7~~, wherein the image displayed in the display unit includes an image produced by extracting an echo peak value in a depth direction of the inspection object.

10~~11~~. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 6~~7~~, wherein the image displayed in the display unit includes an image produced by extracting depth data of the reflected echo from the inspection object.

11~~12~~. The ultrasonic probe apparatus for the ultrasonic inspection apparatus according to claim 6~~7~~, wherein the image displayed in the display unit includes a display of a result of extracting data on the inspection object from the reflected echo from the inspection object and then performing an arithmetical operation on the data.

12~~13~~. An ultrasonic inspection method comprising the steps of:

preparing an ultrasonic inspection apparatus according to claim 1~~including: an ultrasonic probe apparatus including the ultrasonic transducer constituted of a plurality of piezoelectric vibrators, a display unit which displays an image based on image data produced by a signal processing section, and an input unit used to perform an operation command such as a command to start or terminate an inspection or to set an inspection condition; a drive element selecting section which is connected to a plurality of piezoelectric vibrators of the ultrasonic transducer and selects a required piezoelectric vibrator based on a drive signal from a signal generator; a signal detecting circuit which causes an ultrasonic wave emitted from the piezoelectric vibrator selected by the drive element selecting section to be incident via an acoustic propagation medium on the inspection object and receives a reflected echo thereof to detect an electric signal dependent on the reflected echo; and a signal processing section which applies a parallel arithmetic process to the detected electric signal dependent on the reflected echo and produces data on an internal image of the inspection object~~;

disposing the ultrasonic probe apparatus at a predetermined inspection position of the inspection object;

inputting thea inspection-condition-setting command to set inspection conditions through the input unit;

repeating the dispositionan arrangement of the ultrasonic probe apparatus and thean input setting of the inspection-condition-setting command to set the inspection conditions through the input unit until a predetermined display is obtained in the display unit;

inputting thean inspection--starting command through the input unit after adjustment of the predetermined display is obtainedof the display unit;

inspecting the inspection object for flaws by causing the ultrasonic probe apparatus to scan a predetermined range of the inspection object; and

inputting thean inspection--terminatinge command through the input unit after thecompletion of inspecting of the predetermined range of the inspection object is completed.

1314. The ultrasonic inspection method according to claim 1213, wherein at least one of inputting the inspection--condition--setting command, inputting the inspection-starting command, or inputting the inspection-terminating command through the input unit isand the starting or terminating the command through the input unit are performed with the ultrasonic probe apparatus being held.

14~~15~~. The ultrasonic inspection method according to claim 12~~13~~, wherein inputting the inspection-condition-setting command is performed after displaying, in the display unit, an~~the~~ echo waveform image of the reflected echo from the inspection object, or a~~the~~ cross-sectional image of the inspection object~~, the inspection condition setting input is performed through the input unit~~.