

Applied Biosystems 3130 and 3130 x Genetic Analyzers: One Polymer, One Capillary Array Length, Maximum Performance

Genetic analysis laboratories often must run a wide variety of applications. Switching between applications can be costly and time-consuming. Therefore, a flexible instrument that easily lends itself to various applications is essential. The instrument must be able to analyze both sequencing and fragment analysis samples quickly and accurately with a single array and polymer, thus minimizing hands-on time.

Researchers who choose the 3130 Series Genetic Analyzers can perform multiple applications using just one array and one polymer to generate high-quality sequencing and fragment analysis data. Additionally, they can choose from multiple configuration options that meet their workflow and application needs.

Automatic Switching Between Sequencing and Fragment Analysis Applications Maximizes Productivity and Reduces Costs

The flexible 3130 Series Systems feature the 3130 POP-7™ Polymer with 36 cm, 50 cm, and 80 cm capillary arrays. Another novel feature, the detection cell heater, enables higher run temperatures with all 3130 POP-7 Polymer configurations. Higher run temperatures, in turn, result in highly resolved peaks, less run-to-run variability, and the fastest electrophoresis times of any system available in the market today.

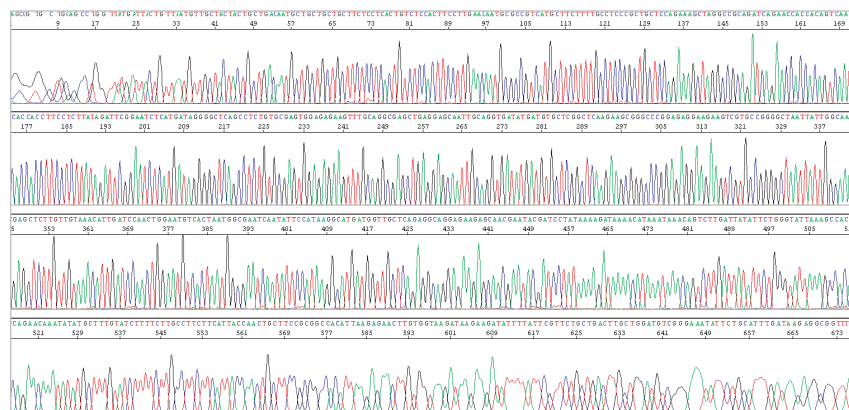


Figure 1. Example of a typical sequencing run using the Ultra-Rapid Sequencing module. The run was performed using BigDye® Terminator Sequencing Standard v3.1. A 668 bp length-of-read was achieved for this sample using 3130 POP-7 Polymer and the 36 cm capillary array. The total run time was 35 minutes.

No array changes and minimal loss of polymer improve the flexibility and performance of the system and reduce the cost per sample. With the easy-to-use Automated Polymer Delivery System, the 3130 Series Systems allow automatic polymer loading, which minimizes hands-on time and maintenance while maximizing performance.

Scientists can choose any configuration to achieve optimal conditions for their research. With the introduction of 3130 POP-7 Polymer for three array lengths, the 36 cm and 50 cm arrays can be used for standard fragment analysis and sequencing runs, and the 80 cm array for long-read sequencing (Tables 1 and 2).

When researchers must switch between polymer type and array lengths, it requires more time and

can increase reagent consumption. By performing multiple applications with a single configuration, the 3130 Series Systems conserve reagents, minimize hands-on instrument time, and maximize performance.

Ultra-Rapid Sequencing with the 36 cm Capillary Array and 3130 POP-7 Polymer

Researchers can now use 3130 POP-7 Polymer, the 36 cm capillary array, and the Ultra-Rapid Sequencing module to automatically sequence up to 16 samples that yield read lengths greater than 500 base pairs (bp). The total run time for the Ultra-Rapid Sequencing module with the 3130 POP-7 Polymer is 35 minutes (Figure 1). The throughput of high-quality data in a 24-hour period is 41 runs, or 656 samples, on a 3130 x system—a 14% increase over runs that use POP-4 Polymer.

Table 1. Sequencing Run Modules.

