Final Report

SATURN TELEMETRY DATA COMPRESSOR TEST PROGRAM

Author

Carl D. Labmeier

April 20, 1968

Under

Contract No. NAS 8-21204

Prepared for

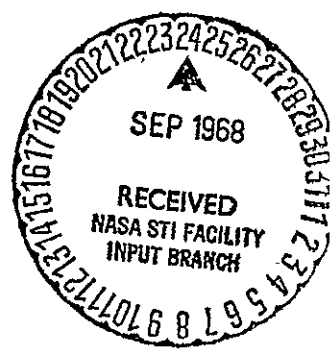
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Huntsville, Alabama

ADVANCED COMMUNICATIONS INFORMATION MANAGEMENT

RESEARCH • DEVELOPMENT • ENGINEERING

ADCOM

A TELEDYNE COMPANY



SATURN
TELEMETRY DATA COMPRESSOR
TEST PROGRAM

FINAL REPORT

by

Carl D. Labmeier

CONTRACT NAS 8-21204

April 20, 1968

Prepared for the

National Aeronautics and Space Administratic
George C. Marshall Space Flight Center
Huntsville, Alabama

by

ADCOM
A Teledyne Company
3980 Fabian Way
Palo Alto, California

G-108

FOREWORD

The purpose of the Telemetry Data Compressor Test Program was to establish the near-optimum data compressor control parameter settings which consist primarily of output bit rate, measurement tolerance settings, priority assignments and rejection of certain type data based upon actual Saturn flight PCM data.

For this report, three different Saturn flights (AS-202, AS-203 and AS-204) were programmed, processed and studied to determine these near-optimum settings.

This study was performed for the National Aeronautics and Space Administration, George C. Marshall Space Flight Center under Contract No. NAS8-21204.

Special thanks is given to Mr. Gabe Wallace for his helpful suggestions and contributions in performance of this program.

SUMMARY

PCM telemetry data from Saturn Flights AS-202, AS-203 and AS-204 were processed through a zero-order predictor data compressor. Tests initially specified for this test program required revision to avoid buffer memory saturation. Therefore to meet program objectives, several new test programs were generated for each flight.

For the three Saturn flights, 153 total test runs were generated to study the buffer memory behavior as a function of the data compressor control parameters. Buffer fullness values were measured from the test run visicorder records and plotted for comparative analysis.

Analysis results showed that the data compression ratio obtained for the high-activity periods varied from 2.0 to 6.5. Test runs generated with 1K tolerance assignments had an average data compression ratio of 2.5; in comparison, test runs operating at the 4K tolerance value had an average data compression ratio of 4.95. This compression ratio improvement could not be clearly attributed to either the rejection of system noise or redundant data samples.

It was not possible to determine the near-optimum data compressor control parameters for all three Saturn flights due to the large number of test programs involved. A significant difference in data characteristics was observed between the three flights analyzed; as such, commonality between optimum control parameters was not found. It remains therefore that if data compression application is to become practical, an effective method of modeling data classes prior to flight must be found or else improved buffer control techniques must be devised.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Continued)

LIST OF ILLUSTRATIONS (Continued)

LIST OF TABLES

1. TEST PROGRAM

The test program consisted of playing back predetection recorded PCM telemetry data into a zero order predictor data compressor system. The PCM data was processed by the data compressor and the compressors operation was observed by recording buffer queue length on a visicorder record. Various data compressor control parameters, such as tolerance control, priority assignment control and compressor output bit rate, were varied in order to observe its effects on buffer fullness or buffer queue length. Both high and low activity periods were interrogated for each flight. The high activity periods consisted of the launch phase for each flight.

Four basic types of buffer fullness plots were prepared for this report to give maximum insight to the data compressor behavior under varying control parameter conditions. These plots are open loop plots, tolerance control plots, priority assignment control plots and combination control plots. These plots were generated from data runs in which the visicorder speed was either 2.0 ips or 1.0 ips so that detailed buffer operations could be observed.

Visicorder records running at 0.2 ips were also generated for the entire flight to show the overall affects of the flight data on the data compressor. Some of these full flight runs included telemetry calibrations while others rejected telemetry calibrations to note the overall queue length affects. These full length data runs were not used for plotting purposes but are described in Data Run Listing for each flight. As a prelude to the test result discussions, the following paragraphs describes the test program operation.

1.1 Electronic Playback System Operation

The primary function of the electronic playback system is to condition, reconstruct, reformat and process the PCM telemetry playback data to the data compressor. The compressor operation is continuously observed by monitoring

and recording the buffer queue length on the visicorder record along with range time. During periods of no data or bad data, the buffer memory was inhibited so as to prevent excessive loading of the buffer memory with noise. This buffer inhibit/enable signal is recorded on the visicorder record simultaneously with the buffer fullness parameters and range time. During in-flight calibration of the telemetry system, both reference and buffer memories are inhibited by a calibration signal. Both the reference and buffer memory inhibit signals are recorded on the visicorder record simultaneously with buffer fullness parameters and range time.

A block diagram of the electronic playback system is shown in Fig. 1. A data tape containing Saturn PCM data, range times (2-pps code) and a calibration inhibit signal are simultaneously played back on an Ampex FR1400 instrumentation tape recorder. The PCM data, which was originally FM recorded on a 450 kHz center frequency subcarrier, is played back through the tape recorders FM electronics. This digital data is then passed through an 8-pole lowpass filter for rejection of unfiltered FM carrier signals and high-frequency noise. It is then amplified and properly biased to meet the bit synchronizer threshold requirements. The bit synchronizer processes the data to provide the Timing, Data Formatting and Control Logic Assembly (TDFCLA) with conditioned PCM data, Clock A which is in phase with the leading edge of PCM data, the compliment of Clock A (Clock B) and a 144 kHz square wave.

The calibration inhibit signal, which was originally modulated on a Voltage Controlled Oscillator (Channel 13) and then direct recorded on tape, was played back through the tape recorders direct reproduce electronics into a Channel 13 FM discriminator for detection. This detected signal was then presented to the TDFCLA for incorporation into the control logic for processing the data to the data compressor.

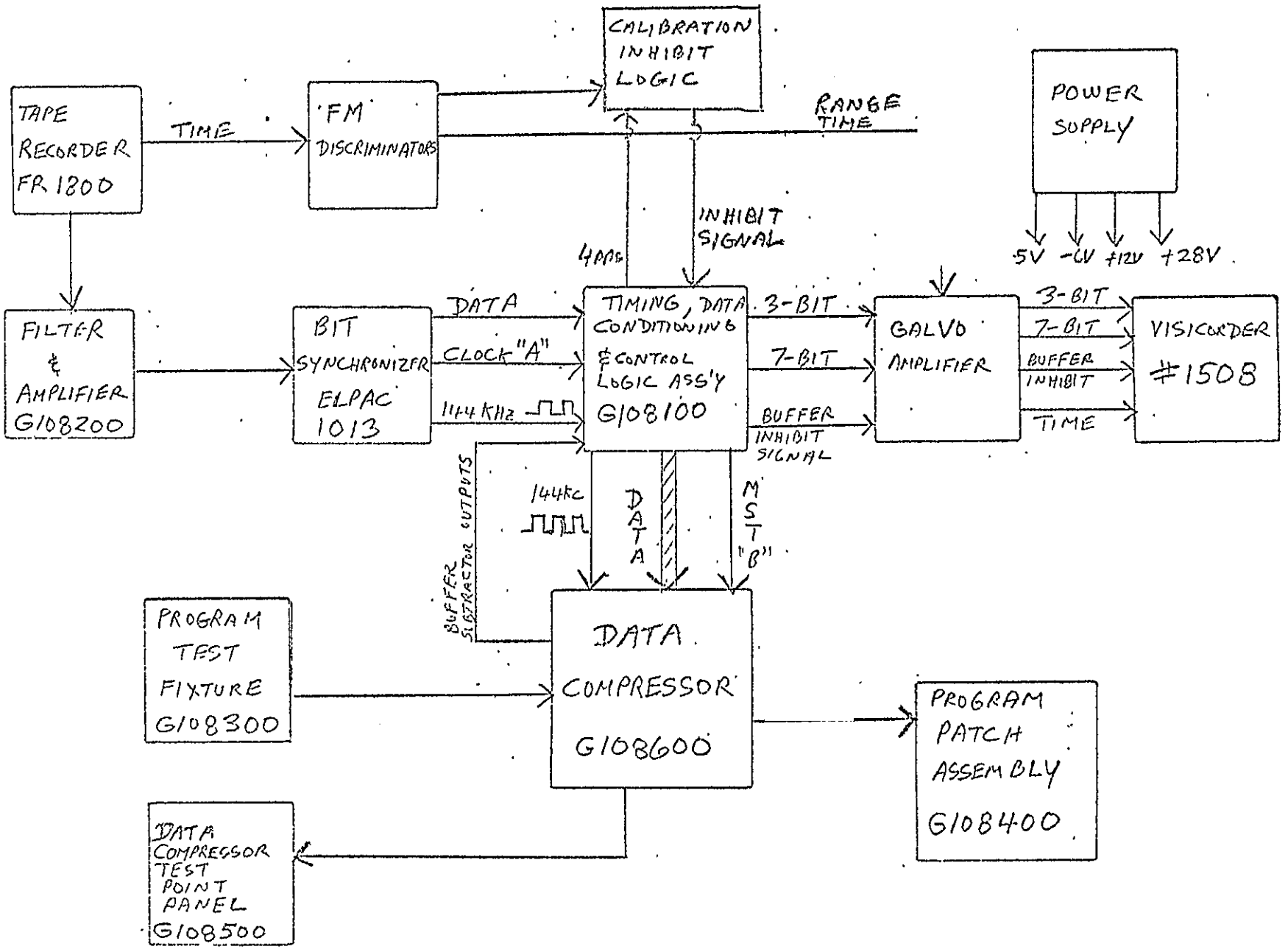


Fig. 1 System Block Diagram

The TDFCLA processes the serial PCM data with the clocks and the calibration inhibit signal to provide the following inputs to the data compressor: parallel PCM data, the master reset pulse (MST "B"), the conditioned 144 kHz signal, the buffer enable/inhibit signal, the reference memory enable/inhibit signal and the reset buffer counters signal. The TDFCLA also accepts the buffer subtractor outputs from the data compressor and converts them into two analog signals (fine and rough) for recording on the visicorder record. Figure 2 shows a more detailed description of the TDFCLA with its serial to parallel converter, master and main frame comparators, master frame sync pulse generator, counters, registers, buffer inhibited logic and associated logic.

The range time originally modulated a voltage controlled oscillator (Channel 15) and was direct recorded on tape. On playback the FM subcarrier is played through the tape recorders direct reproduce electronics and detected by a Channel 15 discriminator. This code (2 pps) is then presented to the galvonometer amplifier for recording on the visicorder record as is shown in Fig. 3.

1.2 Visicorder Records

A typical visicorder record is shown in Fig. 3 and it presents the raw data test results that will be plotted and analyzed. On each record five different signals are recorded simultaneously and they are as follows: range time, buffer fullness, range plot, buffer fullness five plot, reference memory enable/inhibit signal and buffer memory enable/inhibit signal. The range time was recorded in IRIG Standard Time Code – Format "C" -2 pps for each of the three flights and is shown in Fig. 4.

The buffer fullness plots, fine and rough, are derived from the buffer memory subtractor outputs of the data compressor. The subtractor output is a 10 bit word that is derived by taking the difference between the input word counter and output word counter of the buffer memory. For reasons of accuracy,

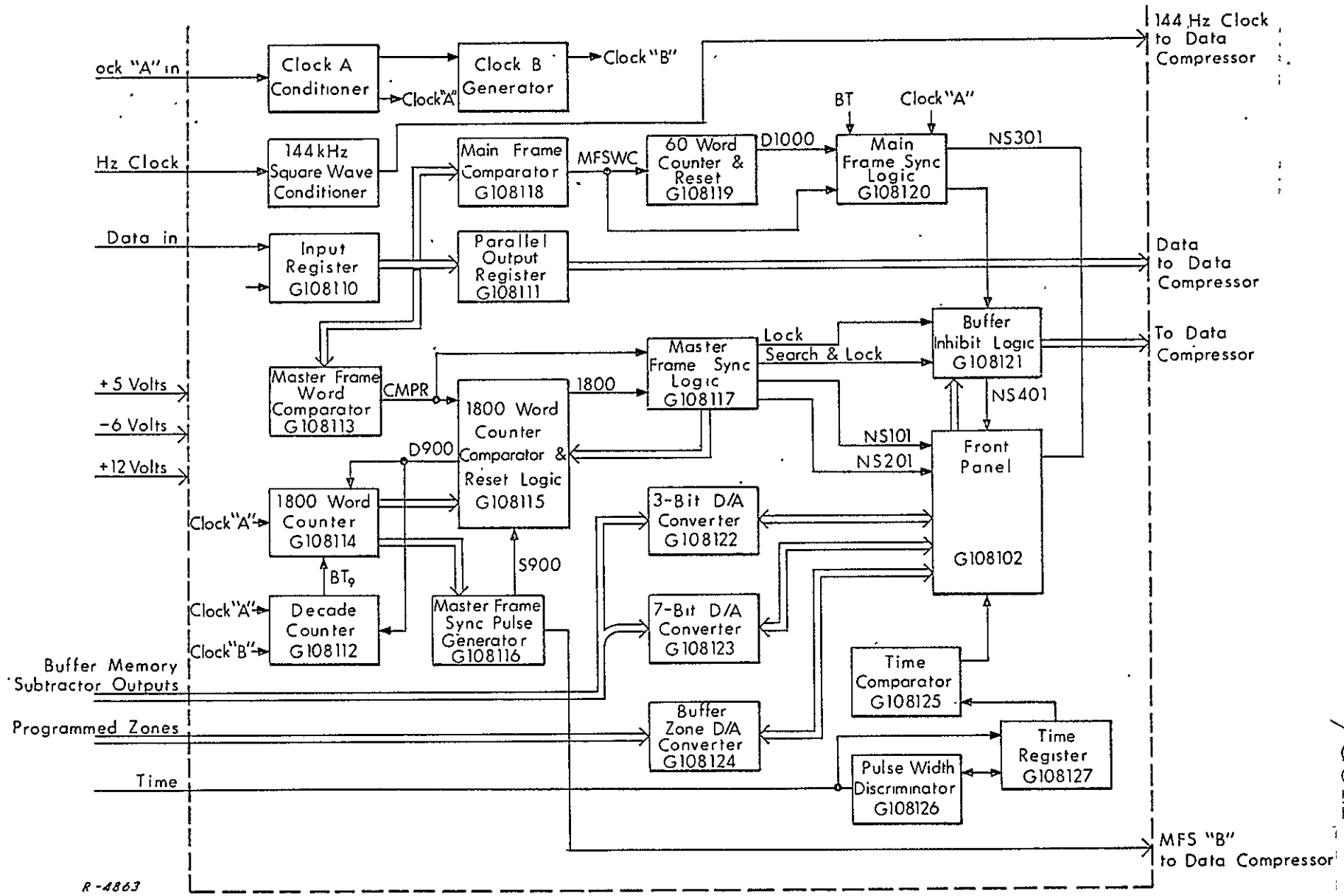


Fig. 2 Timing Data Formatting Control Logic Assembly Block Diagram

AD/COM

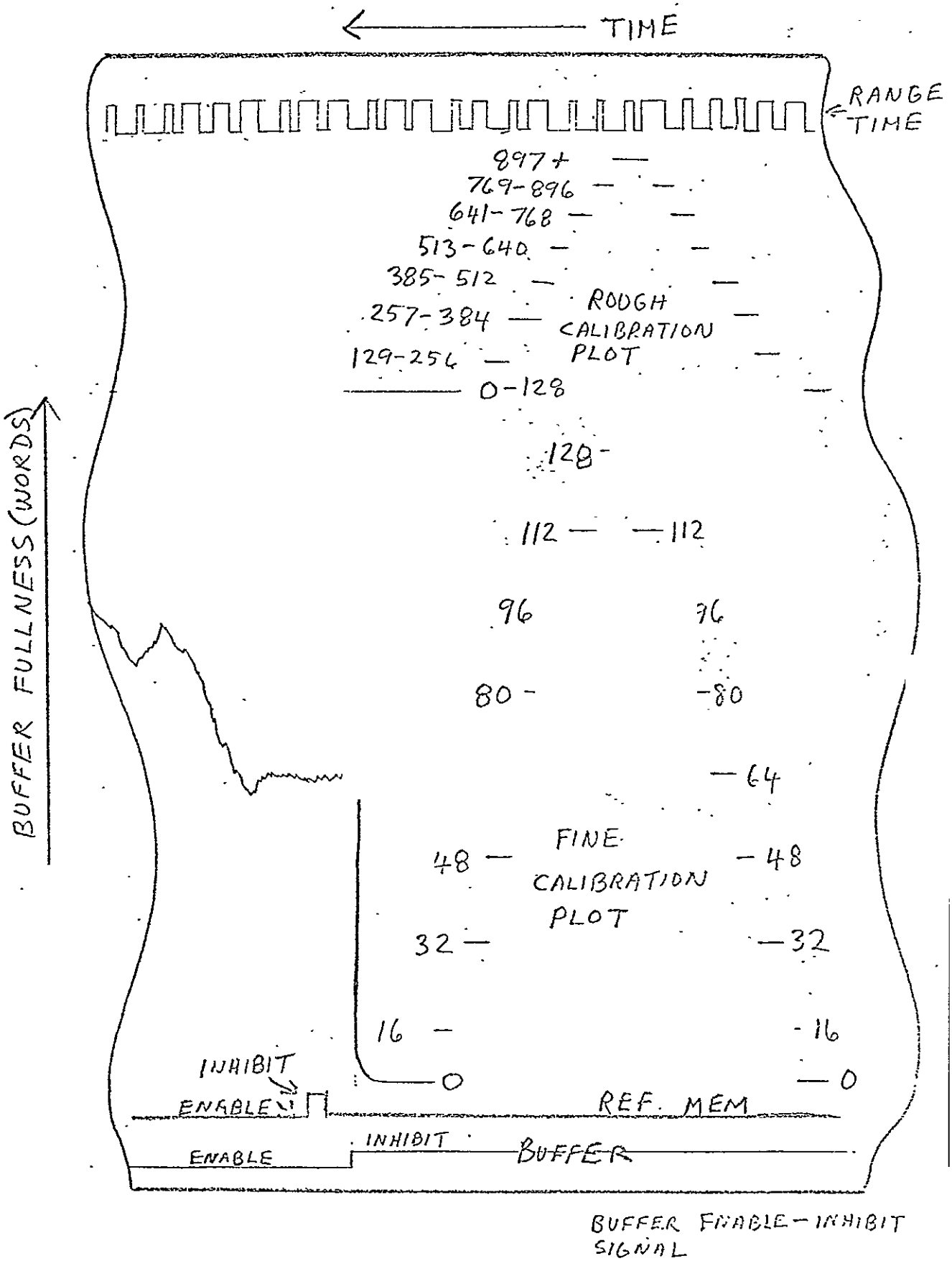


Fig. 3 Visicorder Record

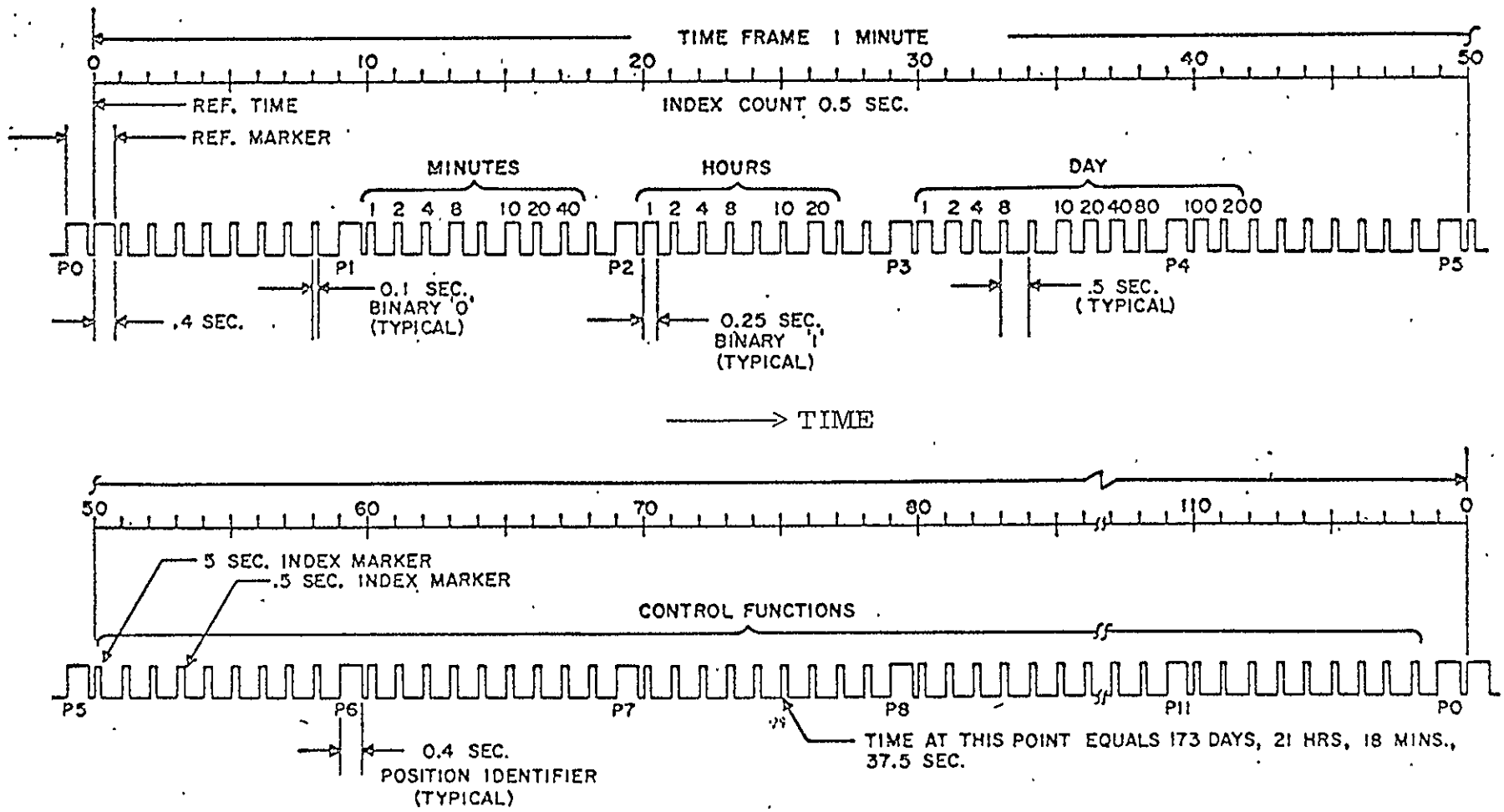


Fig. 4 IRIG Standard Time Code – Format "C" – 2pps Code

clarity, simplicity and resolutions, it was decided to take the 10-bit subtractor output and represent it by two individual plots. As a result, the three most significant bits and seven least significant bits were passed through D/A converters and plotted as the rough and fine buffer fullness plots respectively. Figure 4 shows the calibration steps for each plot as they occur on each of the visicorder recorders. The rough plot is in 128-word steps while the fine plot is in 16-word steps. The buffer can be read to within five words which provides an overall accuracy of 0.5% over the entire buffer fullness range.

The reference memory enable/inhibit signal controls reference memory updating ability. While in the inhibit mode, the reference memory is not updated; this "inhibit" mode occurs during in-flight calibrations of the telemetry system so as to prevent buffer fullness from going into saturation. In the enable mode, the reference memory is allowed to be updated by new data.

The buffer memory enable/inhibit signal controls the buffer memory status as far as accepting or rejecting significant data samples. The inhibit mode occurs when "no data," "loss of data," or "degenerate data" situations exist. This once again prevents buffer memory from overflowing as a result of noise being accepted. The inhibit mode is also utilized during the in-flight calibrations. The enable mode allows significant data to be transferred into the buffer memory resulting from reference memory updating.

1.3 Data Compressor Programming

Prior to system operation, the data compressor must be specifically programmed to handle each individual flight. This programming is accomplished through the Program Patch Assembly which is in addition to the internal programming of the data compressor (refer to Fig. 1). The Program Patch Assembly provides output bit rate programming, reference memory word group selection, and inputs to the control logic equations. All control parameters for the control logic equations are also wired to a patch board assembly located in

the rear of the chassis, making programming of the control logic equations quite accessible.

Internal programming of the data compressor consists of programming the discrete buffer fullness levels located on program cards 2AA and 2BB, plus P14 program connector programming for resetting the reference memory. An additional change to the data compressor also was incurred by disengaging the buffer memory magnetics portion for operational simplicity; only the counters and subtractor portion of the buffer memory are utilized.

To inhibit buffer memory and reference memory operations, additional programming was made to Boards PC-33 and PC4, respectively.

Channel information programming into the data compressor reference memory is accomplished by the program test fixture. In accordance with the particular PCM format and time slot, the proper tolerance, sample rate, priority assignment and address bit information is programmed in the reference memory.

The data compressor internal operations are monitored through the Data Compressor Test Point Panel. For detailed information with regards to these test points, data compressor programming, or compressor operations refer to Lockheed Document LMSC-8-30-65-4.

1.4 Data Presentation

For comparative analysis purposes, the data obtained from each of the various data runs were plotted in one of four different classes of curves. These curves are namely: open loop, tolerance control, priority assignment control and combination control curves. All values plotted in these curves are classified as either Type I or Type II and both values are tabulated in Appendix B for each run. The Type I value is defined as the number of data words or significant samples in the buffer at any instant of time and is referred to as "buffer

fullness" or "buffer queue length." The Type II value is defined as the number of words presented to the buffer over a certain interval of time. For this report, this value was integrated over a 0.5 second interval and is referred to as "input to buffer." Type II values are plotted for curves whose programs are identical to one another except for the variation of one control parameters. An example of this would be two test runs that are identical except for output bit rate. Type II values are plotted for curves whose programs are reasonably the same or identical but have at least two or more control parameters that vary simultaneously. The latter case allows observation of buffer fullness's behavior as a function of more than one data compressor control parameter.

The Type I value is measured directly from the visicorder record by adding the rough and fine buffer fullness plots together for a particular instant of time. The Type II values are obtained by adding the difference in buffer fullness (over a 0.5 second interval) to the word output rate per 0.5 second. This can best be stated by the following equation:

$$\text{Type II} = \text{IB} = (\text{BF}_{\text{at } t} - \text{BF}_{\text{at } t+0.5\,\text{sec}}) + \text{OW}$$

whereby

IB ≡ Input to buffer (words/ 0.5 sec) = Type II values

BF ≡ Buffer fullness (words)

OW ≡ Output words/ 0.5 sec

1.4.1 Open Loop Plots

Open loop curves are generated by plotting buffer fullness (in words) vs. range time. For the test program, these plots were generated for both the high- and low-activity periods of the flight. The purpose of these curves was tc determine the optimum data compressor output bit rate for a particular measurement program. The optimum output bit rate can be defined as that

which restricts the buffer fullness level from going into saturation or being emptied. Type I values are normally plotted for open loop curves due to the fact that the output bit rate is the only varying control parameter.

1.4.2 Tolerance Control Plots

Two types (Type I and Type II) of tolerance control curves are plotted to give different aspects on the affects of tolerance control on buffer fullness or queue length. Tolerance controls for all data runs were not activated until the buffer fullness reached the 128-word level.

Tolerance control curves (Type I) plots buffer fullness (in words) vs. range time at 0.5 second intervals. The tolerance control curves (Type II) plots "input words to buffer" (words/0.5 second) vs. range time.

1.4.3 Priority Assignment Control Plots

Priority control curves show the affect of buffer fullness as a function rejecting nonpriority data when the 128 word level of the buffer has been exceeded. Either buffer fullness (Type I) or "input words to buffer" (Type II) curves are plotted to show the effect of priority control.

1.4.4 Combination Control Plots

These curves show the affect on the buffer memory as a function of two or more buffer control parameters. All combination control curves are plotted as a function of "input to buffer" vs. "range time." These type curves allow test runs to be compared although they may have a completely different set of buffer control parameters.

1.5 Measurement Tolerance Assignments

The tolerance for each measurement in the composite PCM format must be programmed into the data compressor. These tolerance assignments are based upon transducer type and the accuracy required for understanding flight operational parameters.

Table 1 gives a listing of the different kinds of measurement for Flight #AS-202 and their associated codes, approximate percent of measurement list, and the percent of priority assignments for each measurement type. For each of the flights, the different types of measurements are summarized with a defined percentage of the measurement given a priority assignment in accordance with the percentages listed in Table 1.

Table 2 shows a listing of the various types of measurements and their prescribed tolerance assignments. In accordance with the work statement, each measurement has a minimum and maximum tolerance assignment specified by

Table 1

TYPES OF MEASUREMENTS

Measurement Code	Type of Measurement	≅ % of Measurement List	% Given a Priority Assignment
A	Acceleration	21.3	50
B	Acoustic	0.0	0
C	Temperature	32.8	10
D	Pressure	6.9	75
E	Vibration	0.0	0
F	Flow Rate	5.8	100
G	Position	5.2	80
H	Guidance & Control	21.3	50
J	RF & Telemetry	8.7	50
K	Signal	6.4	100
L	Liquid Level	0.0	0
M	Voltage Current	12.7	10
R	Angular Velocity	5.8	100
N	Miscellaneous		50

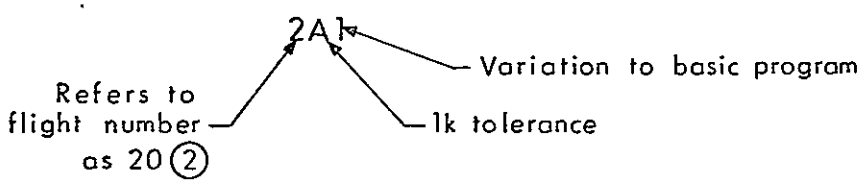
Table 2

MEASUREMENT TOLERANCE ASSIGNMENTS

Type of Measurement	Program A (1K Values Specified By the Work Statement)	Program B (4K Values Specified By the Work Statement)
A, H	±0.1%	±0.78%
B, E	±1.56%	±6.4%
C	±1.56%	±6.4%
D	±0.78%	±3.2%
F	±0.1%	±0.78%
G	±0.78%	±3.2%
J	±0.1%	±0.78%
K	Accept All Essential Samples	±0.1%
L	±1.56%	±6.4%
M	±1.56%	±6.4%
R	±0.1%	±0.78%

4K and 1K, respectively. For this test program, Program 1K will be designated as Program A and Program 4K will be designated as Program B. This change in terminology permits a larger number of test conditions to be investigated. An example of this would be to make test runs of 1K, 2K and 4K on Programs 2A1 and 2B1. Another reason for having Programs A and B comes primarily from the fact that the measurements programmed in with a ±0.1% tolerance accuracy cannot be changed by the tolerance control parameters of the data compressor. This is an inherent characteristic of the data compressor. Thus the required 4K program as specified by the work statement calls for manual reprogramming of the data compressor.

It is noted that Tables 1 and 2 provide a good set of ground rules for programming data channels into the data compressor. However, these rules cannot be fully incorporated into all flights because of buffer memory saturation. To obtain meaningful results on certain data runs, it was necessary to reject several data channels from the basic program. Data channel programming details for each flight are contained in the tables in Appendix A. Table 3 shows a typical listing giving the Frame, Multiplexer, Channel, Group, Stored Address Bit, Priority Assignment, Program A Tolerance Assignment, Program B Tolerance Assignments and program for each data channel. Variations made to the basic A and B programs are specified in the column called "Prog." Programs described by 2A1, 2A2, 3A1, 3B1, etc., can be broken down into the following:



Each of these numbers pertain to a particular test program which is defined on the test program sheet of each flight.

Table 3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. _____ Vehicle No. _____ Sheet 1 of 1

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority			Prog.

TEST PROGRAM OPERATIONS

2.1 Flight AS-202 Tests

Saturn PCM telemetry data from Flight AS-202 Instrumentation Unit was played back from an instrumentation tape, and processed by the zero order predictor Saturn PCM telemetry data compressor. Before data processing could be initiated, the data channel information (priority, tolerance) for Flight AS-203 was manually programmed in the data compressor in accordance with the program described in Table A.1 of Appendix A. In Table A.1, the Frame, Multiplexer, Channel Group, Stored Address Bit, Priority, Program A, Program B and Prog. are described for each data channel. All programs called out in this table are described in detail in Table 4. Any data channel with a particular program called out in its "Prog." column is programmed for rejection for that particular program. For instance, Channel 7B has 2A2 and 2B2 written in the "Prog." column which means that this channel was programmed for rejection for Programs 2A2 and 2B2. Table 4 also lists the number of significant samples presented to the data compressor per second for each of the test programs.

Table 5 gives a complete list of data runs made for Flight AS-202. For each data run the table gives the Visicorder Speed, Time Interval, Data Compressor Output Bit Rate, Programmed Used, Tolerance, Priority Utilized or not, Calibration Included or not, Word Force Level of buffer memory, Figure on which the curve is plotted and finally comments. It should be noted again that no plots were generated from data runs recorded at the 0.2-ips visicorder speed. These runs were made primarily to determine near optimum data compressor parameters and also to verify certain selected programs.

It should also be pointed out that when in-flight calibrations are included in the run, they do not necessarily contribute the buffer fullness for that particular

Table 4

PROGRAMS FOR FLIGHT AS-202

Program	Description	Time Slots Processed By Data Compressor Per Second
2A1	See Table 2 (This program reflects the 1K tolerances assigned to the parameters specified by the work statement)	4992 Words/Sec
2A2	Same as Program 2A1 except that the following channels were rejected Frame 1: 5A, 7B, 11A, 11B, 12A, 12B, 13A, 14B, 15B, 16B, 18A, 18B, 20A, 22A, 25A, 26A, 27A Frame 2: 17A, 19B Frame 3: 17A, 19B Frame 6: 17A Frame 7: 17A Frame 8: 6B, 17A, 19B Frame 9: 2B, 6B, 19B Frame 10: 2B, 6B	2784 Words/Sec
2A3	Same as Program 2A2 except channels 7B, 13A and 19A of Frame 1 were programmed for acceptance	3144 Words/Sec
2B1	See Table 2 (This program reflects the 4K tolerances assigned to the parameters specified by the work statement)	4992 Words/Sec
2B2	Same as Program 2B1 except that the data channels rejected in Program 2A2 were rejected here	2784 Words/Sec
2B3	Same as Program 2B2 except channels 7B, 13A, and 19A of Frame 1 were programmed for acceptance	3144 Words/Sec

Table 5 (Sheet 1 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-202

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
202-1	0.2	17:18:20 — 17:18:20	36	2A1	1K	NO	NO	3	—	SATURATION
202-2	"	"	"	"	4K	"	"	"	—	SATURATION
202-3	"	"	12.0	2A2	1K	"	"	"	—	OPTIMUM OUTPUT RATE FOR PROGRAM 2A2
202-4	1.0	17:15:30 — 17:15:44	10.3	"	"	"	"	"	5	SATURATION
202-5	1.0	"	12.0	"	"	"	"	"	5	OPTIMUM OUTPUT RATE FOR LAUNCH PHASE
202-6	1.0	"	14.4	"	"	"	"	"	5	OUTPUT RATE TOO HIGH
202-7	1.0	"	18.0	2A3	"	"	"	"	6	OPTIMUM OUTPUT RATE FOR PROGRAM 2A3
202-8	1.0	"	14.4	"	"	"	"	"	6	SATURATION
202-9	1.0	"	24.0	"	"	"	"	"	6	OUTPUT BIT RATE IS TOO HIGH
202-10	1.0	"	12.0	2A2	"	"	"	"	9, 10	GOOD TOLERANCE CONTROL PLOTS
202-11	1.0	"	"	"	2K	"	"	"	9, 10	
202-12	1.0	"	"	"	4K	"	"	"	9, 10	
202-13	1.0	"	"	"	1K	YES >128	"	"	14	PRIORITY ASSIGNMENT CONTROL PLOTS
202-14	1.0	"	"	"	2K	"	"	"	14	
202-15	1.0	"	"	"	4K	"	"	"	14	
202-16	0.2	17:15:20 — 17:18:20	18.0	2B1	1K	NO	YES	"	—	SATURATION DURING HIGH ACTIVITY PERIODS
202-17	"	"	24.0	"	"	"	"	"	—	OUTPUT BIT RATE IS TOO HIGH
202-18	"	"	18.0	"	4K	"	"	"	—	NO SATURATION
202-19	1.0	17:15:30 — 17:15:44	"	"	"	"	"	"	11	

Table 5 (Sheet 2 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-202

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
202-20	1.0	17:15:30 — 17:15:44	18.0	2B1	2K	NO	YES	3	11	GOOD DATA
202-21	"	"	"	"	1K	"	"	"	11	SATURATION
202-22	"	"	"	"	1K	YES >128	"	"	15	GOOD DATA PLOTTED ON A PRIORITY ASSIGN.
202-23	"	"	12.0	"	1K	"	"	"	15, 16	CONTROL PLOT
202-24	"	"	"	"	2K	"	"	"	20, 16	GOOD DATA PLOTTED ON COMBINATION
202-25	"	"	10.3	"	"	"	"	"	20	CONTROL PLOT
202-26	"	17:17:40 — 17:17:54	"	"	1K	NO	NO	"	13	GOOD PLOTS OF LOW ACTIVITY PERIOD
202-27	"	"	"	"	2K	"	"	"	13	
202-28	"	"	"	"	4K	"	"	"	13	
202-29	"	17:15:30 — 17:15:44	5.54	2B2	1K	"	"	"	7	OPTIMUM OUTPUT RATE FOR PROGRAM 2B2
202-30	"	"	5.14	"	1K	"	"	"	7	SATURATION
202-31	"	"	6.0	"	"	"	"	"	7	GOOD DATA
202-32	"	"	6.55	"	"	"	"	"	7, 18	GOOD DATA
202-33	"	"	5.54	"	2K	"	"	"	18	
202-34	"	"	"	"	1K	YES >128	"	"	17	
202-35	"	"	4.8	"	2K	"	"	"	17	
202-36	"	17:17:40 — 17:17:54	"	"	1K	NO	"	"	19	LOW ACTIVITY PERIOD -- COMBINATION
202-37	"	"	"	"	2K	"	"	"	19	CONTROL PLOT
202-38	"	"	4.24	"	"	"	"	"	19	

Table 5 (Sheet 3 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-202

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
202-39	0.2	17:15:20 – 17:18:20	5.54	2B2	1K	NO	YES	3	—	
202-40	"	"	"	"	"	"	NO	"	—	
202-41	1.0	17:15:30 – 17:15:44	12.0	2B3	"	"	"	"	12	
202-42	"	"	10.3	"	"	"	"	"	—	
202-43	"	"	12.0	"	2K	"	"	"	12	
202-44	"	"	"	"	4K	"	"	"	12	
202-45	"	"	10.3	"	"	"	"	"	—	
202-46	"	17:17:40 – 17:17:54	4.8	2B2	1K	"	"	"	8	
202-47	"	"	5.14	"	"	"	"	"	8	
202-48	"	"	"	"	"	"	"	64	—	
202-49	"	"	5.54	"	"	"	"	"	—	
202-50	"	"	6.0	"	"	"	"	"	—	
202-51	"	"	12.0	2B1	"	"	"	"	—	
202-52	"	"	14.4	"	"	"	"	"	—	
202-53	"	"	10.3	"	"	"	"	"	—	
202-54	0.2	17:15:20 – 17:18:20	18.0	2B2	"	"	"	3	—	

AD/COM.

run. For instance all curves plotted on the launch period do not include bration words because calibration words occur later in the run. It is the intent of this section of the report to present the plotted data runs with all analysis reserved for the analysis section of this report.

2.1.1 Open Loop Plots

Program 2A1 was first attempted with the data compressor output bit rate set at 36 Kbps. The visicorder records showed that for Runs #202-1 and #202-2 the buffer fullness went into saturation for the entire flight. Program 2A2 was then programmed into the data compressor and open loop Runs #202-4, #202-5, and #202-6 were made with Run #202-5 (12 Kbps) being optimum as is shown in Fig. 5.

Program 2A3 is the same as Program 2A2 except that three channels of data (at 120 sps) were programmed for acceptance into the data compressor. Runs #202-7, #202-8 and #202-9 were made and plotted in Fig. 6. Run #202-7 with an output bit rate of 18 Kbps was optimum. From Table B-1 in Appendix B the "input words to the buffer" was compared for Run #202-5 and #202-7. The results showed that Run #202-7 accepts approximately 360 more words a second than does Run #202-5 which is expected.

Figure 7 shows open loop plots of Runs #202-29, #202-30, #202-31 and #202-32 for Program 2B2. Run #202-29 with an output bit rate of 5.54 Kbps appears to be optimum reaching a buffer fullness of 600 words. Run #202-39 was made at a visicorder speed of 0.2 ips and gives a look at the entire flight for Program 2B2, 1K tolerance and an output bit rate of 5.54 Kbps.

Figure 8 shows a plot of Runs #202-46 and #202-47 which were run for Program 2B2 and the selected low activity period. This is a Type II plot which plots "input to buffer" vs. "range time.