Sequencing Run Modules	Array Length	Polymer	Run Time (min)	24-hr Throughput*		KB™ Basecaller Q ₂₀ LOR**†
				3130 Analyzer	3130x/ Analyzer	
UltraSeq36_POP7	36 cm	POP-7	35	164	656	500
RapidSeq36_POP7	36 cm	POP-7	60	96	384	600
FastSeq50_POP7	50 cm	POP-7	60	96	384	700
StdSeq50_POP7	50 cm	POP-7	120	48	192	850
LongSeq80_POP7	80 cm	POP-7	170	32	128	950

* Number of samples
 ** Sequencing Analysis Software v5.2 provides a metric Length-of-Read (LOR), defined as the usable range of high-quality or high-accuracy bases determined by Quality Values (QV) generated by KB Basecaller Software v1.2. The LOR is determined using a sliding window of 20 bases, which have an average QV greater than 20.
 † 98.5% basecalling accuracy, less than 2% N's

Table 2. Fragment Analysis Run Modules.

Fragment Analysis Run Modules	Array Length	Polymer	Run Time (min)	24-hr Throughput		Resolution (bp)	Performance SD**
				3130 Analyzer GT*	3130x/ Analyzer GT*		
FragmentAnalysis 36_POP7	36 cm	POP-7	35	3,290	13,170	500	0.15
FragmentAnalysis 50_POP7	50 cm	POP-7	50	2,300	9,220	500	0.15

*20 genotypes/injection
 **Standard deviation: 1 base pair (bp) resolution at 99.99% accuracy

Note: Tables 1 and 2 display only the run modules for the 3130 Series Systems that use POP-7 Polymer. The 3130 Series Systems are also enabled with run modules that use POP-6™ and POP-4™ polymers (not shown).

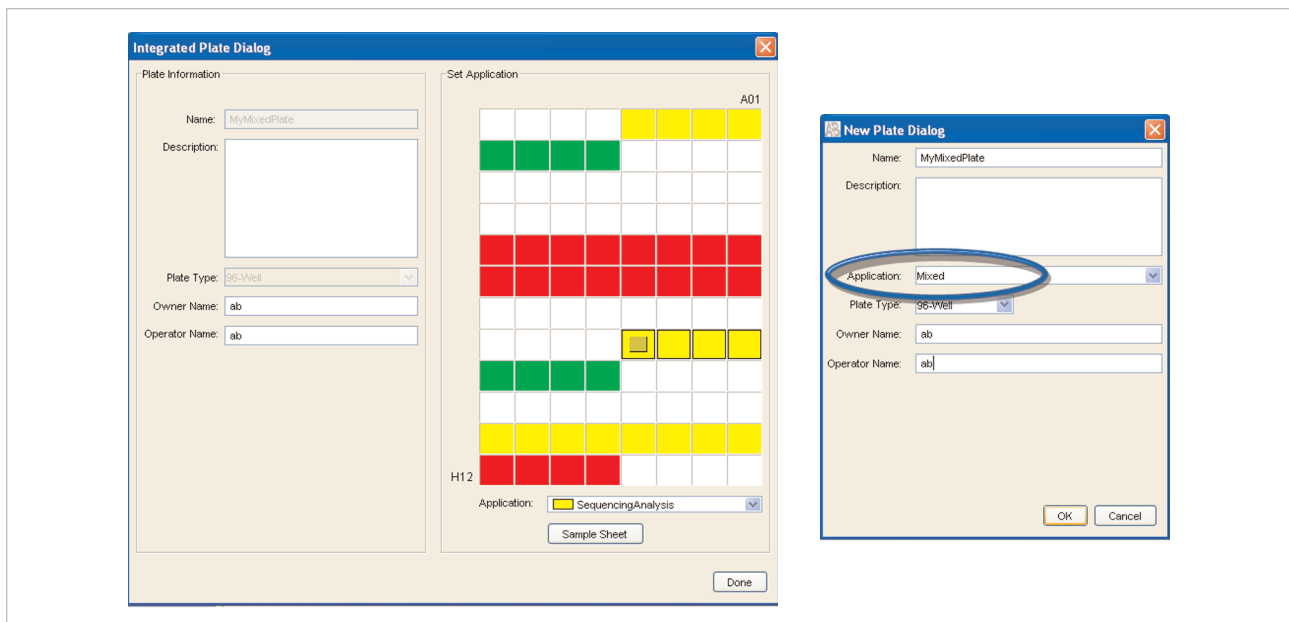


Figure 2. By selecting Mixed-Plate Record in Data Collection Software v3.0, sequencing runs associated with Sequencing Analysis Software v5.2 (yellow), and SeqScape® Software v2.5 (green), as well as fragment analysis runs associated with GeneMapper® Software v3.7 (red), can be set up in the same plate.