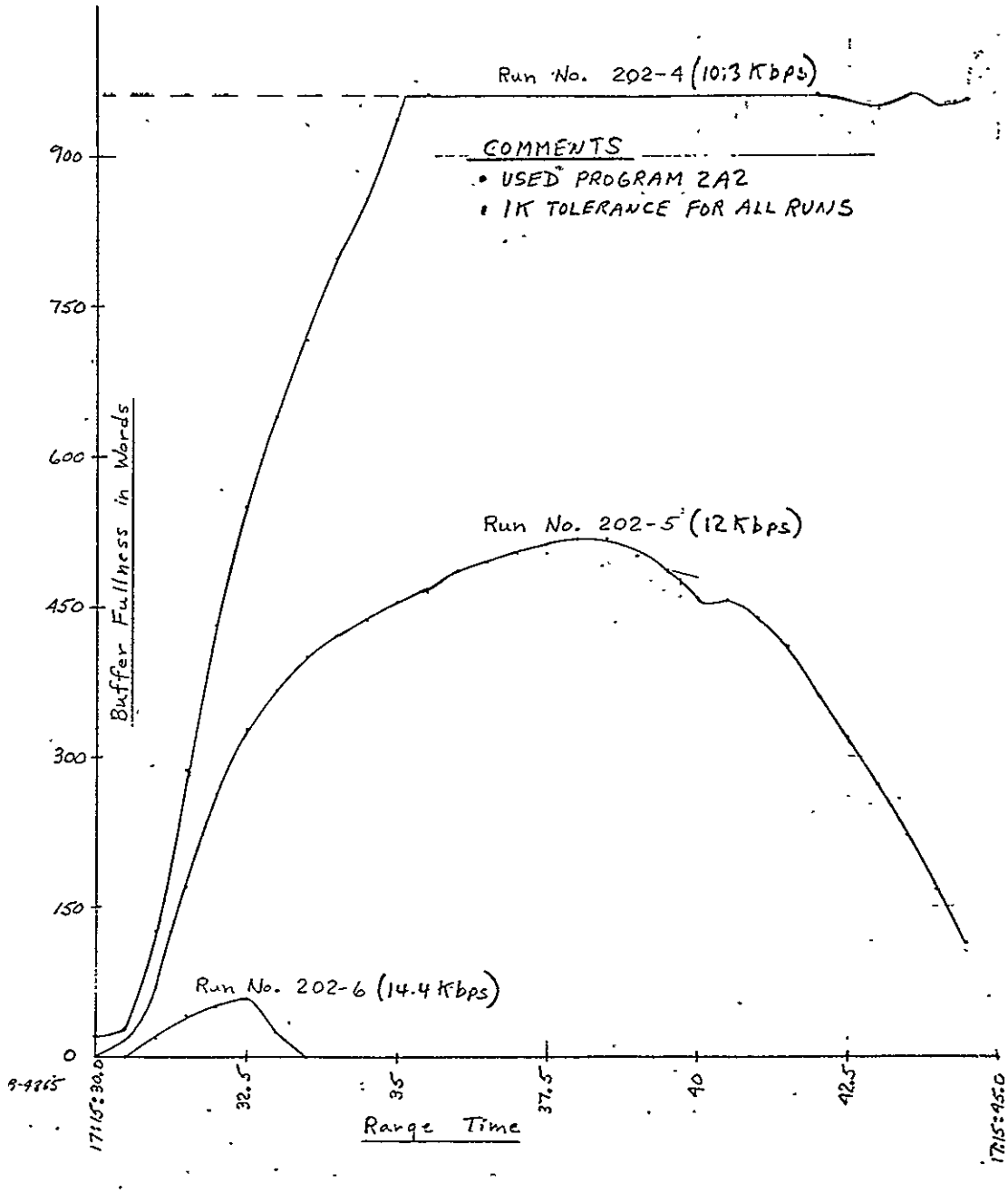


Fig. 5 Open Loop Plots (Type I) – Runs #202-4, #202-5 & #202-6

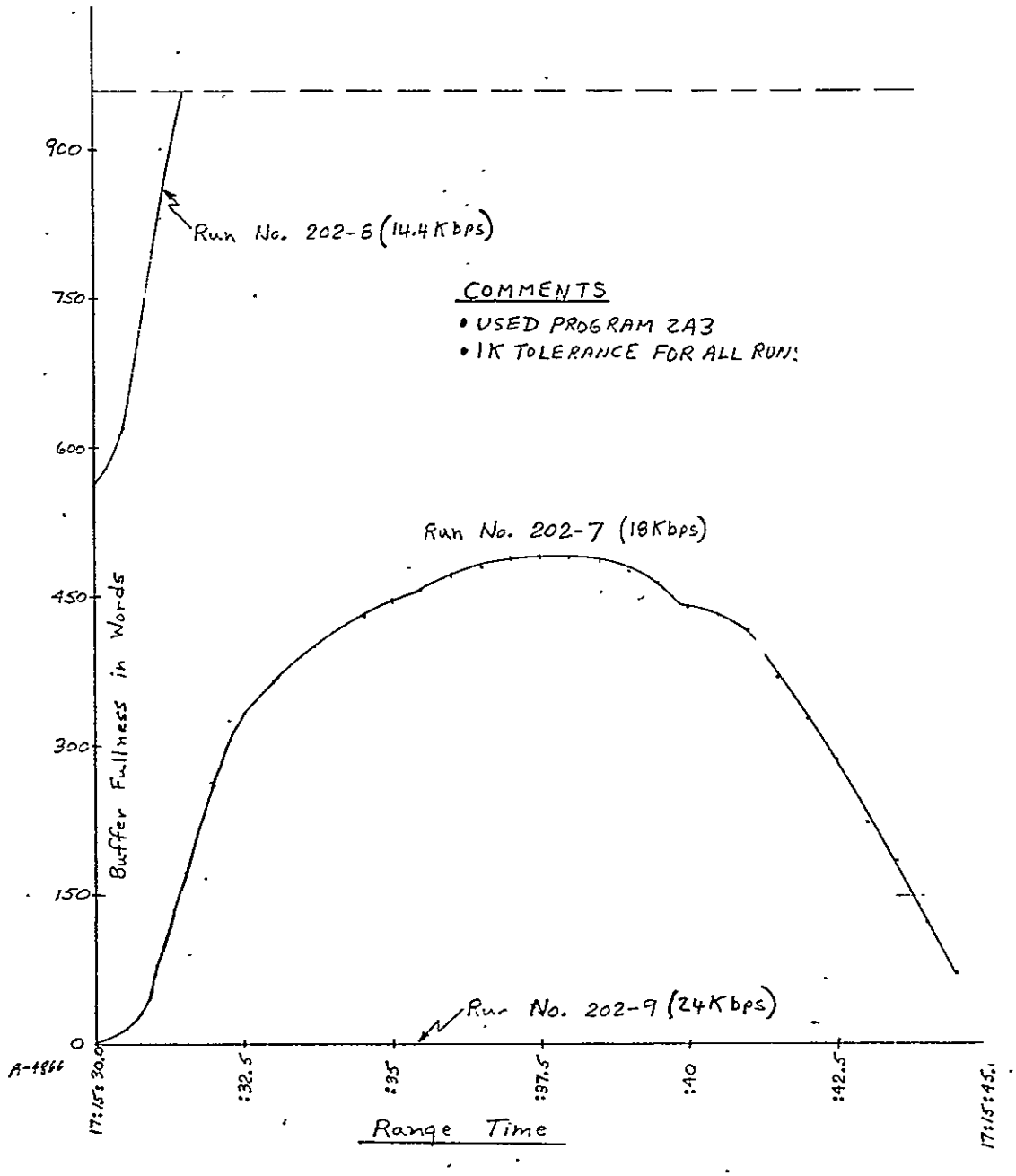


Fig. 6 Open Loop Plots (Type I) – Runs #202-7, #202-8 & #202-9

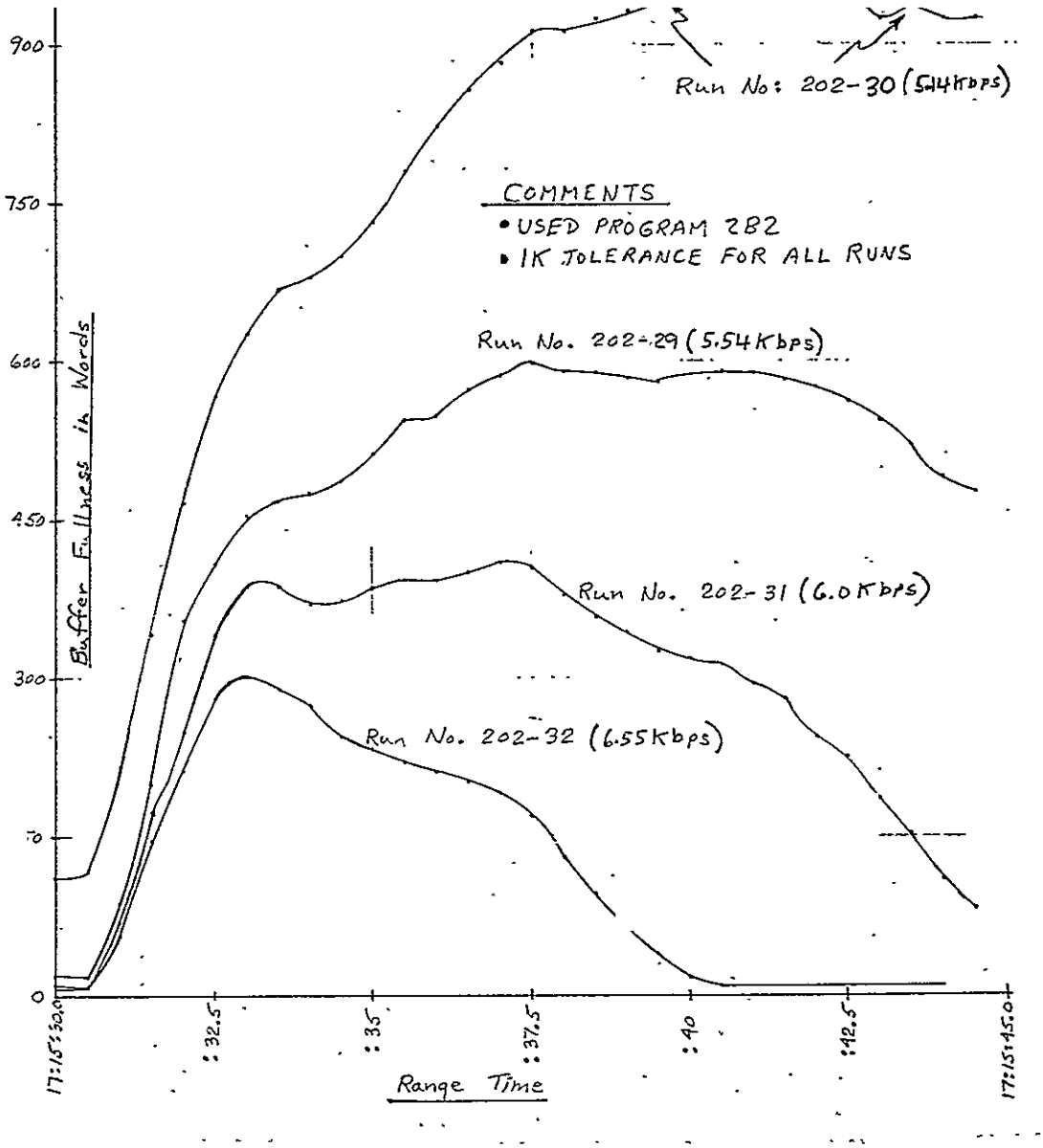


Fig. 7 Open Loop Plots (Type I) – Runs #202-29, #202-30, #202-31 & #202-32

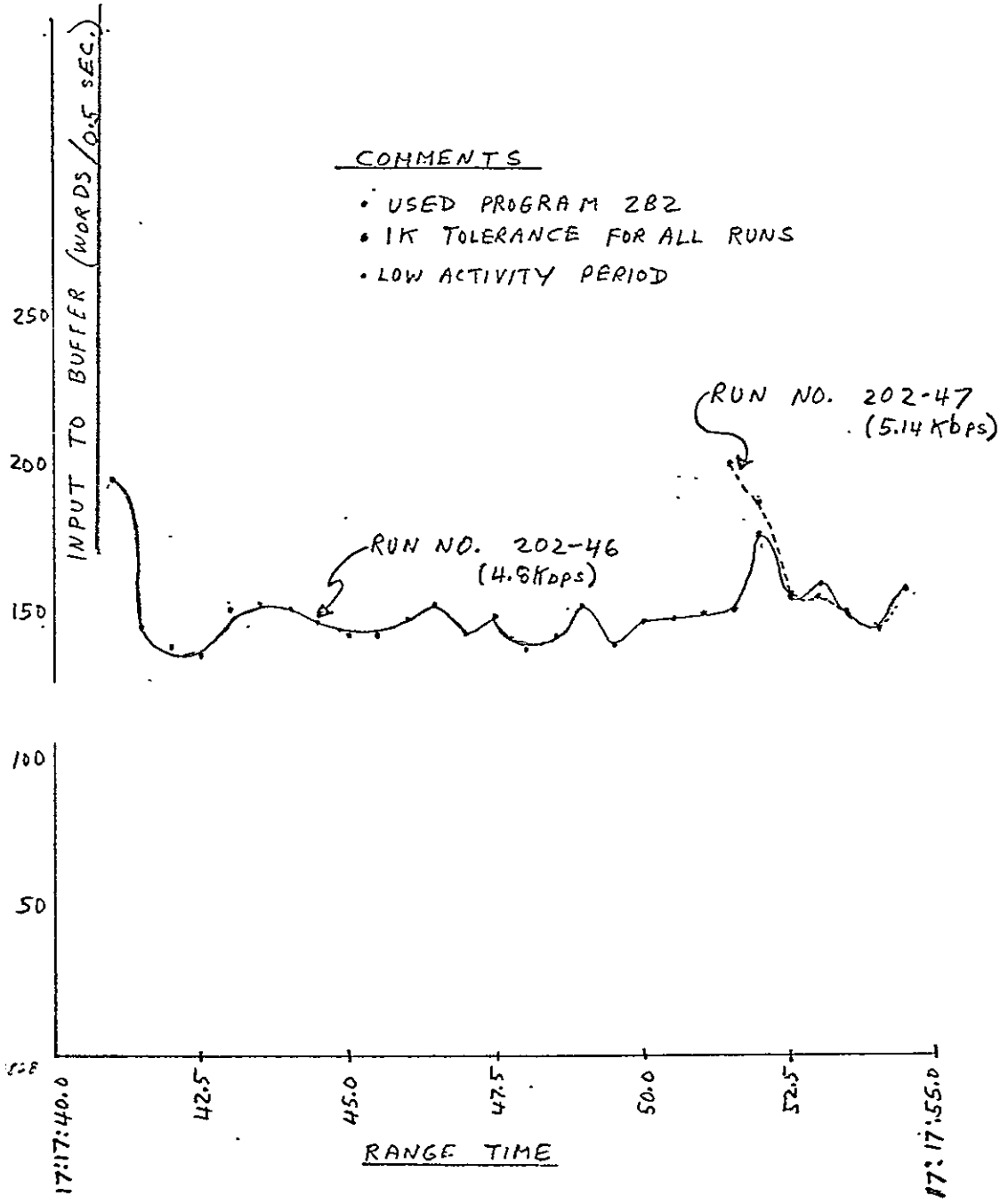


Fig. 8 Open Loop Plots (Type II) – Runs #202-46 & #202-47

2.1.2 Tolerance Control Plots

Figure 9 shows tolerance control plots of Runs #202-10, #202-11 and #202-12 for tolerances of 1K, 2K and 4K, respectively. Tolerance control appeared to have more effect going from the 1K to 2K controls in relation to going from the 2K to 4K controls. Figure 10 is a Type II plot of the same Runs #202-10, #202-11, and #202-12 which plots input words vs. range time. The crossovers of the curves in Fig. 10 can be attributed to inaccuracies in measuring the visicorder records along the time axis.

For Program 2B1, tolerance control plots (Type I) were made from Runs #202-19, #202-20, and #202-21 for tolerance of 1K, 2K and 4K, respectively, and are shown in Fig. 11. The output bit rate was 18 Kbps with good control over buffer queue length being quite apparent. Figure 12 shows a plot of Runs #202-41, #202-43, and #202-44 for tolerances of 1K, 2K, and 4K, respectively, for Program 2B3. All plots in Figs. 11 and 12 are generated from identical programs except that the guidance and control measurements have been rejected for Program 2B3.

Utilizing Program 2B1, Fig. 13 shows plots generated from Runs #202-26, and #202-27, and #202-28 for tolerances of 1K, 2K and 4K, respectively. These are Type I curves plotted for the low activity period.

2.1.3 Priority Assignment Control Plots

For all priority assignment control plots, the control goes into effect when the buffer reaches or exceeds the 128-word buffer level. Figure 14 shows a plot of Runs #202-13, #202-14, and #202-15 for Program 2A2.

Figure 15 shows a plot of Runs #202-22 and #202-23 for Program 2B1. These are Type II plots which plot input to buffer vs. range time.

2.1.4 Combination Control Plots

In Fig. 16, Runs #202-23 (1K to 1) and #202-24 (2K tol.) are plotted with all nonpriority data being rejected at the 128 word level. These are Type I

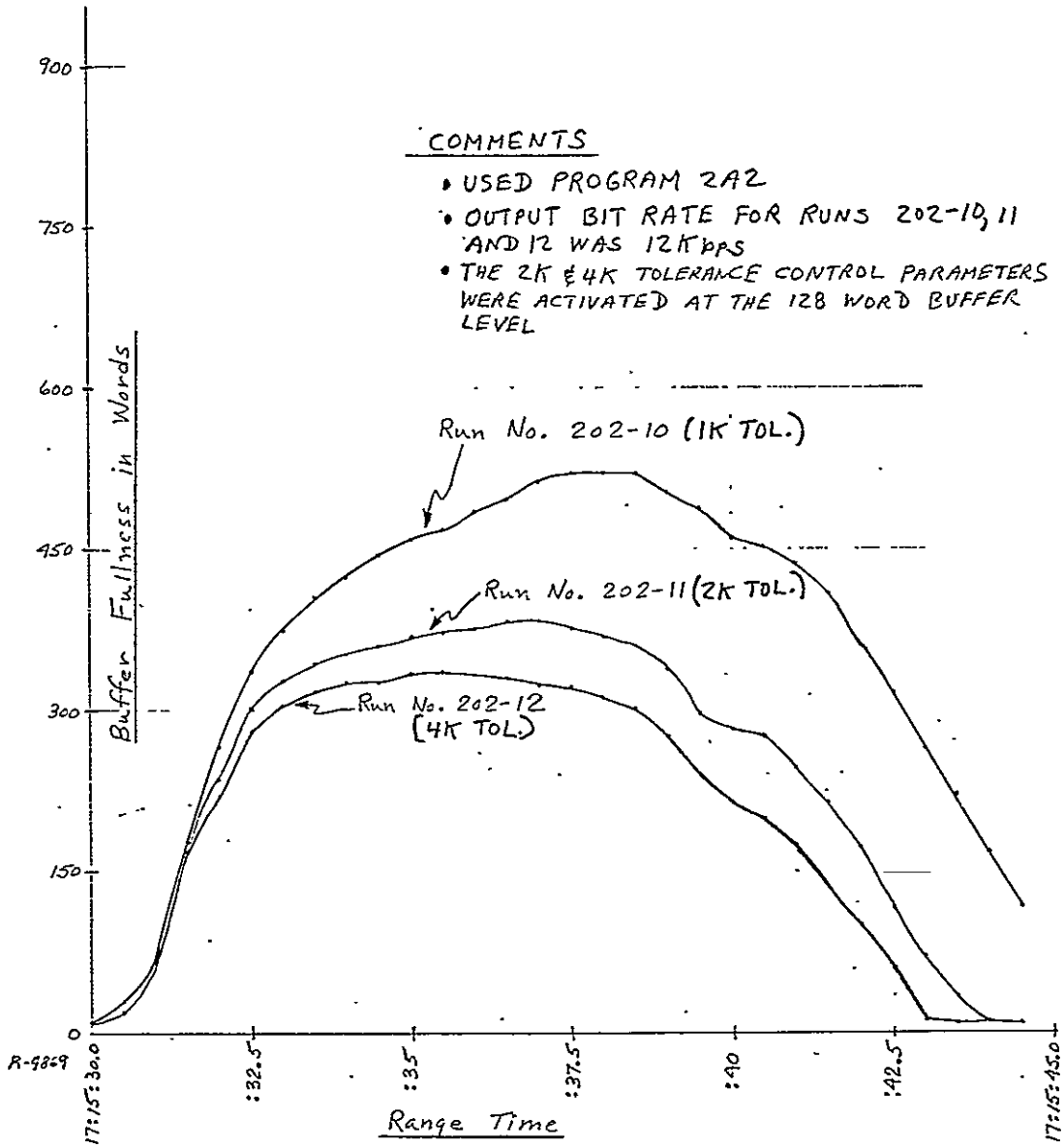


Fig. 9 Tolerance Control Plots (Type I) – Runs #202-10, #202-11 & #202-12

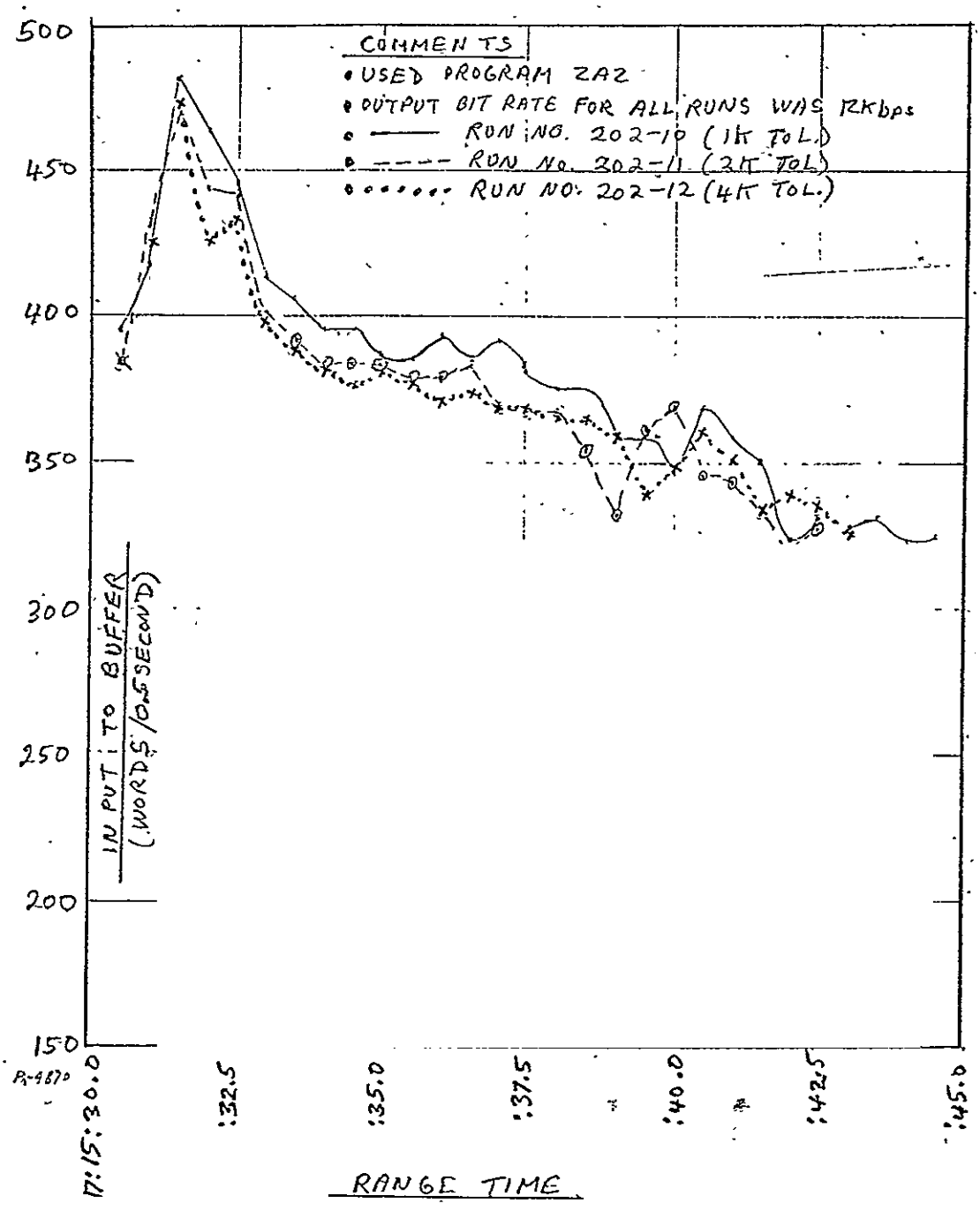


Fig. 10 Tolerance Control Plots (Type II) – Runs #202-10, #202-11 & #202-12

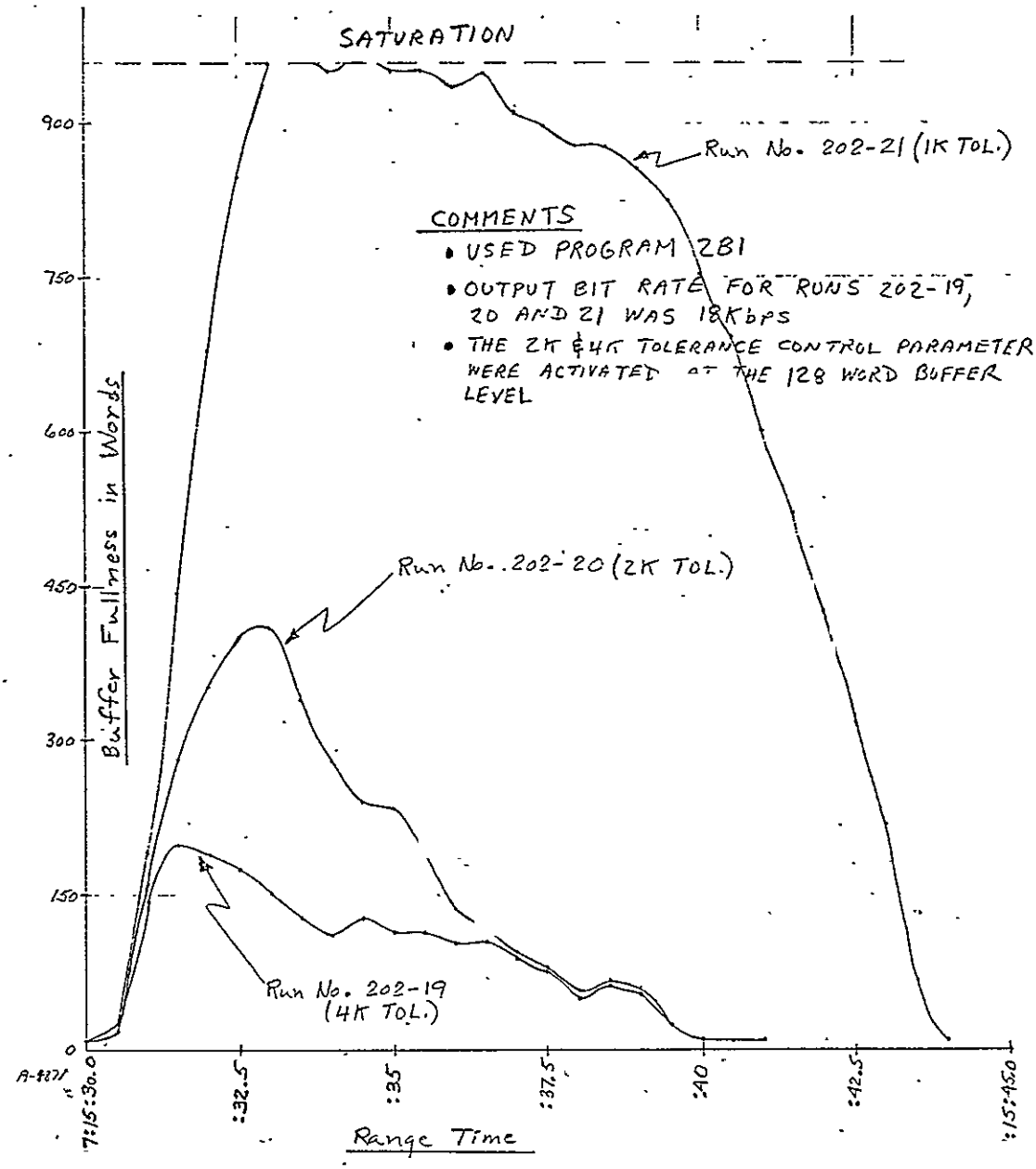


Fig. 11 Tolerance Control Plots (Type I) – Runs #202-19, #202-20 & #202-21

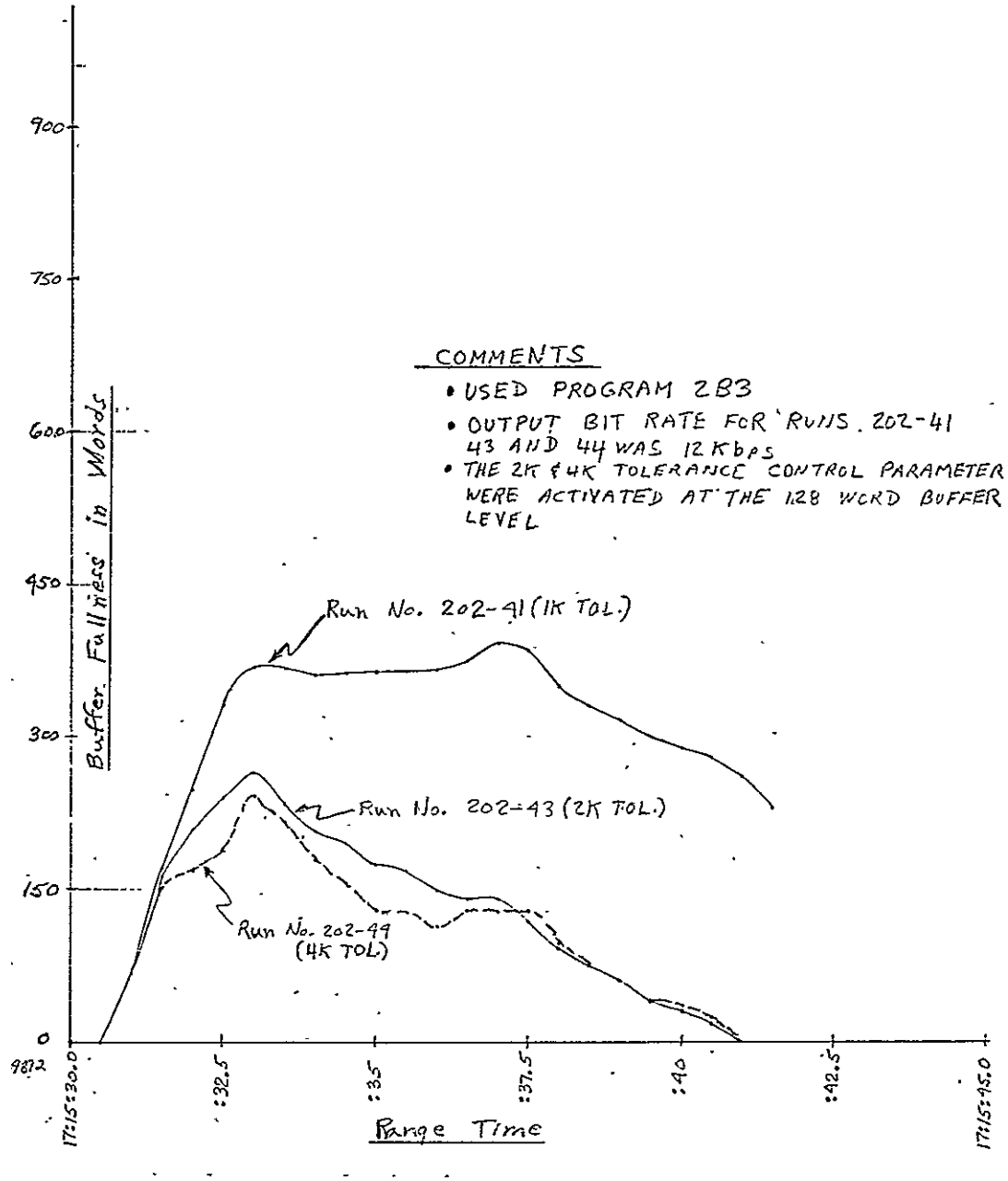


Fig. 12 Tolerance Control Plots (Type I) – Runs #202-41, #202-43 & #202-44

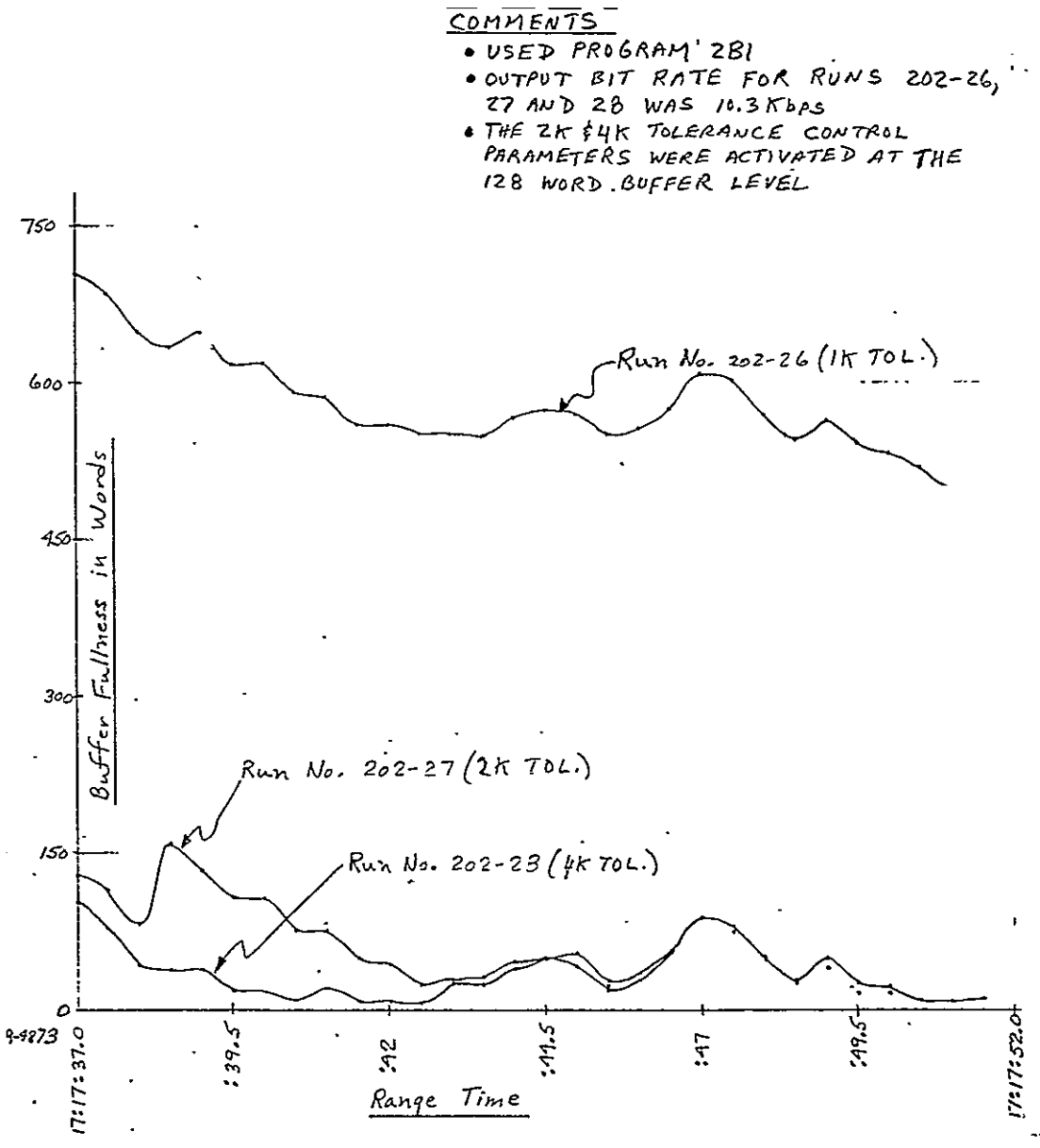


Fig. 13 Tolerance Control Plots (Type I) – Runs #202-26, #202-27 & #202-28

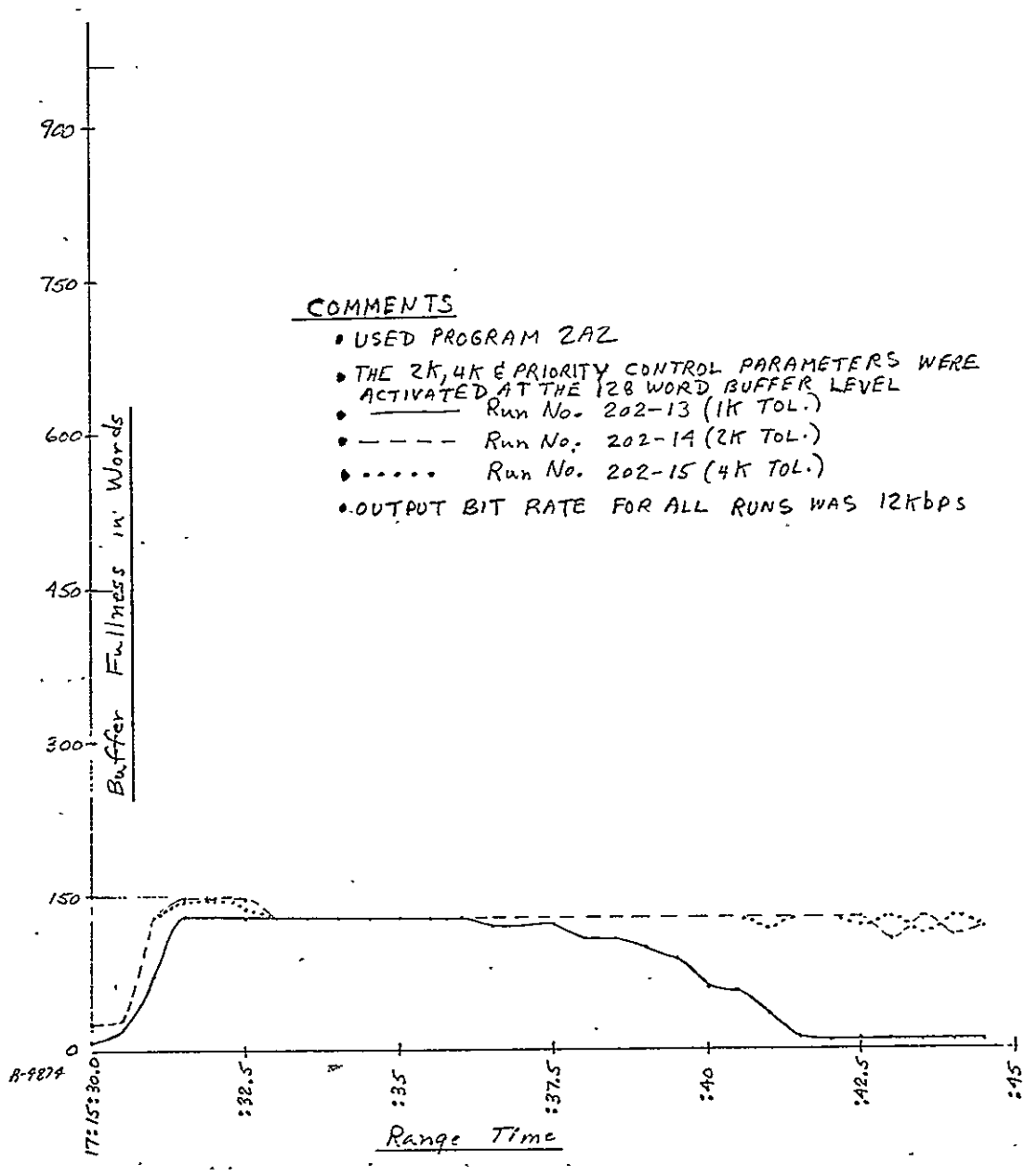
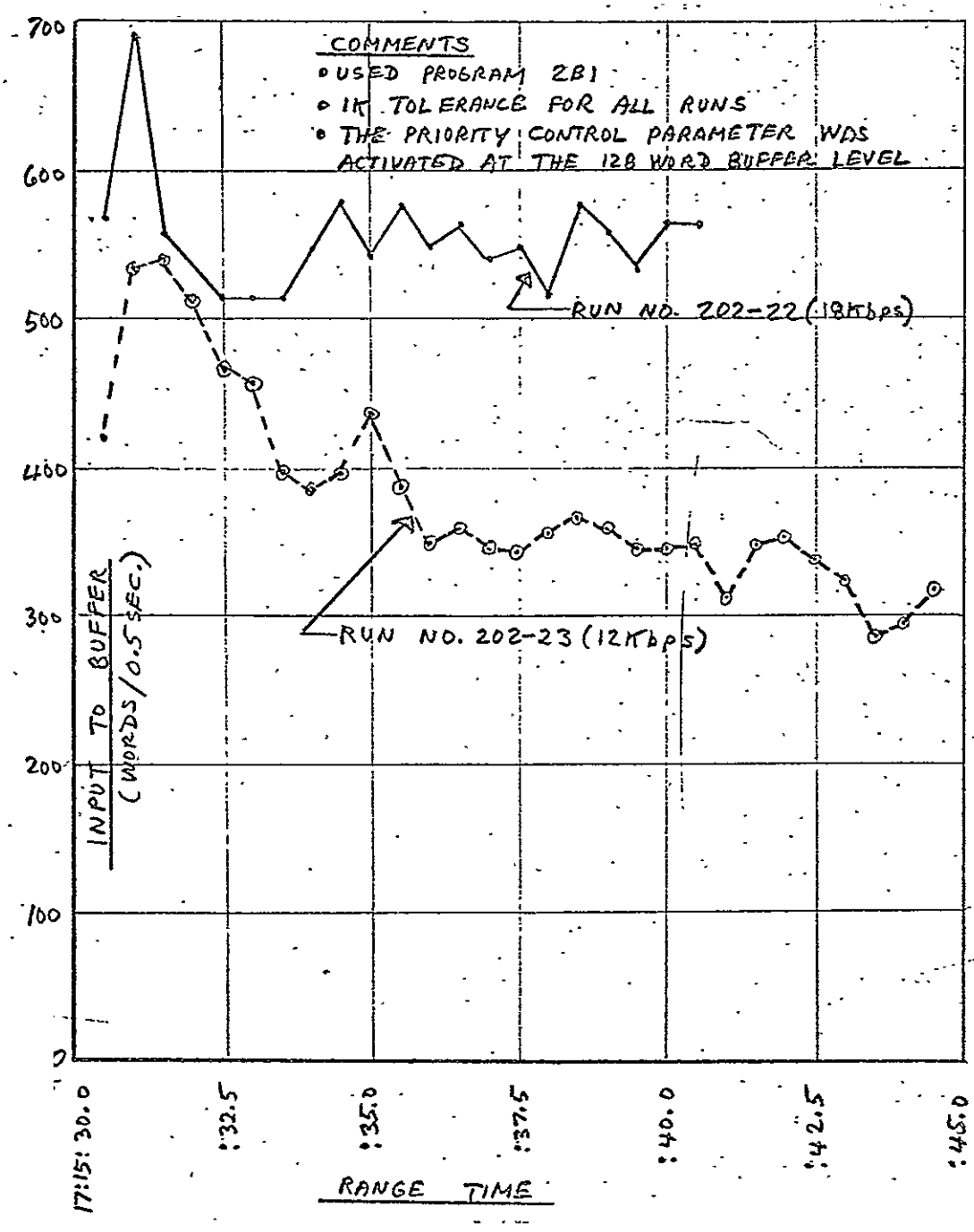


Fig. 14 Priority Assignment Control Plots (Type I) – Runs #202-13, #202-14 & #202-15



Priority Assignment Control Plots (Type II) – Runs #202-23 & #202-24

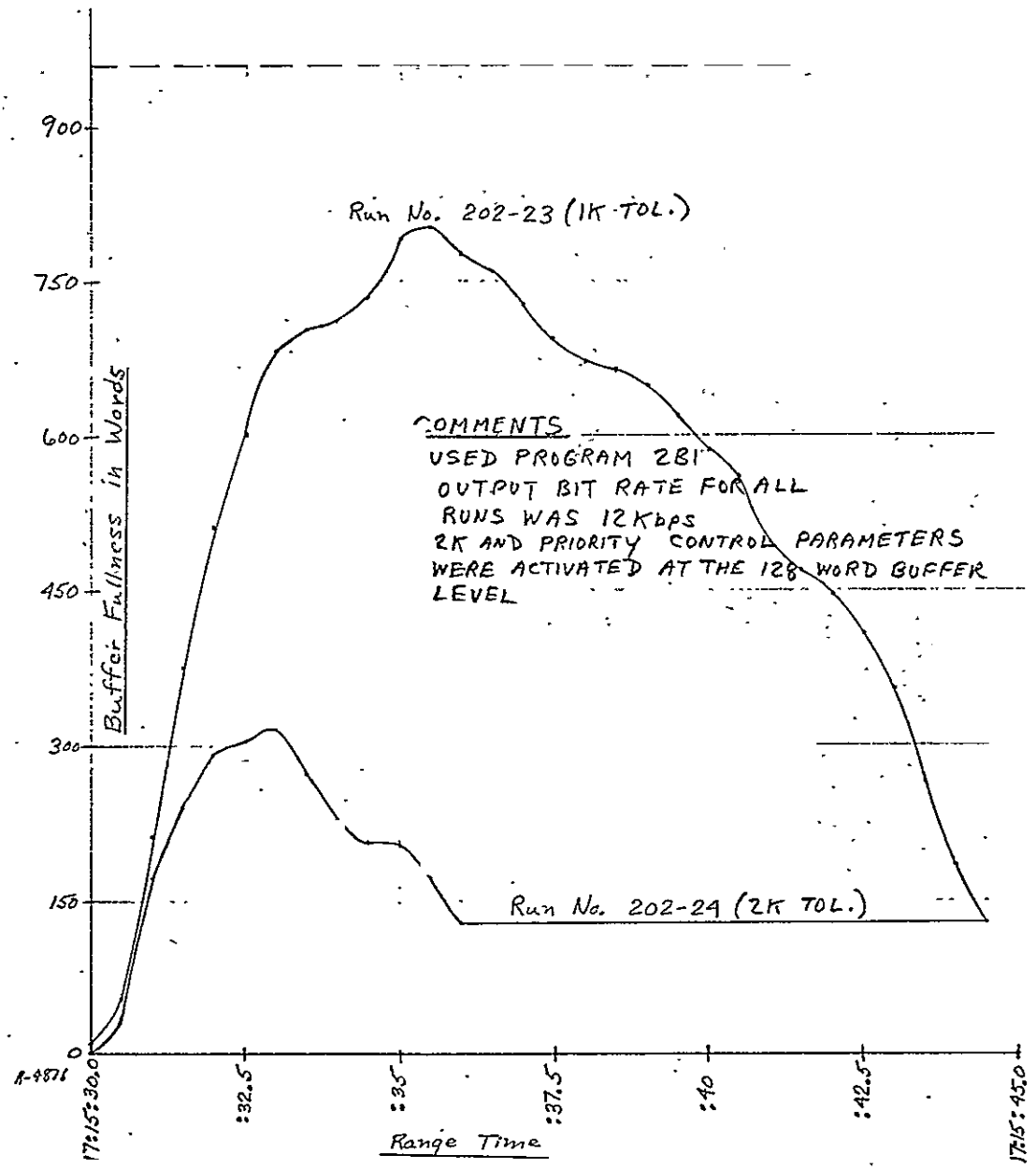


Fig. 16 Combination Control Plots (Type I) – Runs #202-22 & #202-23

curves which show that buffer queue length can be quite effectively controlled by both priority and tolerance controls.

Figure 17 shows a combination plot of different output bit rates and tolerances plus priority assignment utilization. In this figure, Runs #202-34 and #202-35 are plotted for Program 2B2.

Runs #202-32 and #202-33 are plotted in Fig. 18 showing the effects of both tolerance and priority control. These plots are Type II curves and were run on Program 2B2.

Figures 19 and 20 are Type II plots of combinations of different output bit rates and tolerance controls. Figure 19 shows plots of Runs #202-36, #202-37, and #202-38 while Fig. 20 shows plots of Runs #202-24 and #202-25.

2.2 Flight AS-203 Tests

Saturn PCM telemetry data from Flight AS-203 Instrumentation Unit was played back from an instrumentation tape and processed by a zero-order predictor Saturn PCM telemetry data compressor. The tests on this flight were broken down into verification tests and flight tests and are listed in Table 6. In Table 6, Runs #203-1 through #203-9 are classified as verification test because their purpose is to verify that the electronic playback system was properly operating. Verification was accomplished by programming the data channel information into the data compressor as specified by Program A in Table A.2 of Appendix A and then making the data runs. Program A was the identical program used for the generation of data runs for the first G-108 preliminary report. In comparing data Runs #203-1 through #203-9 with previous G-108 data runs, a good comparison was obtained thus verifying that the system was in good operational order.

For further verification, two other instrumentation tapes obtained from different tracking stations and each containing the same PCM data, were also run and compared, with good results.