Multi-Application Plate Record

The Mixed-Plate Record function in Data Collection Software v3.0 allows researchers to process both sequencing and fragment analysis samples in the

same plate record, using either the 36 cm or 50 cm 3130 POP-7 Polymer configuration. This software feature enhances the capability of the instrument to perform multiple applications

using a single capillary and polymer, thereby minimizing hands-on time and maximizing productivity (Figure 2).

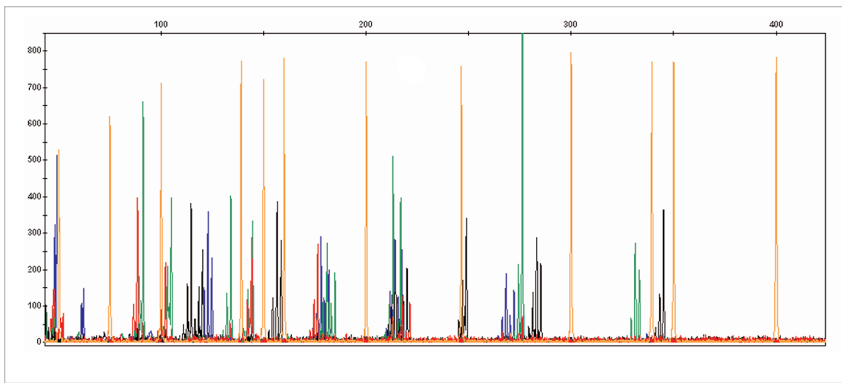


Figure 3. Electropherogram of microsatellite loci from the 3130xL Genetic Analyzer, run with the GeneScan-500 LIZ size standard, a 36 cm array, and 3130 POP-7 Polymer, with a run time of 35 minutes.

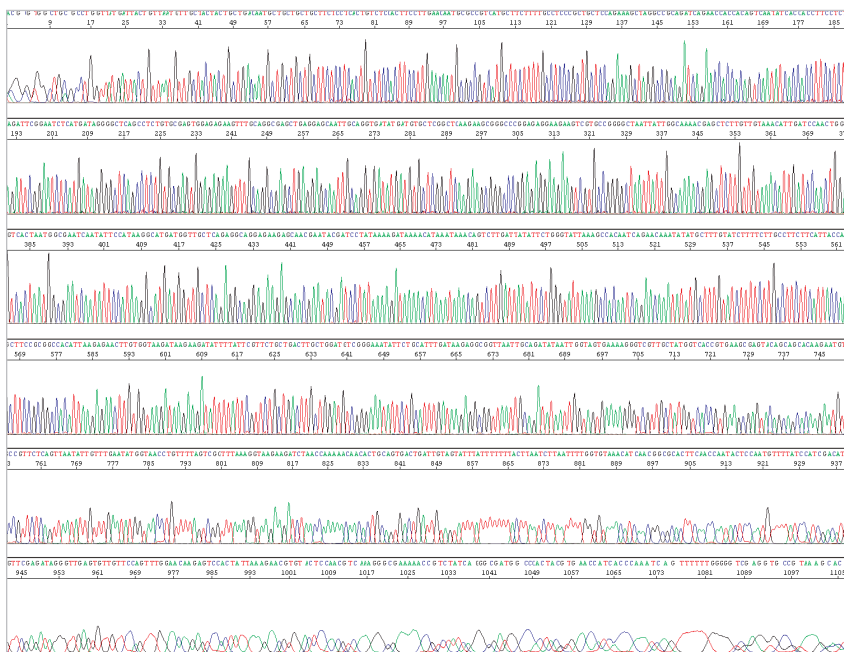


Figure 4. The above electropherogram from a 3130xL Genetic Analyzer is an example of a typical long-read sequence obtained from a BigDye Terminator Sequencing Standard v3.1. A QV₂₀ LOR of 1,090 bp was achieved using the 3130 POP-7 Polymer. Total run time: 2 hours, 50 minutes.