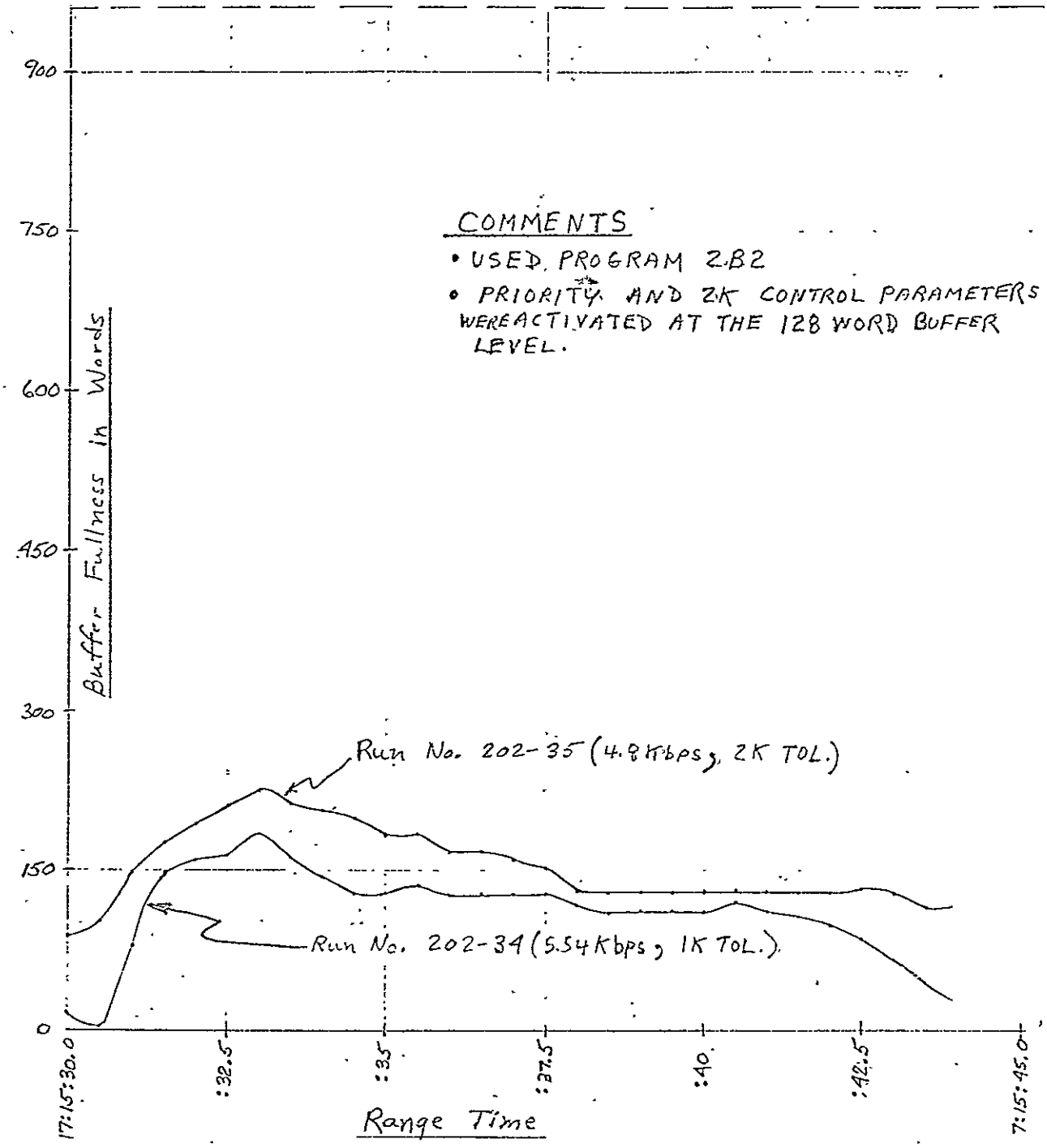


Fig. 17 Combination Control Plots (Type I) – Runs #202-34 & #202-35

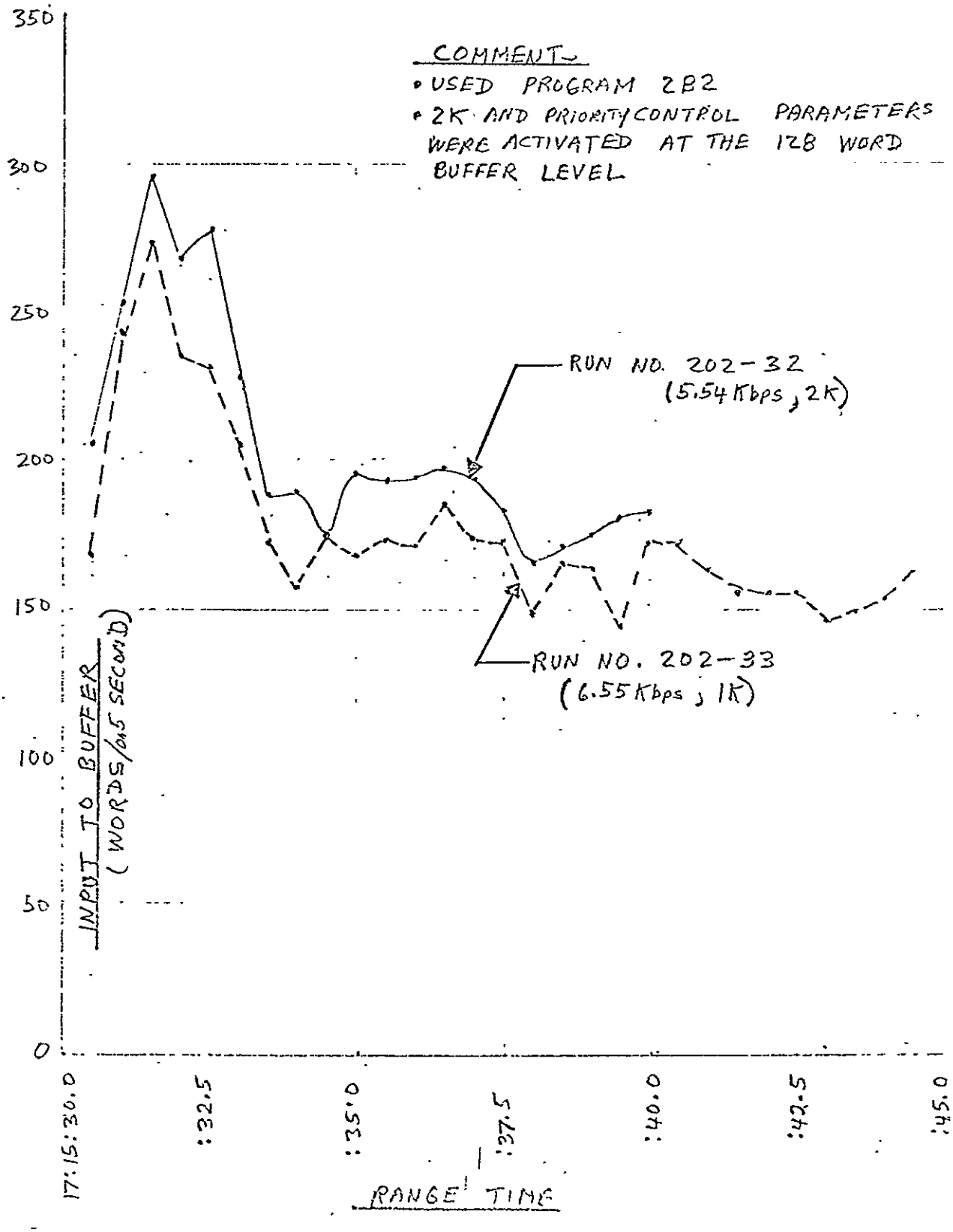


Fig. 18 Combination Control Plots (Type II) – Runs #202-32 & #202-33

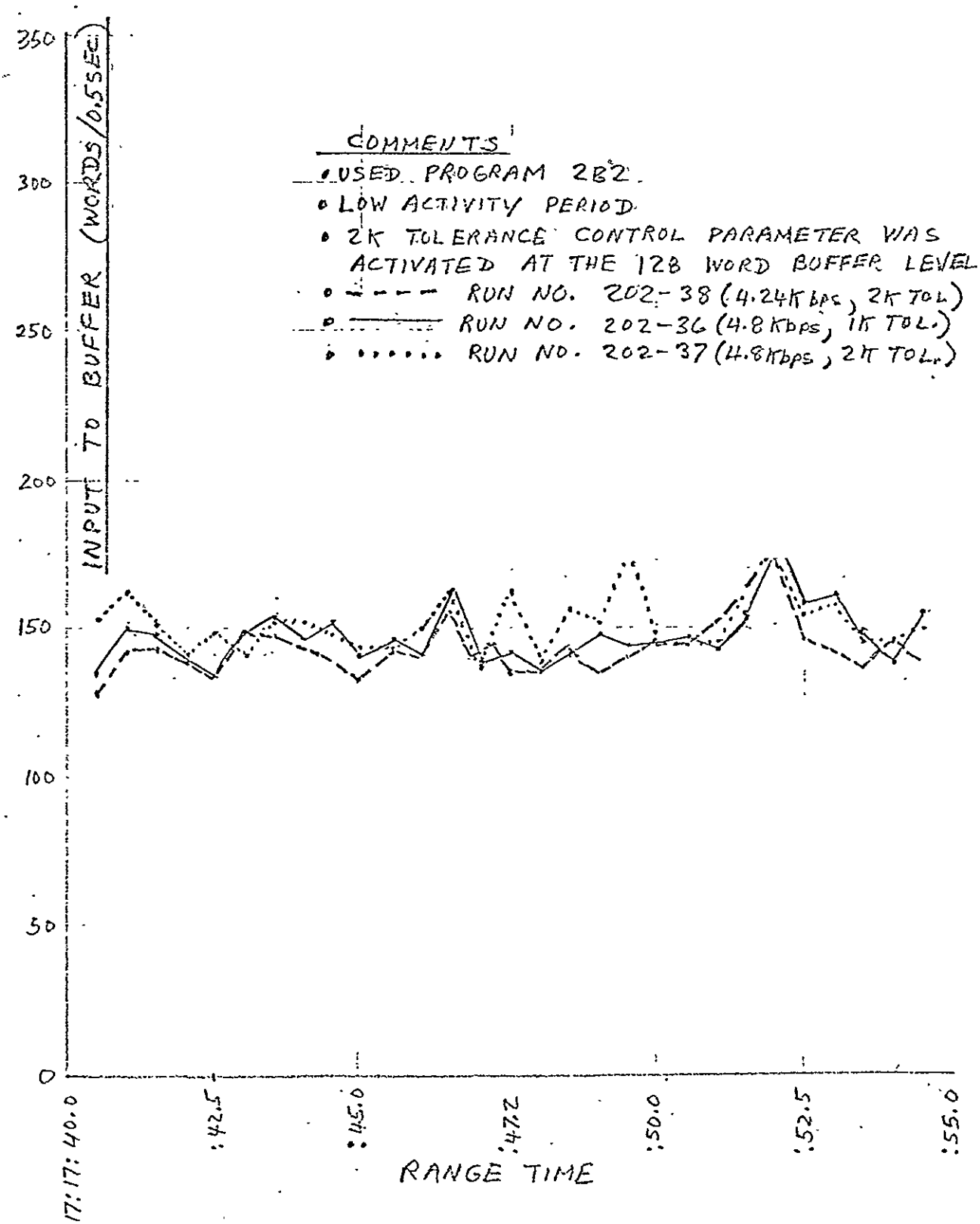


Fig. 19 Combination Control Plots (Type II) – Runs #202-36, #202-37 & #202-38

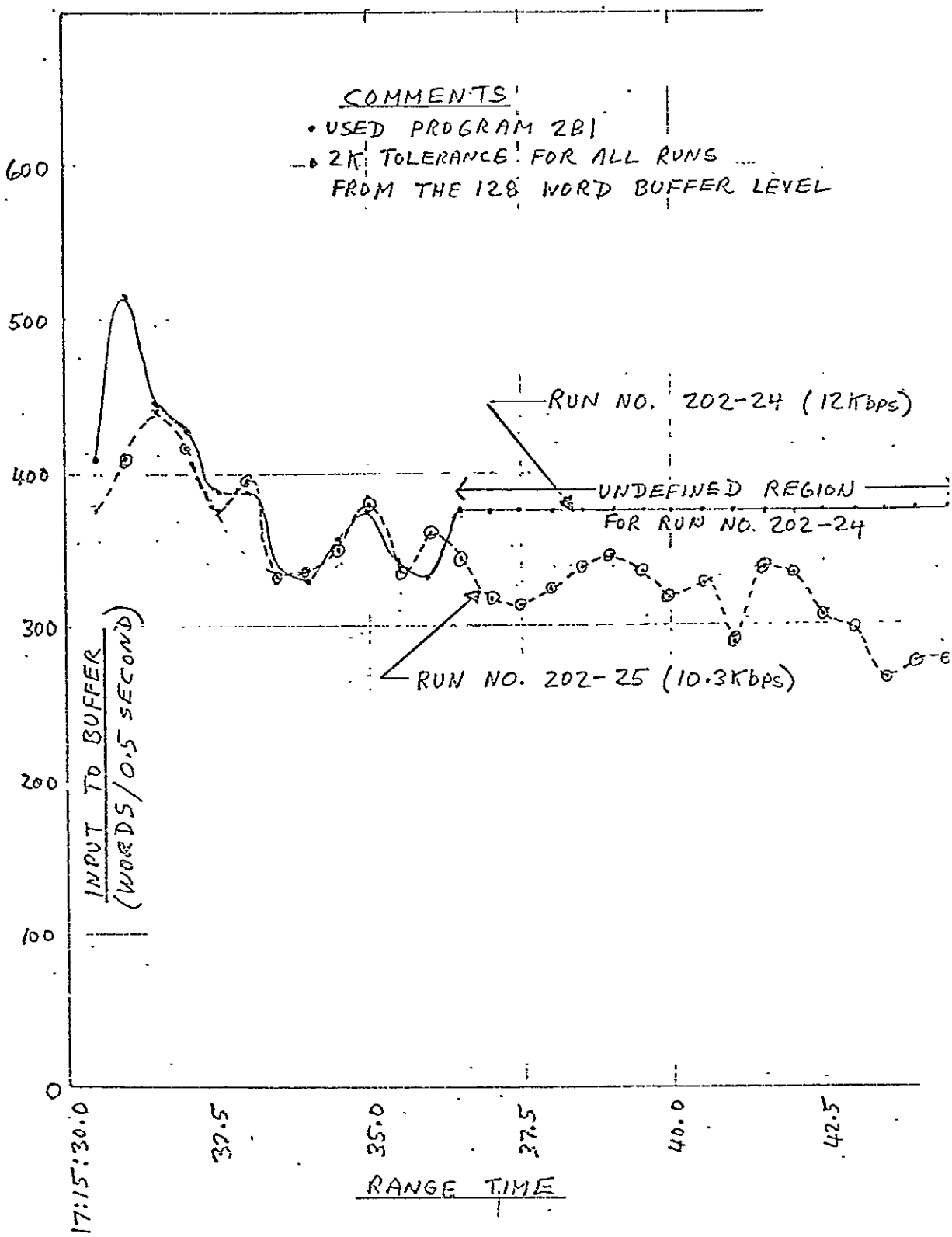


Fig. 20 Combination Control Plots (Type II) – Runs #202-24 & #202-25

Table 6 (Sheet 1 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-203

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
203-1	0.2	14:53:10 – 15:00:10	7.2	A	1K	NO	YES	64		SATURATION
203-2	"	"	"	"	"	"	"	"	-	
203-3	"	"	"	"	"	"	NO	"	—	
203-4	"	"	10.3	"	"	"	"	"	—	
203-5	"	"	7.2	"	"	"	YES	3	—	
203-6	"	"	4.24	"	"	"	NO	"	—	
203-7	"	"	5.54	"	"	"	NO	"	—	
203-8	"	"	7.2	"	"	"	YES	64	—	TAKEN FROM TAPE #10 TRACK #2
203-9	"	"	"	"	"	"	"	"	—	TAKEN FROM TAPE #9 TRACK #3
		END OF	VERIFICATION		RUNS				—	
203-10	0.2	14:53:16 – 15:00:10	24.0	3A1	1K	NO	NO	3	—	SATURATION
203-11	"	"	36.0	"	"	"	"	"	—	SATURATION EXCEPT PERIOD 14:55:12 TO 14:55:40
203-12	"	"	"	"	4K	"	"	"	—	SATURATION EXCEPT PERIOD 14:55:10 TO 14:55:45
203-13	"	"	"	"	"	"	"	"	—	"
203-14	1.0	14:55:18 – 14:55:32	"	"	"	"	"	"	—	LOW ACTIVITY PERIOD NOT IN SATURATION
203-15	"	"	"	"	1K	"	"	"	—	
203-16	"	"	24.0	"	"	"	"	"	—	SATURATION
203-17	"	"	"	"	4K	"	"	"	—	SATURATION
203-18	0.2	14:53:10 – 15:00:10	18.0	3A2	1K	"	YES	"	—	NO SATURATION

Table 6 (Sheet 2 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-203

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
203-19	0.2	14:53:10 — 15:00:10	12.0	3A2	1K	NO	YES	3	—	SATURATION
203-20	〃	〃	14.4	〃	〃	〃	〃	〃	—	OPTIMUM BIT RATE FOR PROGRAM 3A2
203-21	2.0	〃	〃	〃	〃	〃	〃	〃	23, 24	DEMONSTRATES
203-22	〃	〃	〃	〃	4K	〃	〃	〃	23, 24	TOLERANCE CONTROL OVER BUFFER
203-23	〃	〃	〃	〃	2K	〃	〃	〃	23, 24	FULLNESS
203-24		〃	24.0	3A3	〃	〃	〃	〃	25	DEMONSTRATES
203-25	〃	〃	〃	〃	1K	〃	〃	〃	25	TOLERANCE CONTROL OVER BUFFER
203-26	〃	〃	〃	〃	4K	〃	〃	〃	25	FULLNESS
203-27	0.2	14:53:10 — 15:00:10	14.4	3B1	1K	〃	NO	〃	—	SATURATION DURING LAUNCH
203-28	〃	14:53:13 — 14:53:27	18.0	〃	〃	〃	〃	〃	—	SATURATION DURING LAUNCH
203-29	〃	14:53:10 — 14:54:45	24.0	〃	〃	〃	〃	〃	—	OUTPUT BIT RATE TOO HIGH
203-30	〃	14:53:10 — 15:00:10	12.0	〃	〃	〃	〃	〃	—	SATURATION OVER 1/3 OF FLIGHT
203-31	〃	〃	10.3	〃	〃	〃	〃	〃	—	ALMOST COMPLETE SATURATION OVER FLIGHT
203-32	2.0	14:55:15 — 14:55:32	〃	〃	〃	〃	〃	〃	22	LOW ACTIVITY PERIOD GOOD DATA
203-33	〃	〃	12.0	〃	〃	〃	〃	〃	—	TOO HIGH OF OUTPUT BIT RATE FOR LOW ACT. PERIOD
203-34	1.0	〃	〃	〃	〃	〃	〃	64	22	LOW ACTIVITY PERIOD
203-35	〃	14:55:15 — 14:55:32	14.4	〃	〃	〃	〃	〃	22	LOW ACTIVITY PERIOD
203-36	0.2	PRIOR TO AND LAUNCH	36.0	〃	〃	〃	〃	3	—	NO APPARENT ACTIVITY
203-37	〃	〃	24.0	〃	〃	〃	〃	〃	—	LAUNCH PERIOD OCCURS

Table 6 (Sheet 3 of 6)

LISTING OF DATA RUNS FOR FLIGHT AS-203

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
203-38	0.2	PRIOR TO AND LAUNCH	15.0	3B1	1K	NO	NO	3	—	LAUNCH PERIOD IN SATURATION
203-39	"	"	14.4	"	"	"	"	"	—	LAUNCH PERIOD IN SATURATION
203-40	"	14:53:10 - 15:00:10	24.0	3B3	"	"	"	64	—	ENTIRE FLIGHT NO SATURATION
203-41	"	"	"	3B3	"	"	"	3	—	SATURATION
203-42	"	"	"	3B1	"	"	YES	"	—	NO SATURATION CALIBRATION APPEARS
203-43	"	"	15.0	3B1	"	YES >128	"	"	—	NO SATURATION
203-44	"	"	24.0	3B3	"	"	NO	"	—	SATURATION
203-45	"	"	36.0	"	"	"	"	"	—	NO SATURATION
203-46	2.0	14:53:13 - 14:53:27	14.4	3B2	"	NO	"	"	21, 27	GOOD
203-47	"	"	7.2	"	2K	"	"	"	27	DATA OF
203-48	"	"	"	"	4K	"	"	"	27	LAUNCH
203-49	"	"	"	"	1K	YES >128	"	"	26	GOOD DATA
203-50	"	"	4.8	"	"	"	"	"	26	GOOD DATA
203-51	"	"	6.0	"	"	NO	"	"	21	GOOD DATA

Flight AS-203 tests consist of Runs #203-10 through #203-51 which are described in detail in Table 6. In the table, the Visicorder Speed, Time Interval, Output Bit Rate, Program Used, Tolerance, Priority Utilized, Calibration Included or not, Forced Word Level, Figure on which the run is plotted and Comments are given for each data run. The program used for each run is described in detail in Table 7. The total number of time slots presented to the data compressor for processing each second is shown in the third column. Column 2 lists the data channels deletions to be made to the basic data channel programs and this is described in Table A. 3 in Appendix A.

Table A. 3 lists all data channels to be programmed into the data compressor with respect to stored address bit, priority and tolerances for Programs 3A1 and 3B1.

2. 2. 1 Open Loop Plots

Runs #203-10 through #203-17 used Program 3A1 and data compressor output bit rates of 24 and 36 Kbps with the result that the buffer fullness parameter went into saturation. Only during short intervals of low activity did buffer fullness drop out of saturation.

For Program 3B2, open loop curves (Type I) of Runs #203-46 and #203-51 are plotted in Fig. 21. Run #203-46 was optimum with an output bit rate of 14. 4 Kbps.

Also utilizing Program 3B2 of open loop curves (Type I) for the low activity period (14:55:18-14:55:33) were plotted in Fig. 22 using Runs #203-32, #203-34, and #203-35.

2. 2. 2 Tolerance Control Plots

Figure 23 shows a plot of Runs #203-21, #203-22 and #203-23 for tolerance of 1K, 4K and 2K, respectively. These are Type I plots that show control over buffer queue length as a function of the tolerance control. Figure 24 is a

Table 7

PROGRAMS FOR FLIGHT AS-203

Program	Description	Time Slots Processed By Data Compressor Per Second
3A1	See Table 2 (This program reflects the 1K tolerances assigned to the parameters specified by the work statement)	5916 Words/Sec
3A2	Same as Program 3A1 except the guidance and control ("H" type) and "K" type measurements were programmed for rejection. They are as follows:	3948 Words/Sec
	Frame — Channels 1 — 3A, 5A, 6A, 11B, 12A, 12B, 13A, 13B, 14B; 16B, 17A, 19A, 20A, 22A, 27A. 2 — 2A, 18A, 19B 3 — 1A, 18A, 19B 4 — 1A, 18A, 19B 5 — 1A, 17A, 18A 6 — 17A, 18A 7 — 7A, 18A 8 — 6B, 18A, 19B 9 — 2A, 18A, 19B 10 — 2A	
3A3	Same as Program 3A1 except that the "H" type measurements were rejected	4452 Words/Sec
3B1	See Table 2 (This program reflects the 4K tolerances assigned to the parameters specified by the work statement)	5916 Words/Sec
3B2	Same as Program 3B1 except that the measurements rejected in Program 3A2 were also rejected here	3948 Words/Sec
3B3	Same as Program 3B1 except that the H60-603 measurements were programmed for acceptance	6876 Words/Sec

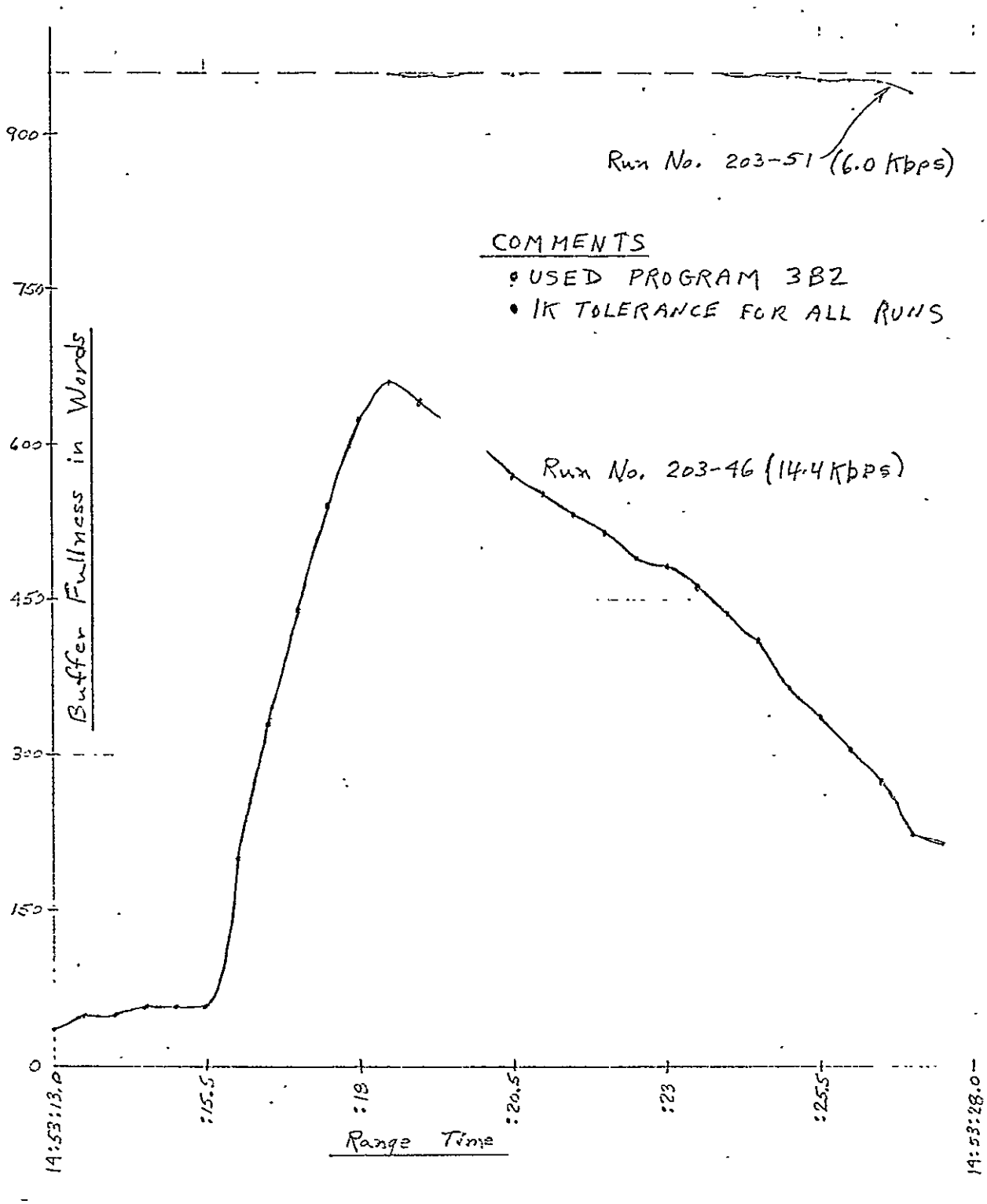


Fig. 21 Open Loop Plots (Type I) – Runs #203-46 & #203-51

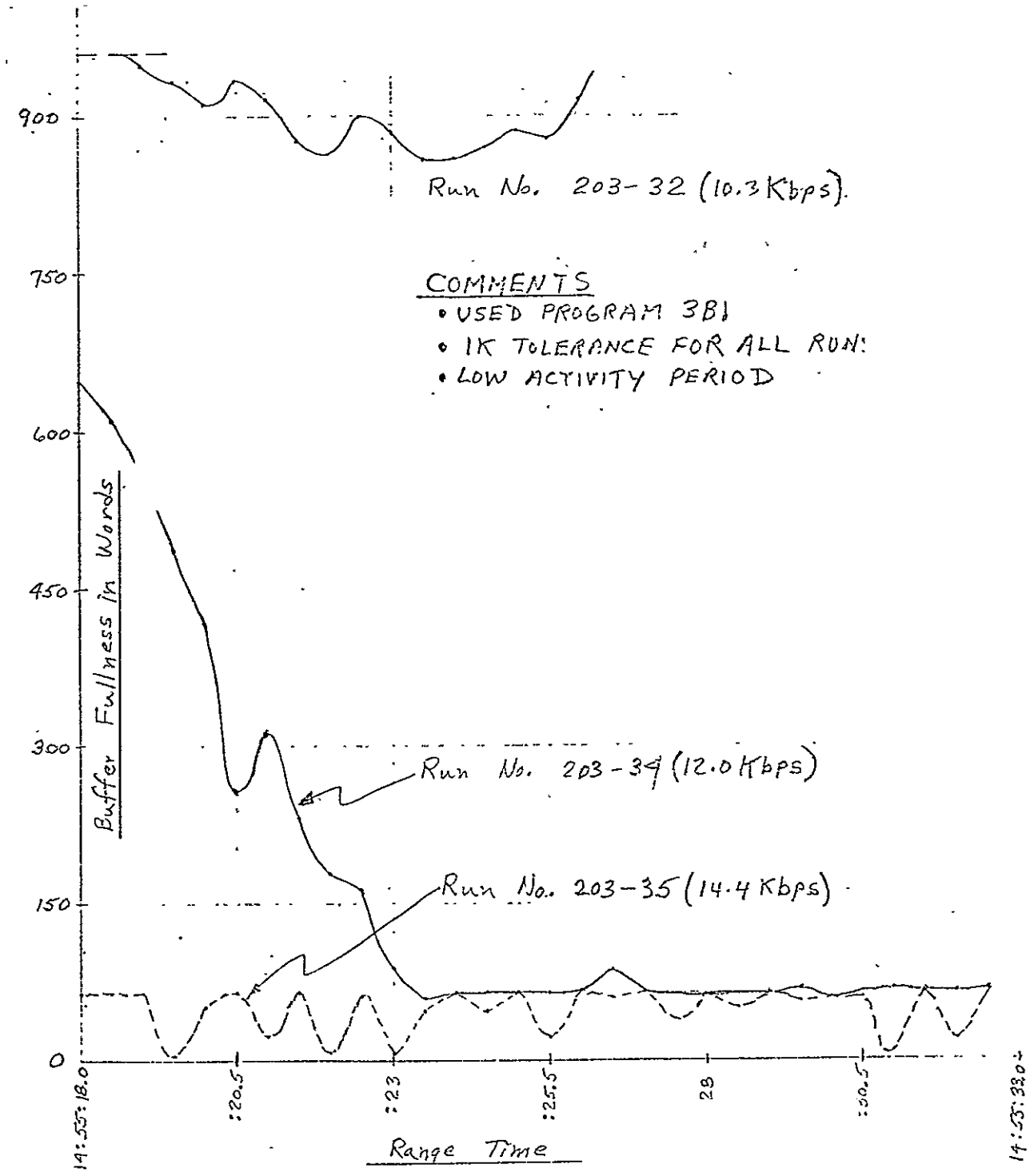


Fig. 22 Open Loop Plots (Type I) – Runs #203-32, #203-34 & #203-35

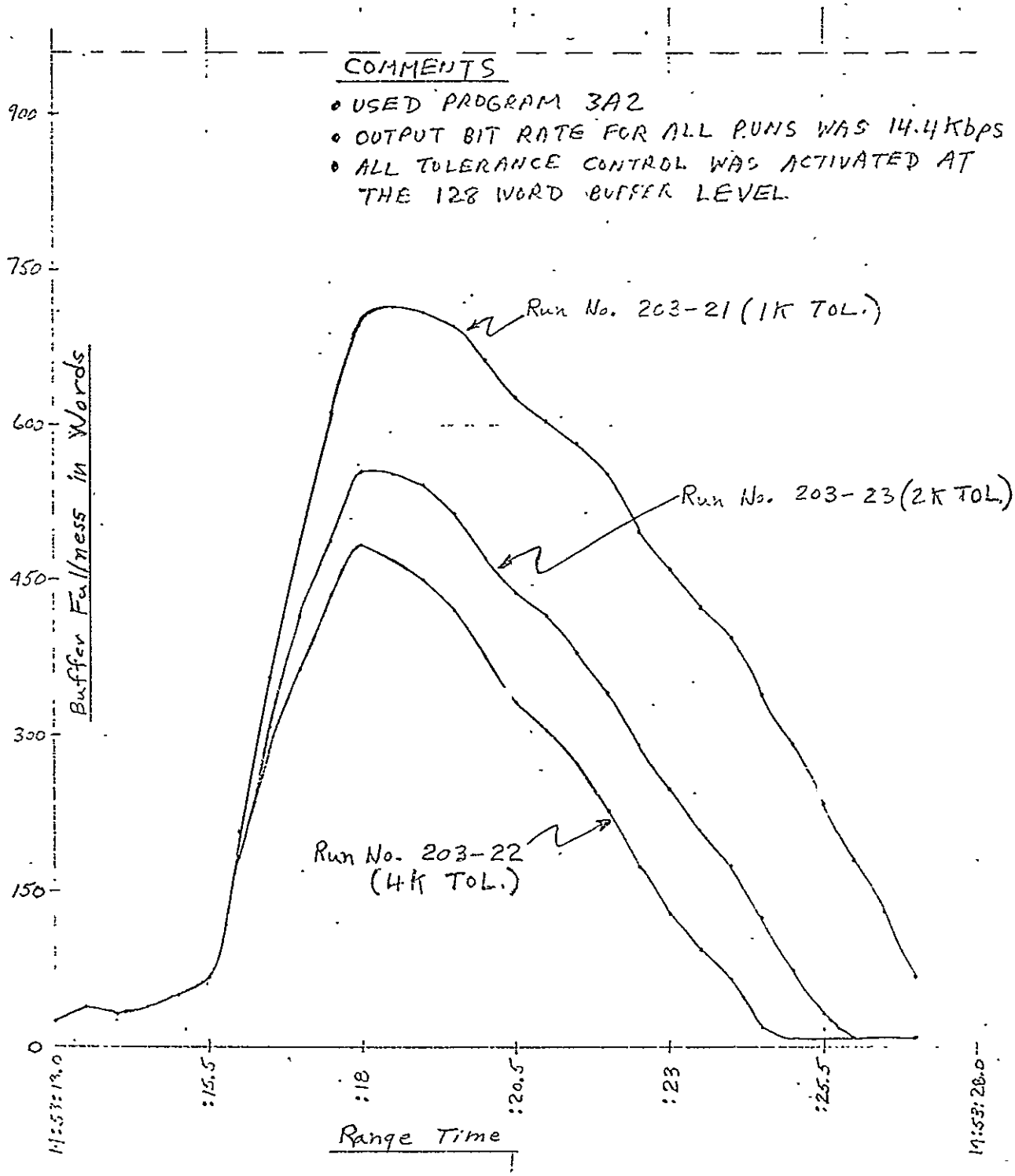


Fig. 23 Tolerance Control Plot (Type I) – Runs #203-21, #203-22 & #203-23 .

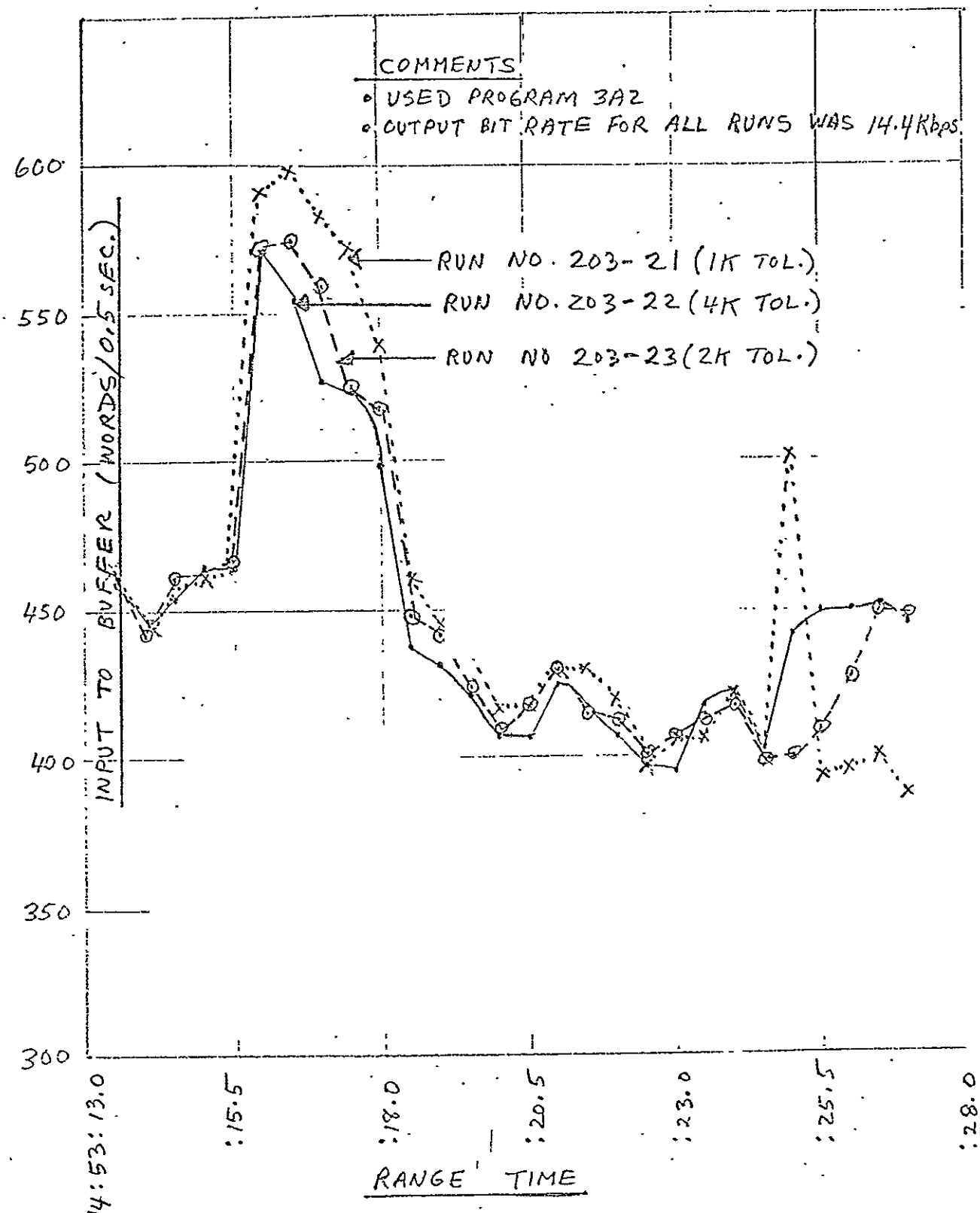


Fig. 24 Tolerance Control Plots (Type II) – Runs #203-21, #203-22 & #203-23

Type II plot of the same runs whereby "input to the buffer" is plotted against "range time." In this plot, the number of words sent to the buffer memory every 0.5 second is plotted.

Figure 25 shows plot of Runs #203-24, #203-25 and #203-26 for tolerances of 2K, 1K and 4K, respectively, for Program 3A3.

2.2.3 Priority Assignment Control Plots

For Program 3B2, Fig. 26 shows a plot of (Type II) Runs #203-49 and #203-50 being subjected to priority assignment control. As is to be expected, the data run with the higher output rate will have more input words submitted to the buffer memory. Reasons for this has already been discussed in the "priority assignment control plot" section for Flight AS-203.

2.2.4 Combination Control Plot

Figure 27 is a combination plot (Type II) that plots Runs #203-46, #203-47 and #203-48. Both output bit rate and tolerance control were utilized for these plots.

2.3 Flight AS-204 Tests

Saturn PCM telemetry data from Flight AS-204 instrumentation unit was played back from an instrumentation tape and processed by the zero-order predictor Saturn PCM telemetry data compressor. The data channel information (priority, stored address bit and tolerance) was manually programmed in the data compressor in accordance with values specified in Table A.4 in Appendix A. In the table, two basic data channel programs are specified (4A1 and 4B1) which adhere to the 1K and 4K tolerances specified by the work statement.

Table 8 lists all data runs for Flight AS-204. For each data run, the Visicorder Speed, Time Interval, Output Bit Rate, Program Used, Tolerance, Priority Utilized or not, Calibration Included or not, Forced Word Level, Plotted

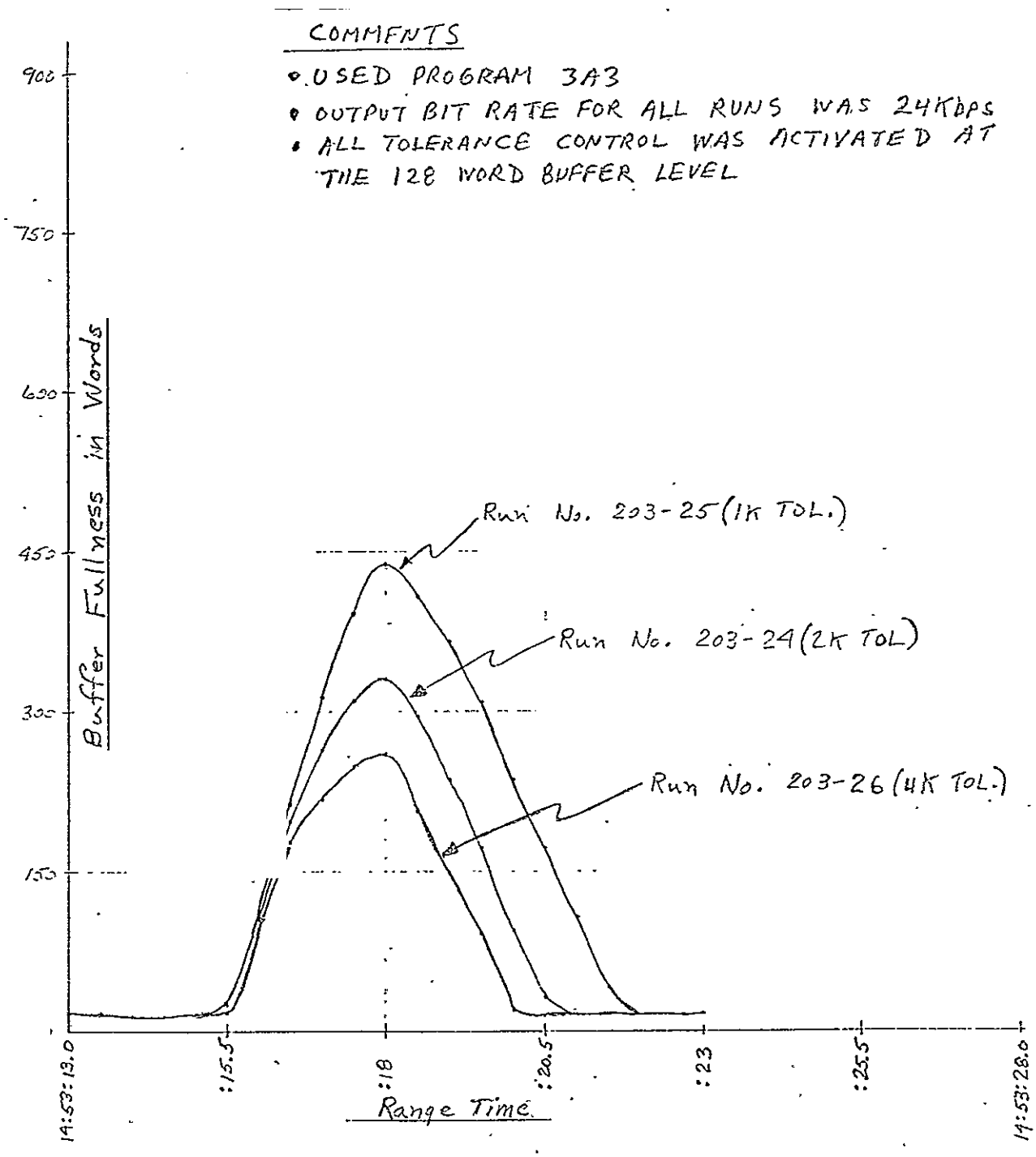


Fig. 25 Tolerance Control Plots (Type I) – Runs #203-24, #203-25 & #203-26

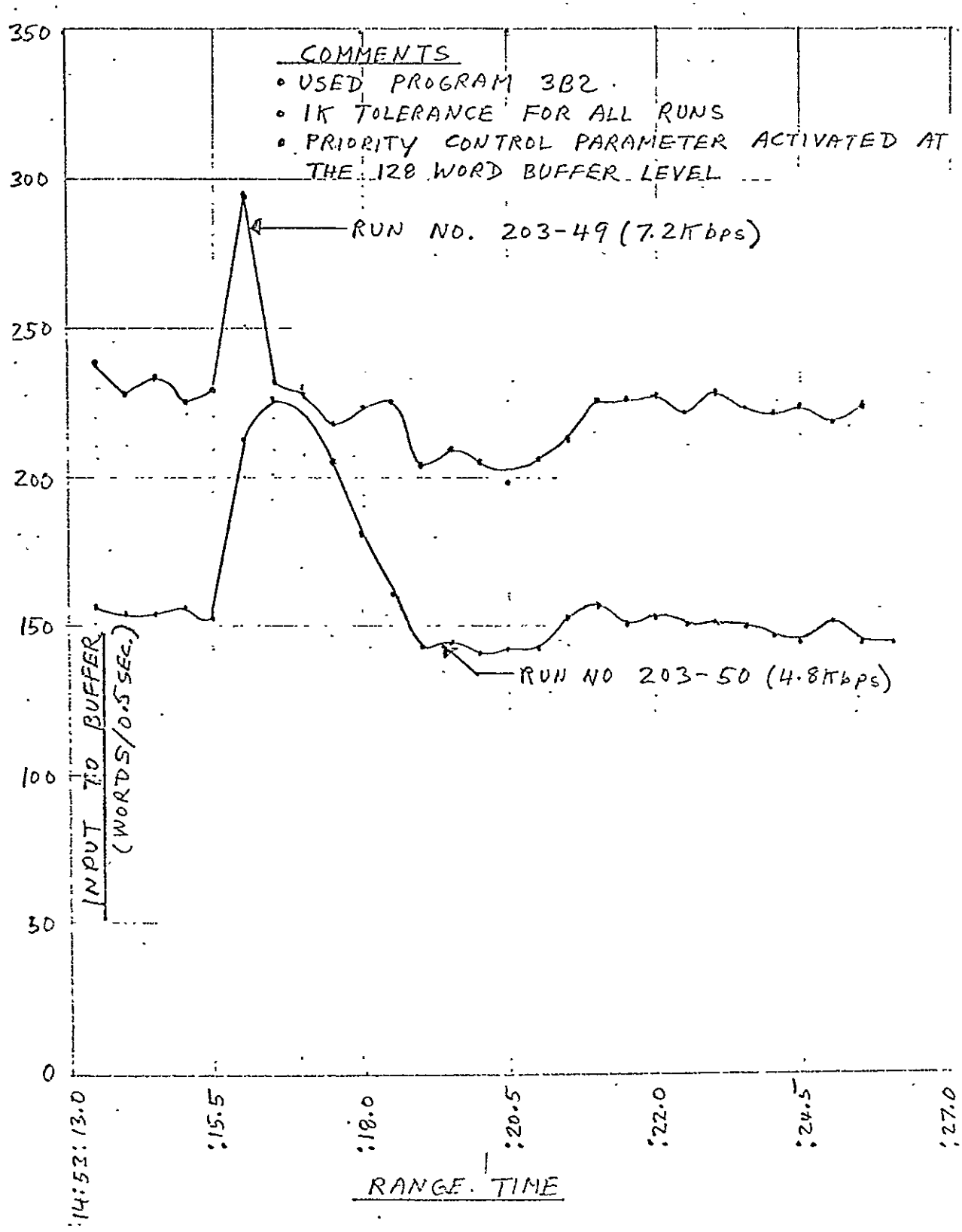


Fig. 26 Priority Assignment Control Plots (Type II) – Runs #203-49 & #203-50

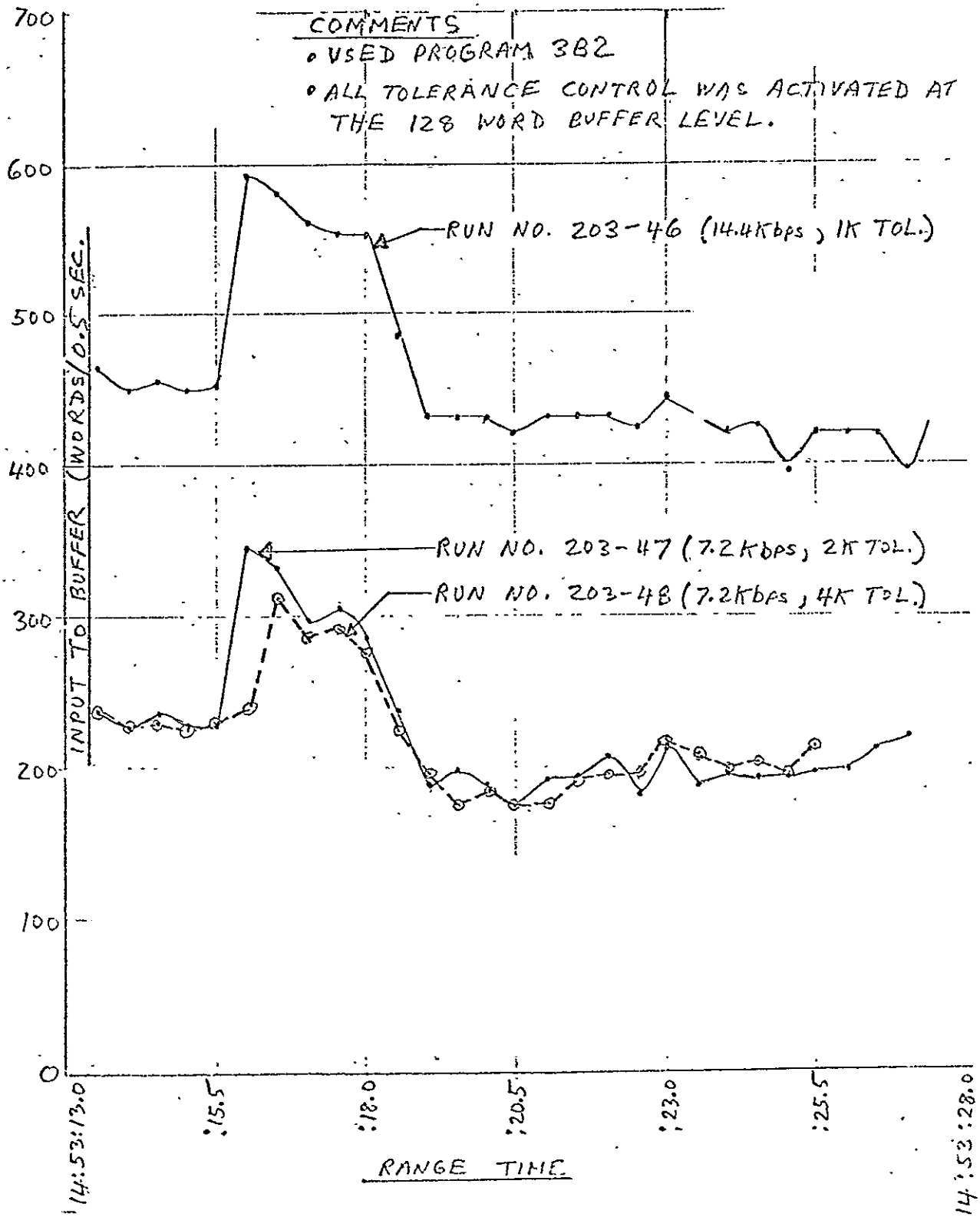


Fig. 27 Combination Control Plots (Type II) – Runs #203-46, #203-47 & #203-48

Table 8 (Sheet 1 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-204

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
204-1	0.2	22:48:00 — 22:52:25	24.0	4H1	1K	NO	NO	3	—	NO SATURATION OVER ENTIRE FLIGHT
204-2	"	"	"	"	"	"	YES	"	—	NO SATURATION OVER ENTIRE FLIGHT
204-3	"	"	18.0	"	"	"	NO	"	—	SATURATION OVER ENTIRE FLIGHT
204-4	"	"	36.0	"	"	"	"	"	—	USELESS - NO ACTIVITY
204-5	"	"	24.0	"	"	"	"	64	—	NO SATURATION OVER ENTIRE FLIGHT
204-6	1.0	22:52.10 — 22:53:25	"	"	"	"	"	"	—	LOW ACTIVITY PERIOD TO HIGH DP RATE
204-7	"	22:48:05 — 22:48:20	"	"	"	"	"	"	31	USEFUL DATA
204-8	"	"	"	"	2K	"	"	3	31	
204-9	"	"	"	"	4K	"	"	"	31	
204-10	"	"	18.0	"	"	"	"	"	—	SATURATION
204-11	0.2	22:48:00 — 22:52:25	24.0	"	"	"	YES	3	—	NO SATURATION
204-12	1.0	22:48:05 — 22:48:20	"	"	1K	YES >128	NO	"	—	
204-13	"	"	"	"	4K	"	"	"	—	
204-14	"	"	5.0	4A2	1K	NO	"	"	28	OPEN LOOP CONTROL POINTS
204-15	"	"	9.0	"	"	"	"	"	28	
204-16	"	"	10.3	"	"	"	"	"	28	
204-17	0.2	22:48:00 — 22:52.25	9.0	"	"	"	YES	"	—	GOES INTO SATURATION AT CAL. POINT
204-18	"	"	"	"	"	"	NO	"	—	NO SATURATION
204-19	"	"	"	"	"	"	"	64	—	SATURATION BRIEFLY

Table 8 (Sheet 2 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-204

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
204-20	1.0	22:52:10 – 22:52:25	8.0	4A2	1K	NO	NO	64	—	GOOD DATA
204-21	"	"	9.0	"	"	"	"	"	—	TOO HIGH OF OUTPUT BIT RATE
204-22	"	"	7.2	"	"	"	"	"	—	SATURATION
204-23	"	22:48:05 – 22:48:20	9.0	"	2K	"	"	3	37,34	TOLERANCE
204-24	"	"	8.0	"	"	"	"	"	34 37	PLOT, GOOD
204-25	"	"	"	"	4K	"	"	"	34,37	DATA
204-26	"	"	9.0	"	"	"	"	"	34,37	
204-27	0.2	22:48:00 – 22:52:25	10.3	"	1K	"	YES	"	—	NO SATURATION
204-28	1.0	22:48:05 – 22:48:20	9.0	"	"	YES >128	NO	"	36	GOOD DATA,
204-29	"	"	8.0	"	2K	NO	"	"	36	OPEN LOOP, TOLERANCE
204-30	"	"	"	"	"	YES >128	"	4	36	& PRIORITY VARIATIONS
204-31	"	"	"	"	4K	"	"	"	36	
204-32	0.2	22:45:00 – 22:52:25	24.0	4B1	1K	NO	YES	"	—	NO SATURATION
204-33	1.0	22:45:05 – 22:46:20	6.0	4B2	"	"	NO	"	29,37	OPEN LOOP
204-34	"	"	6.55	"	"	"	"	"	29	PLOT - GOOD
204-35	"	"	5.54	"	"	"	"	"	29	DATA
204-36	"	"	6.0	"	2K	"	"	"	32,37	PLOTTED WITH RUN 204-33 TO
204-37	"	"	"	"	4K	"	"	"	32,37	SHOW TOLERANCE CHANGE
204-38	"	"	5.54	"	2K	"	"	"	—	GOOD DATA

Table 8 (Sheet 3 of 3)

LISTING OF DATA RUNS FOR FLIGHT AS-204

Run Number	Visi. Speed (ips)	Time Interval	Output Bit Rate (k bps)	Program Used	Tol.	Priority Utilized	Cal. Included	Forced Word Level (Words)	Plotted on Fig. No.	Comments
204-34	1.0	22:48:05 — 22:48:20	5.54	4B2	2K	YES >128	NO	3	35	PLOTTED WITH RUN NO. 204-43
204-40	"	22:52:10 — 22:52:25	"	"	1K	NO	"	C4	30, 39	OPEN LOOP REF
204-41	"	"	6.0	"	"	"	"	"	30	
204-42	"	"	5.14	"	"	"	"	"	—	
204-43	"	"	5.54	"	2K	"	"	"	33	PLOTTED WITH RUN NO. 204-34
204-44	"	22:45:05 — 22:45:20	6.0	"	1K	YES >128	"	3	35	NO SATURATION
204-45	0.2	22:48:00 — 22:52:25	"	"	"	NO	"	"	—	COMPARE TO SEE AFFECT
204-46	0.2	"	"	"	"	"	YES	"	—	OF CALIBRATIONS
204-47	1.0	22:48:05 — 22:48:20	8.0	4B3	"	"	NO	"	—	NO SATURATION
204-48	0.2	22:48:00 — 22:52:25	"	4B3	"	"	"	"	—	NO SATURATION

ADVANCED COMMUNICATIONS RESEARCH AND DEVELOPMENT

AD/COM.

On What Figure and Comments are specified. Variations to the two basic data channel Programs 4A1 and 4B1 can be made and are specified in the "Program Used" column. A complete description of each of these programs is given in Table 9.

It is the intent of this section to basically describe the plots for the flights and leave all analysis to the analysis section of this report. All points plotted in these figures are listed in Table B.3 of Appendix B.

2.3.1 Open Loop Plots

Figure 28 shows a plot (Type I) of Runs #204-14, #204-15, #204-16 for Program 4A2. Run #204-14 with an output bit rate of 8.0 Kbps appears to be most optimum.

Figure 29 shows a plot (Type I) of Run #204-33, #204-34 and #204-35 for Program 4B2. The optimum output bit rate is 6.0 Kbps which was programmed on Run #204-33.

For the low activity period (22:52:10 - 22:52:25), Runs #204-40 and #204-41 were plotted in Fig. 30. Run #204-40 appears to be suitable for further analysis.