Fragment Analysis Application using the 3130 POP-7™ Polymer and 36 cm Capillary Array

By combining the 36 cm capillary array and 3130 POP-7 Polymer, the 3130 Series Systems provide an ideal method for microsatellite analysis. Microsatellites or Short Tandem Repeats (STRs) are polymorphic DNA loci that contain a repeated nucleotide sequence. STRs can be used for a variety of applications, such as human

disease-association studies, genetic mapping, population genetics, and parentage testing. STRs can also be used as a tool for plant and animal breeders. The ABI PRISM® Linkage Mapping Set, GeneMapper™ v3.7 and the 3130 Series Genetic Analyzers provide a complete microsatellite system.

Composed of 811 highly informative dinucleotide markers, the linkage mapping set is used for linkage

disequilibrium, association studies, and population genetics. When run in conjunction with the GeneScan™ 500 LIZ® size standard and custom-labeled PET® primers, between 15 and 20 loci can be multiplexed and resolved in one capillary after PCR amplification (Figure 3).

Long-Read Sequencing with the 3130 POP-7™ Polymer and the 80 cm Capillary Array

For sequencing longer read lengths, researchers need only switch the 36 cm or 50 cm capillary array to an 80 cm capillary array and continue using 3130 POP-7 Polymer as the separation medium. These systems now automatically process 4 or 16 samples with a QV₂₀ LOR greater than 950 bp. The total run time is 2 hours, 50 minutes (Figure 4). On a 3130xL system, the researcher can efficiently sequence a total of 8 runs (128 samples) in a 24-hour period, generating high-quality data in excess of 121 kb with minimal hands-on time (Table 1).

One Polymer, One Array, Multiple Applications

The ability to perform multiple sequencing and fragment analysis applications without switching the polymer and capillary array on the 3130 Series Genetic Analyzers provides the investigator with high-quality data and lower costs while significantly reducing hands-on time. The increased flexibility provided by the Multiple Run modules in Data Collection Software v3.0 fulfills an expanding research need—the ability to be able to change quickly between sequencing and fragment analysis samples using the same set-up. This results in improved data quality for multiple applications and requires less time.

Efficient Workflow, Multiple Applications, Improved Data Quality

The 3130 Series Systems are fully automated, high-performance, fluorescence-based, multi-capillary, electrophoresis instruments that analyze 4 or 16 samples simultaneously. On both 3130 Series Systems, sample analysis is fully automated from the moment the plate is placed on the instrument and the run is started. For sequencing, fragment analysis, or both, these instruments provide continuous, unattended operation, from automated polymer loading and sample injection, to separation, detection, and data analysis. Automated polymer delivery, by means of the Automated Polymer Delivery System, eliminates the normal, clean-up steps that must be performed manually.

Furthermore, the detection cell heater provides better thermal control, which, when coupled with the 3130 POP-7 Polymer, yields improved data quality, faster runs, and longer read lengths.

The integration of these components in the 3130 Series Systems improves performance and functionality. It also ensures instrument flexibility. Easy-to-use features maximize laboratory productivity while reducing the overall cost per sample. Compared with other capillary electrophoresis instruments on the market today, the Applied Biosystems 3130 and 3130*xL* Genetic Analyzers provide the most cost-effective means of achieving maximum performance.

Order Information

Description	P/N
3130 <i>xL</i> and 3100 Capillary Array (36 cm)	4315931
3130 and 3100- <i>Avant</i> Capillary Array (36 cm)	4333464
3130 <i>xL</i> and 3100 Capillary Array (50 cm)	4315930
3130 and 3100- <i>Avant</i> Capillary Array (50 cm)	4333466
3130 <i>xL</i> and 3100 Capillary Array (80 cm)	4319899
3130 and 3100- <i>Avant</i> Capillary Array (80 cm)	4333465
3130 POP-7™ Polymer	4352759
10X Genetic Analyzer Buffer with EDTA	402824
Hi-Di™ Formamide	4311320
BigDye® Terminator v3.1 Cycle Sequencing Ready Reaction Kit	1,000 rxn 4337456
3100 and 3130 BigDye® Terminator v3.1 Matrix Standards	4336974
BigDye® Terminator v3.1 Sequencing Standard	4336935
Matrix Standard Set DS-02	4323014
Matrix Standard Set DS-30	4345827
Matrix Standard Set DS-31	4345829
Matrix Standard Set DS-32	4345831
Matrix Standard Set DS-33	4345833
GeneScan™-500 LIZ® Size Standard	4322682



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Headquarters

850 Lincoln Centre Drive
Foster City, CA 94404 USA
Phone: 650.638.5800
Toll Free: 800.345.5224
Fax: 650.638.5884

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