2.3.2 Tolerance Control Plots

Figure 31 shows a plot (Type I) of Runs #204-7, #204-8 and #204-9 for tolerance of 1K, 2K and 4K, respectively. These plots were run for Program 4A1 and show buffer queue length as a function of tolerance control.

For Program 4B2, Fig. 32 shows plots of Runs #204-33, #204-36 and #204-37 for tolerances of 1K, 2K and 4K, respectively. Figure 33 shows plots of Runs #204-40 and #204-43 for the same program only for the low activity period.

Table 9

PROGRAMS FOR FLIGHT AS-204

Program	Description	Time Slots Processed By Data Compressor Per Second
4A1	See Table 2 To prevent the buffer memory from being completely filled, all guidance and control (H type) measurements were programmed for rejection. This program reflects the 1K tolerances assigned to the parameters specified by the work statement	4596 Words/Sec
4A2	Same as Program 4A1 except the following "K" type measurements were deleted Frame — Channels 1 — 3B, 5B, 6A, 11B, 13A, 17A, 17B, 18B 19A, 19B, 20B, 24B, 25B, 26B 2 — 13A 4 — 13A, 22B 5 — 8B, 13A 6 — 13A 7 — 13A, 14B 8 — 8B 9 — 8B	2496 Words/Sec
4B1	See Table 2 Same as program 4A1 except that this program reflects the 4K tolerances assigned to the parameters specified by the work statement.	4596 Words/Sec
4B2	Same as Program 4B1 except that the data channels rejected in Program 4A2 were rejected here	2496 Words/Sec
4B3	Same as Program 4B1 except that the tolerances of the "K" type measurements were changed to ±0.78%	4596 Words/Sec

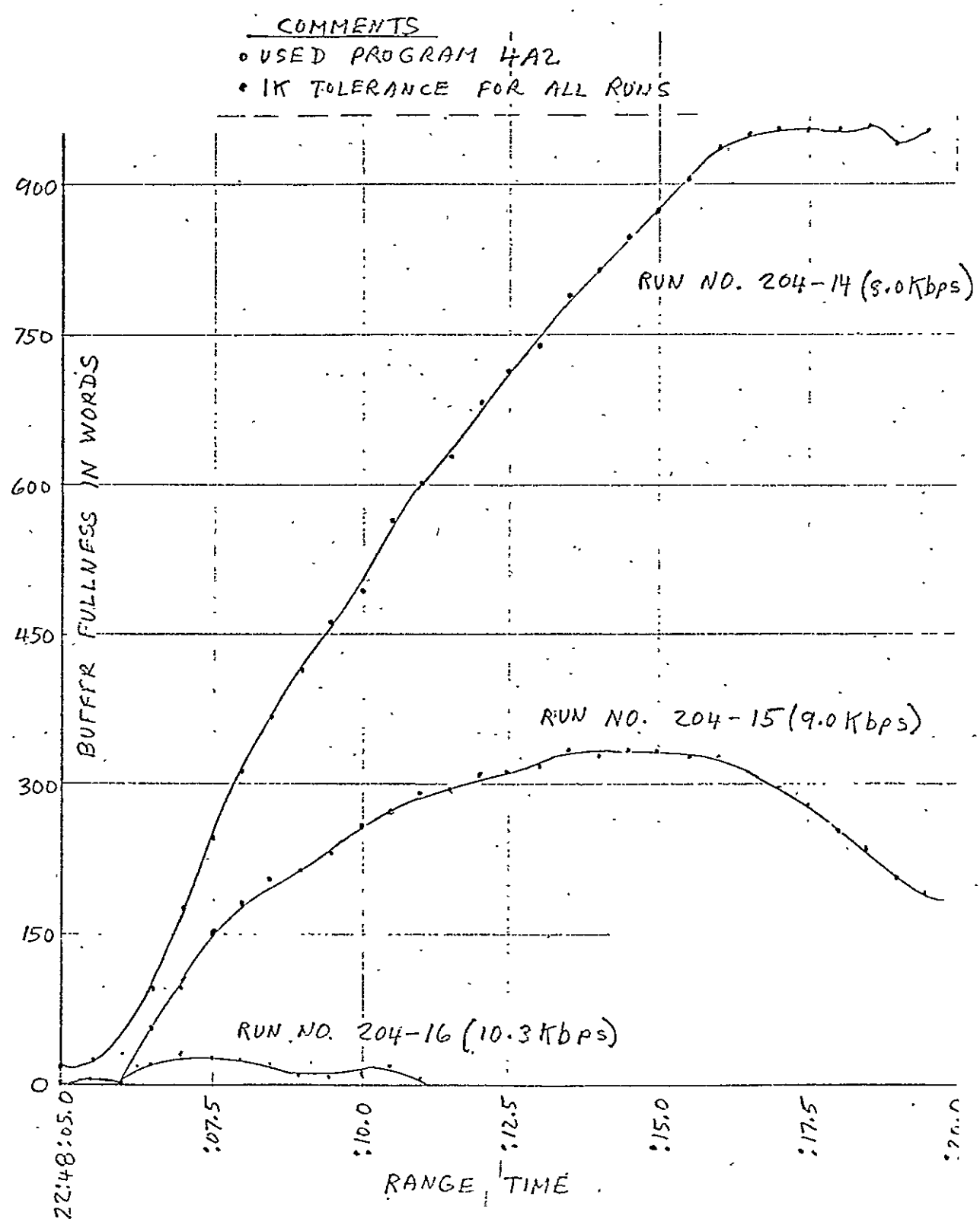


Fig. 28 Open Control Plots (Type I) – Runs #204-14, #204-15 & #204-16

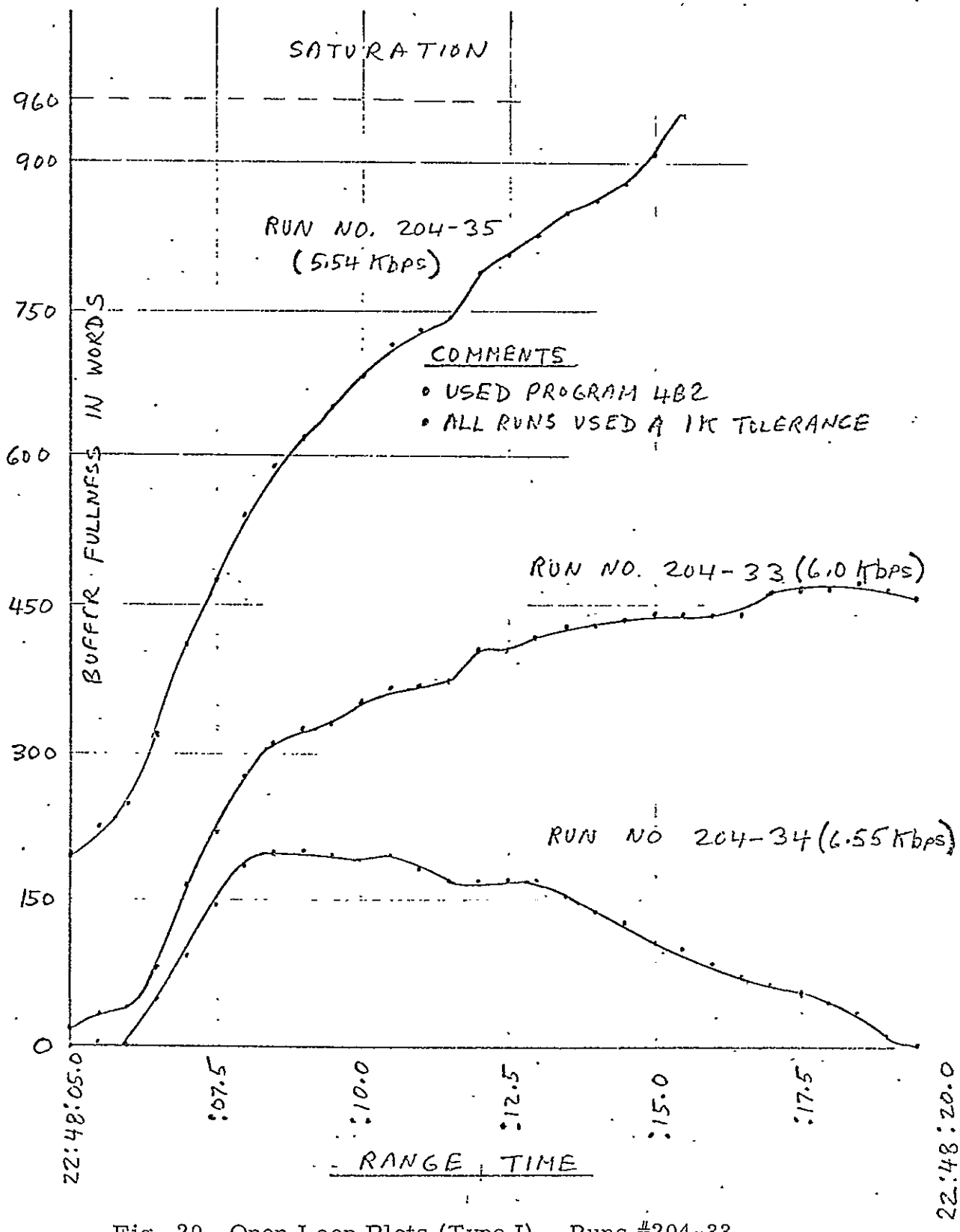


Fig. 29 Open Loop Plots (Type I) – Runs #204-33, #204-34 & #204-35

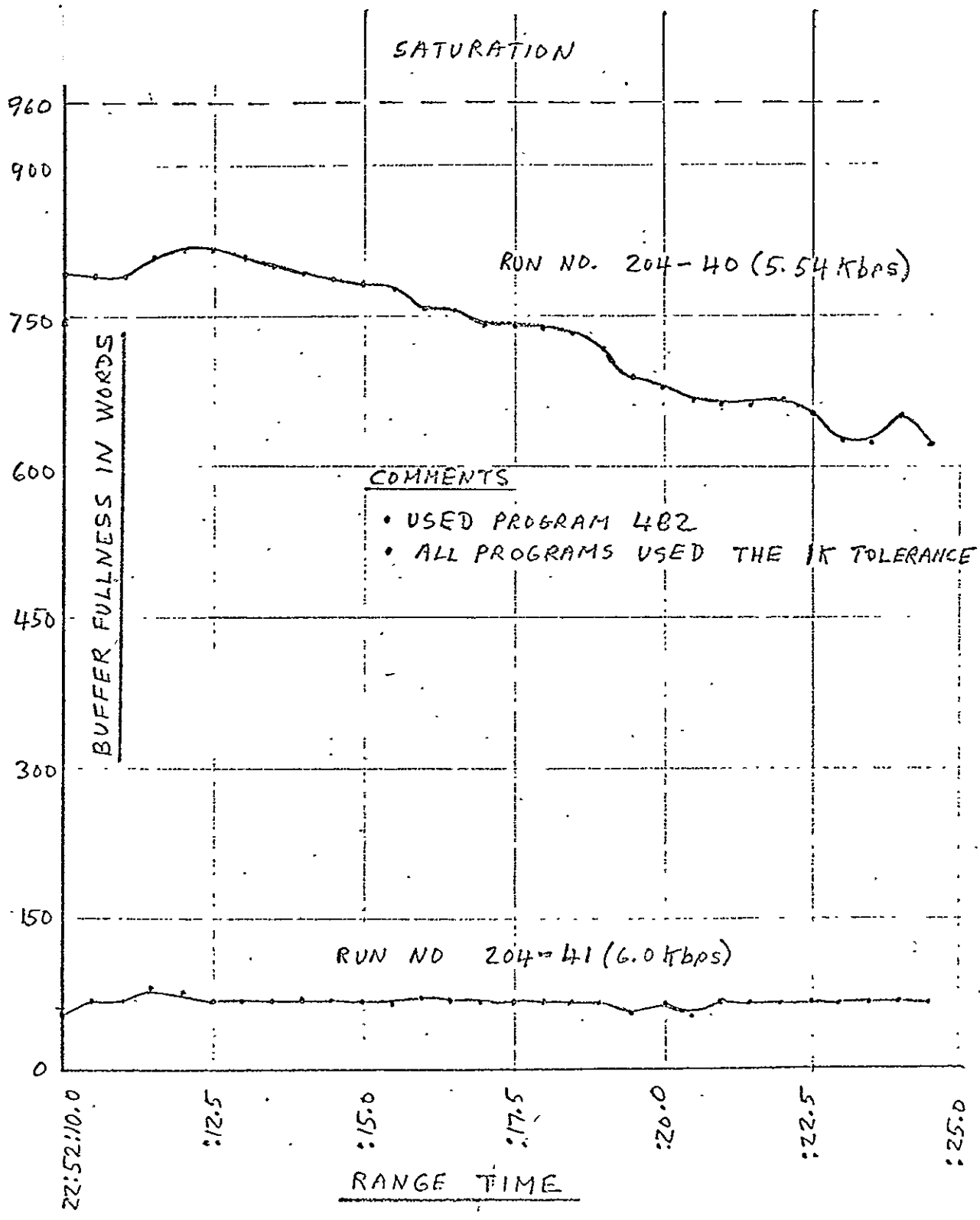


Fig. 30 Open Loop Plots (Type I) – Runs #204-40 & #204-41

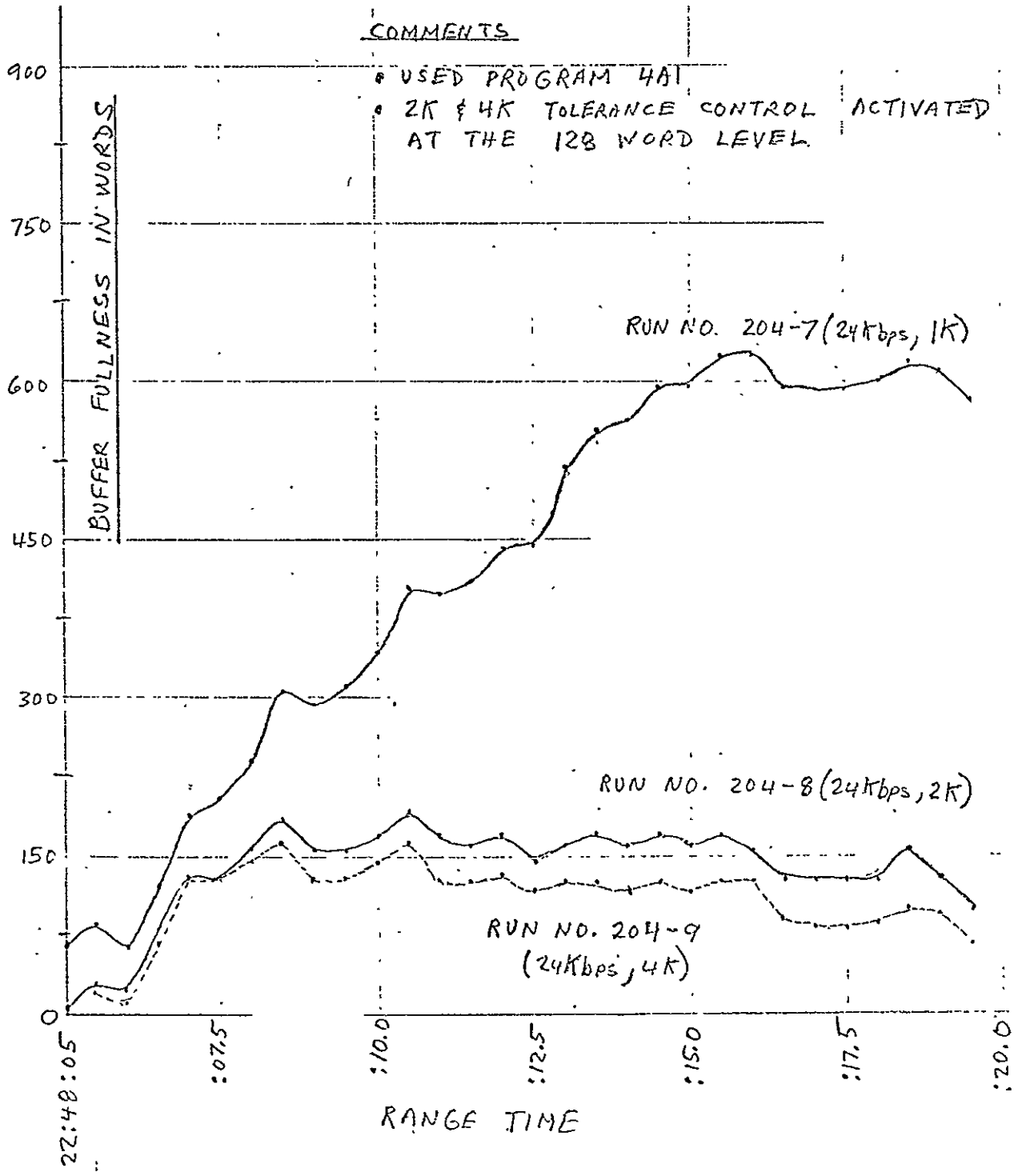


Fig. 31 Tolerance Control Plots (Type I) – Runs #204-7, #204-8 & #204-9

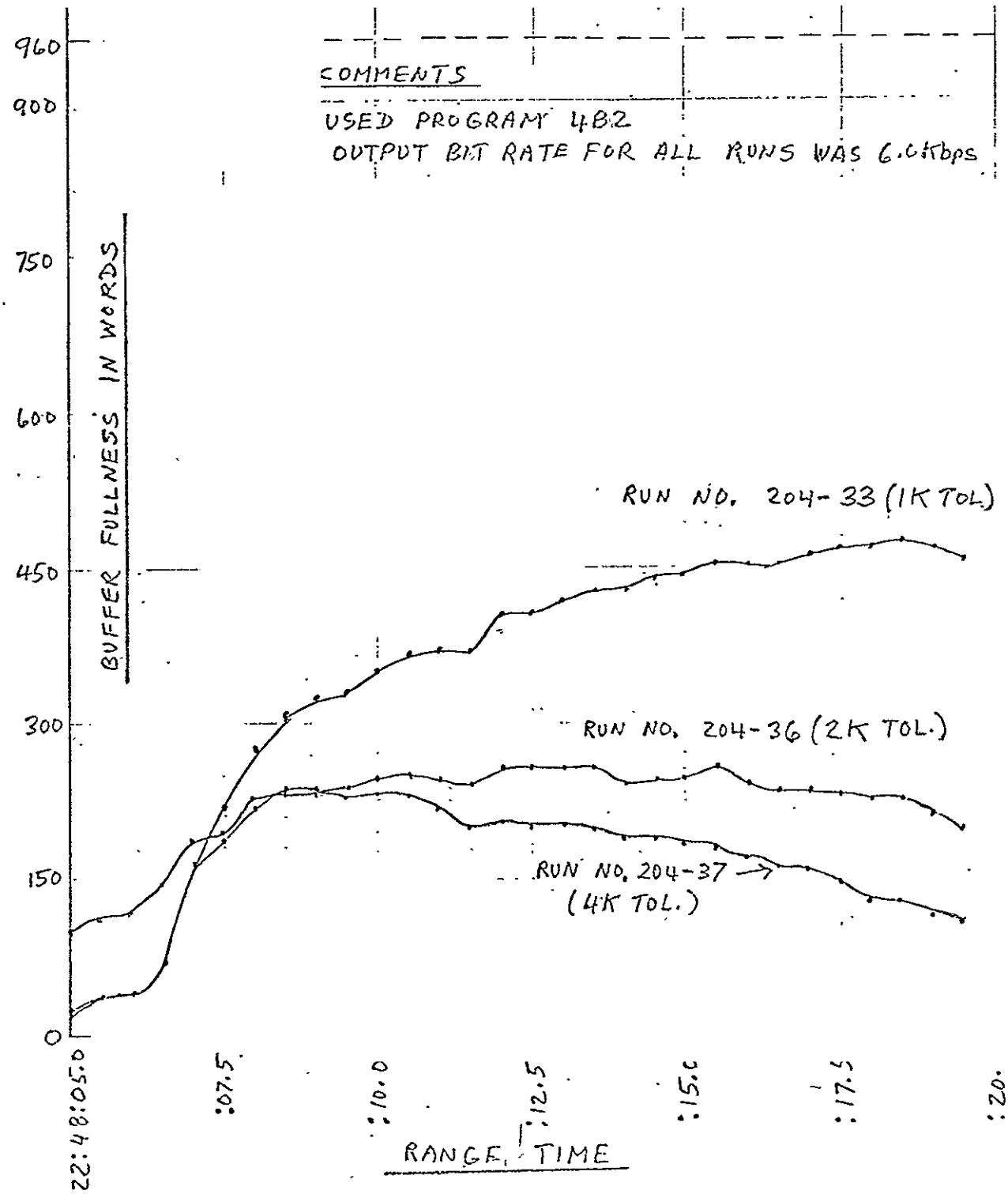


Fig. 32 Tolerance Control Plots (Type I) – Runs #204-33, #204-36 & #204-37

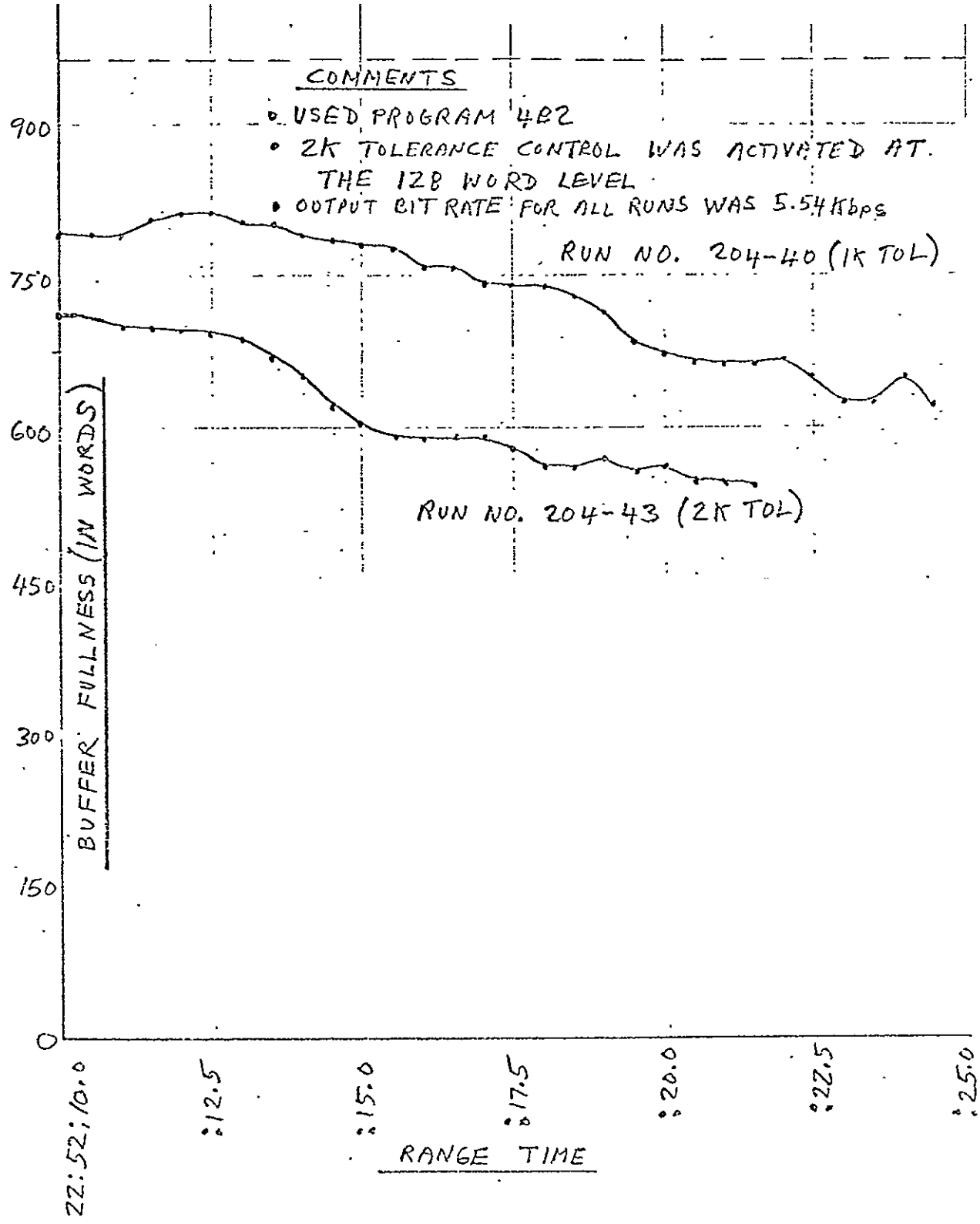


Fig. 33 Tolerance Control Plots (Type I) – Runs #204-40 & #204-43

Figure 34 show plots (Type I) of Runs #204-23, #204-24, #204-25, and #204-26 for Program 4A2. Runs #204-23 and #204-26 were programmed with an output bit rate of 9.0 Kbps, while Runs #204-24 and #204-25 had output bit rates of 8.0 Kbps.

2.3.3 Priority Assignment Control Plots

Figures 35 and 36 show priority assignment plots for Programs 4B2 and 4A2, respectively. Both figures plot "input to buffer" vs. "range time."

2.3.4 Combination Control Plot

Figure 37 shows a plot of Runs #204-23, #204-24, #204-25, #204-26, #204-33, #204-36, and #204-37. All curves plot "input to buffer" vs. range time.

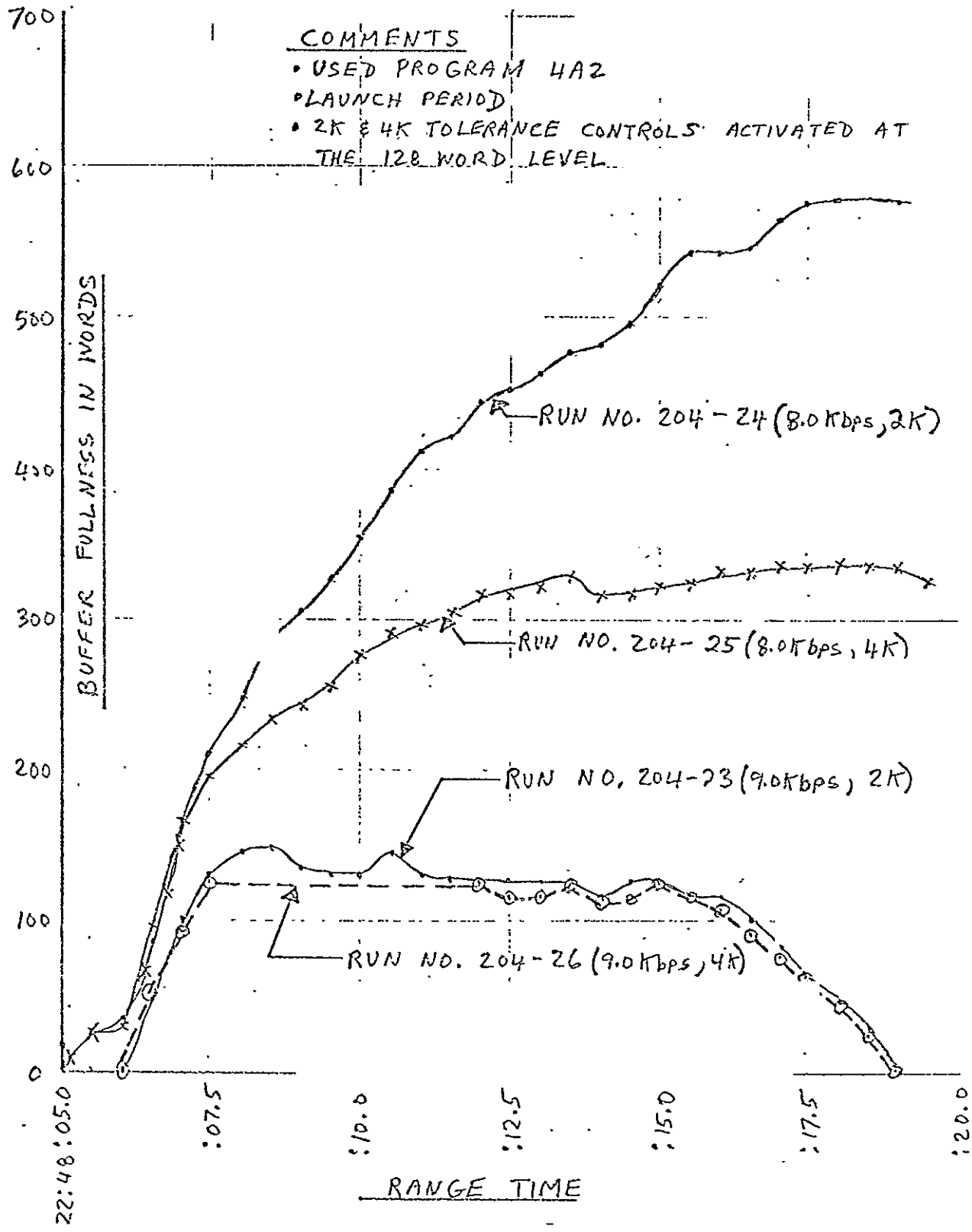


Fig. 34 Tolerance Control Plots (Type I) – Runs #204-23, #204-24, #204-25 & #204-26

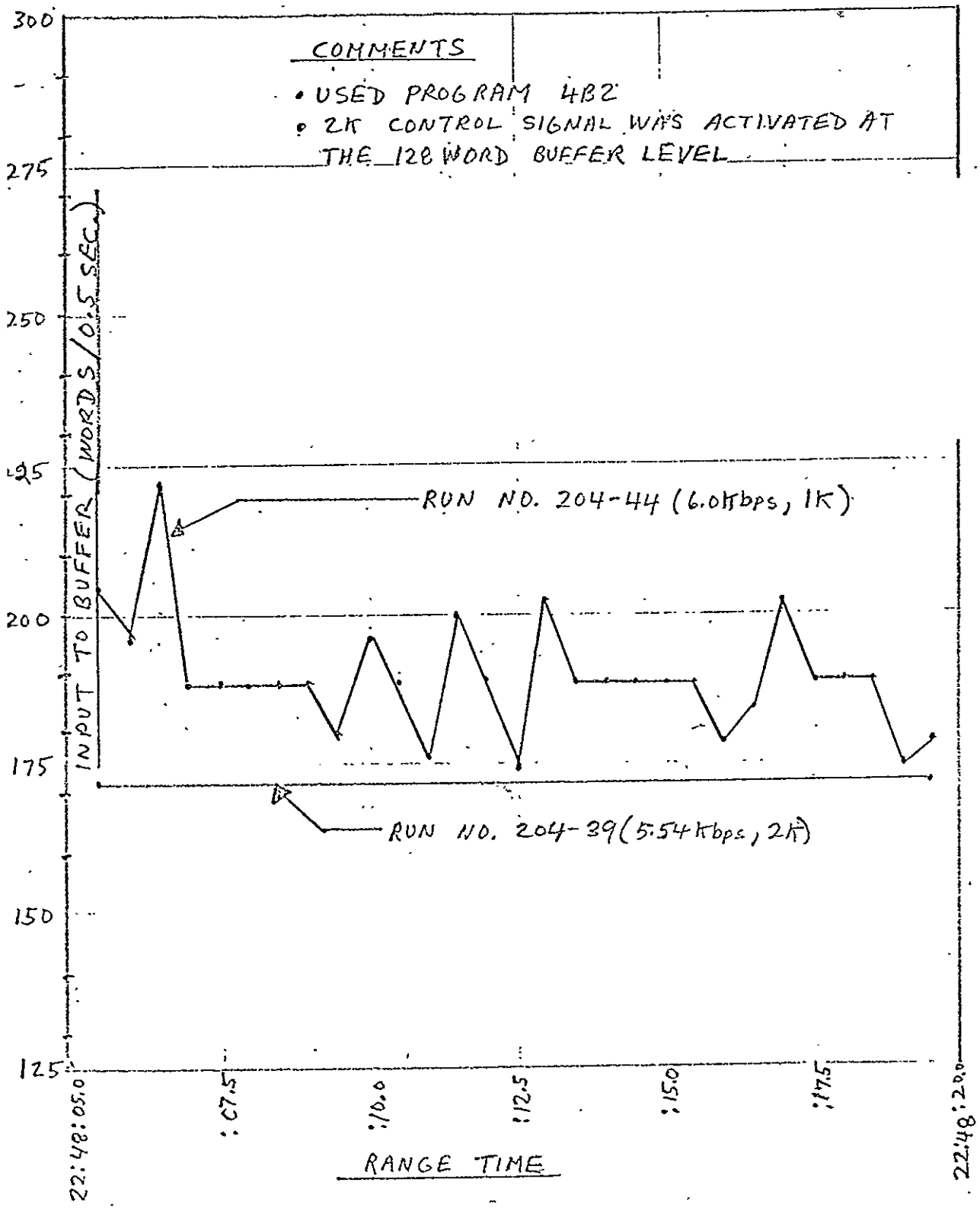


Fig. 35 Priority Assignment Control Plots (Type II) – Runs #204-39 & #204-44

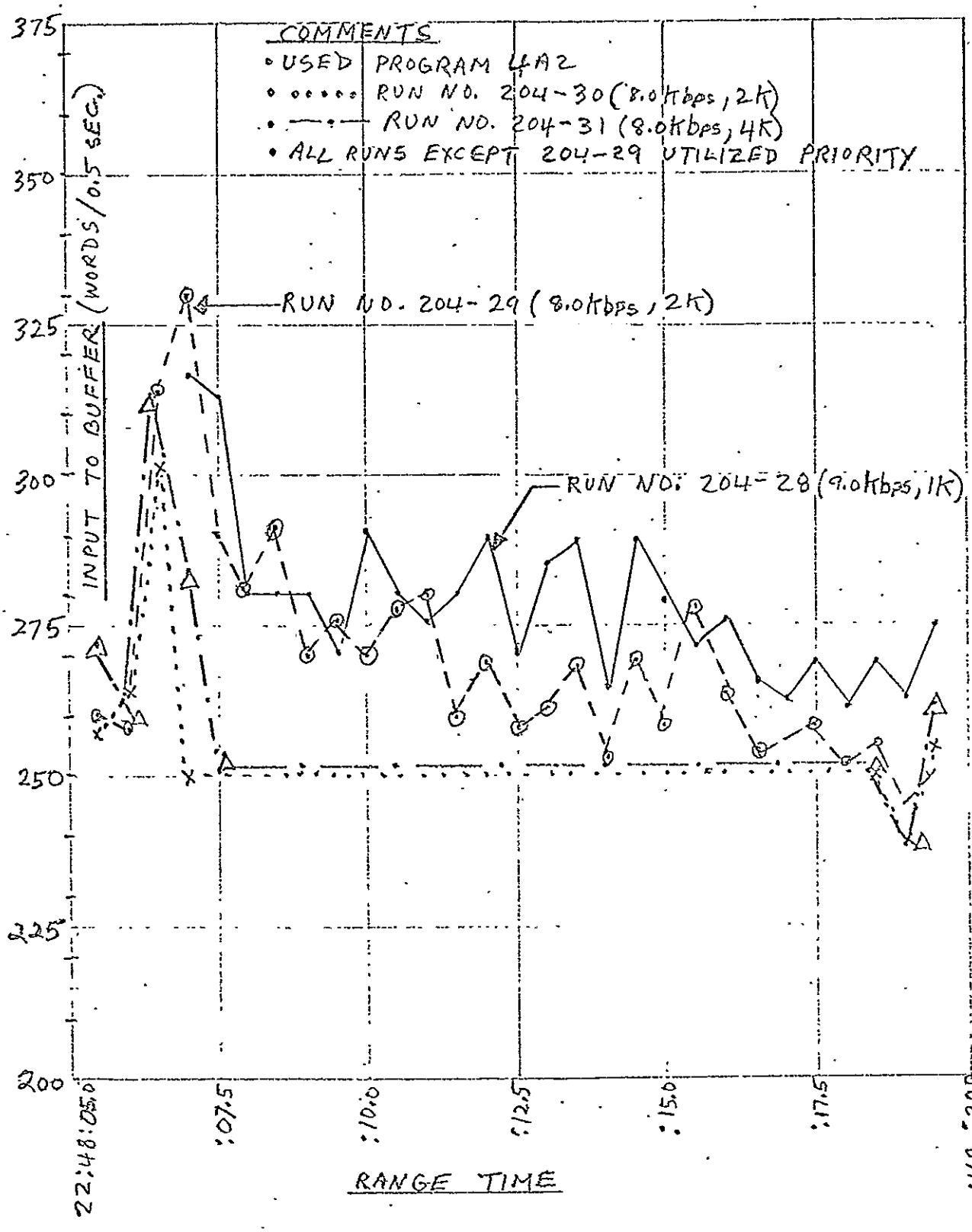


Fig. 36 Priority Assignment Control Plots (Type II) – Runs #204-28, #204-29, #204-30 & #204-31

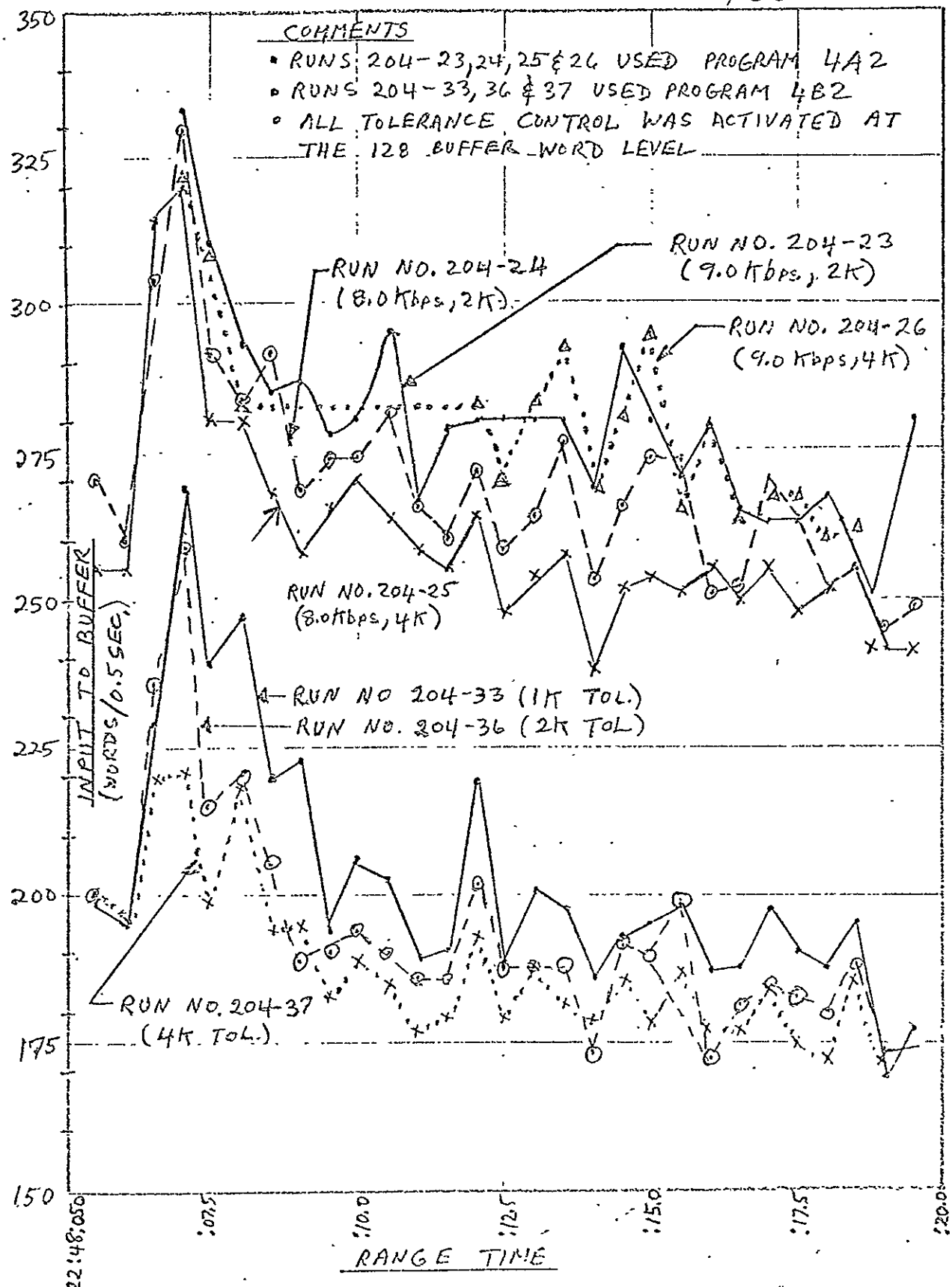


Fig. 37 Combination Control Plots (Type II) – Runs #204-23, #204-24, #204-25, #204-26, #204-33, #204-36 & #204-37

3. ANALYSIS

Data Compression Ratio

It was not the intent of the Data Compressor Test program to perform a thorough theoretical analysis on data compression. However, some analysis on the test results is in order. Due to the large number of test runs generated, several optimum test runs from each flight were selected for study.

Table 10 lists these optimum test runs from Flights 202, 203 and 204 along with their associated Program, Input Bit Rate, Output Bit Rate, Maximum Buffer Queue Length, Maximum Input Words to Buffer, Figures Plotted on, Flight Number and Data Compression Ratio. The data compression ratio was determined by taking the ratio of the input bit rate to the output bit rate. The input bit rate was determined for each program by summing all nonprogram rejected data time slots with the sync word time slots (360) and multiplying their sum by 10. The output bit rate was directly read from the compressor program sheet.

Table 10 lists test runs for both high and low activity periods. In-flight telemetry calibrations for all test runs were rejected so as to eliminate false buffer memory operations.

Studying Table 10 revealed that the data compression ratio for the launch period varied from 1.95 for Run #202-7 to 5.67 for Run #202-29. Low activity periods showed data compression ratios extending from 5.1 to 7.42. It is interesting to note the difference in data compression ratios between the basic Type A and B programs. The average compression ratio for Program A is 2.5 as compared to 4.92 for Program B. Recalling that Programs A and B are respectively the 1K and 4K tolerances assignments specified by the work statement, a significant improvement in compression ratio has been achieved by widening the data measurement tolerances.

Table 10

DATA COMPRESSION RATIO CHART

Optimum Run	Program	Input Bit Rate	Output Bit Rate	Maximum Buffer Queue Length	Maximum Input Words to Buffer 0.5 Sec	Plotted On Figures	Flight Number	Data Compression Ratio
202-5	2A2	31,440	12,000	516 words	475	6	202	2.62
202-7	2A3	35,040	18,000	489	665	7	202	1.95
202-29	2B2	31,440	5,540	600	354	8	202	5.67
202-46	2B2	31,440	4,800	low activity	193	9	202	6.55
202-38	2B2 (2K)	31,440	4,240	low activity	176	20	202	7.42
203-46	3B2	43,080	14,400	660	590	22,28	203	3.00
203-32	3B1	62,760	10,300	low activity	358	23	203	6.09
203-21	3A2	39,840	14,400	700	598	24,25	203	2.8
203-25	3A3	48,120	24,000	438	860	26	203	2.0
204-14	4A2	28,560	8,000	956	396	29	204	3.57
204-33	4B2	28,560	6,000	474	269	30,38	204	4.76
204-40	4B2	28,560	5,540	low activity	193	31	204	5.1
204-7	4A1	49,560	24,000	624	820	32	204	2.07

At this point it is impossible to attribute the improved data compression ratio to system noise or the rejection of redundant data samples. Further analysis should be performed to determine the system noise before meaningful tolerance values can be assigned to each type of measurement.

3.2 Input Words to Buffer

Another method for observing the effectiveness the control parameters have on the buffer queue length is to observe the number of input words to the buffer memory per unit interval of time. For this test program, the input words to the buffer were integrated over a 0.5 second interval for all test runs and tabulated in the tables of Appendix B.

Comparing the "input to buffer" values for tolerance control type runs, the number of input words to the buffer decreased as the measurement tolerances were widened as was expected. After studying the "input to buffer" parameter for numerous test runs, it was felt that integrations over smaller increments of time could give a better appreciation of buffer operations.

4. RECOMMENDATIONS

Based upon the test analysis results, the following recommendations are proposed for future test and study.

1. Determine the system noise level for each flight so that proper accuracy values can be assigned to each data channel for the 1K tolerance program. (Presently, an ambiguity exists in trying to attribute the generation of significant data samples from either system noise or activity.)

2. Study the number of input words to the buffer memory over smaller time increments. (For this report, the number of buffer input words was integrated over 0.5 second intervals, depicting data activity trends. For a better understanding of compressor operations on this data, it is suggested that the "input words to buffer" parameter be integrated over each main frame interval.)

3. Study Saturn PCM telemetry data utilizing a first-order data compressor and compare results with the zero-order predictor buffer experiments.

4. Conduct additional studies to compare queuing buffer control characteristics between adaptive aperture and adaptive filtering. These experiments might best be conducted by constructing an adaptive filter breadboard which could be added in front of the Saturn data compressor or the MSFC Telemetry Redundancy Analyzer System. In view of the Saturn PCM telemetry noise problem, it is believed that adaptive filtering will more effectively control buffer queue length and promises to reduce compression RMS errors.

Appendix A

DATA CHANNEL PROGRAM SHEETS

The tables presented in this appendix describe the data channel information programmed into the data compressor for various Saturn flights. Tables A. 1, A. 3 and A. 4 describe the programs used for Flights AS-202, AS-203 and AS-204, respectively. Table A. 2 describes the program used for verification tests of Flight AS-203.

For each data channel, the stored address bit priority and tolerance are programmed into the data compressor. Variations to the basic Programs XA1 and XB1 are noted in the column designated as "Prog." A description of these program variations is described in the test for that particular flight.

AD/COM

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 1 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG. 2B1	Prog.
1	—	1	1	1	A	0	0	REJ	REJ	
2	C6-601	1	1	1	B	0	0	1.56	6.4	
3	C27-603	1	1	2	A	0	0	1.56	6.4	
4	G1-1 G1-404	1	1	2	B	0	1	.78	3.2	
5	C38-601	1	1	3	A	0	0	1.56	6.4	
6	—	1	1	3	B	0	0	REJ.	REJ.	
7	—	1	1	4	A	0	0	REJ.	REJ.	
8	C17-603	1	1	4	B	1	0	1.56	6.4	
9	H69-602	1	1	5	A	0	1	.1	.78	2A2, 2A3 2B3, 3B3
10	J7-603	1	1	5	B	1	1	.1	.78	
11	—	1	1	6	A	0	0	REJ.	REJ.	
12	C58-602	1	1	6	B	0	0	1.56	6.4.	
13	D10-603	1	1	7	A	1	1	.78	3.2	
14	K4-603	1	1	7	B	1	1	ACC	.1	2A2, 2B2
15	H60-603	1	1	8	A	1	0	REJ	REJ.	
16	H60-603	1	1	8	B	1	0	REJ	REJ	
17	H60-603	1	1	9	A	1	0	REJ	REJ.	
18	H60-603	1	1	9	B	0	0	REJ	REJ	
19	F2-601	1	1	10	A	0	1	.1	.78	
20	M2-602	1	1	10	B	1	1	1.56	6.4	
21	H70-607	1	1	11	A	1	1	.1	.78	2A2, 2A3 2B2, 2B3
22	H10-603	1	1	11	B	1	0	.1	.78	"
23	H71-603	1	1	12	A	1	0	.1	.78	"
24	H11-603	1	1	12	B	1	1	.1	.78	"

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 2 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
25	K	1	1	13	A	0	1	Acc	.1	2A2, 2B2
26	M18-601	1	1	13	B	0	0	1.56	6.4	
27	—	1	1	14	A	1	0	REJ.	REJ.	
28	H12-603	1	1	14	B	1	1	.1	.78	2A2, 2A3 2B2, 2B3
29	—	1	1	15	A	1	0	REJ.	REJ.	
30	H40-603	1	1	15	B	1	0	.1	.78	2A2, 2A3 2B2, 2B3
31	—	1	1	16	A	1	0	REJ.	REJ.	
32	H41-603	1	1	16	B	0	0	.1	.78	2A2, 2A3 2B2, 2B3
33	K1	1	1	17	A	0	1	ACC.	.1	" "
34	J1-603	1	1	17	B	1	1	.1	.78	
35	H1-2	1	1	18	A	1	1	.1	.78	2A2, 2A3 2B2, 2B3
36	H42-603	1	1	18	B	1	0	.1	.78	"
37	K	1	1	19	A	0	1	ACC	.1	2A2, 2B2
38	C68-601	1	1	19	B	1	1	1:56	6.4	
39	H1-3	1	1	20	A	1	1	.1	.78	2A2, 2A3 2B2, 2B3
40	A2-603	1	1	20	B	0	1	.1	.78	
41	J25-602	1	1	21	A	1	0	.1	.78	
42	—	1	1	21	B	1	0	REJ.	REJ.	
43	H1-4	1	1	22	A	0	1	.1	.78	2A2, 2A3 2B2, 2B3
44	M24-603	1	1	22	B	1	1	1.56	6.4	
45	H60-603	1	1	23	A	1	0	REJ.	REJ	
46	H60-603	1	1	23	B	1	0	REJ	REJ.	
47	H60-603	1	1	24	A	1	0	REJ.	REJ.	
48	H60-603	1	1	24	B	1	0	REJ.	REJ.	

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 3 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
49	H2-2 H3-404	1	1	25	A	1	0	.1	.78	2A2, 2A3 2B2, 2B3
50	—	1	1	25	B	1	0	REJ.	REJ.	
51	H2-3 H4-404	1	1	26	A	1	1	.1	.78	2A2, 2A3 2B2, 2B3
52	D1-900	1	1	26	B	1	0	.78	3.2	
53	H2-4 H5-404	1	1	27	A	1	0	.1	.78	2A2, 2A3 2B2, 2B3
54	D3-900	1	1	27	B	1	1	.78	3.2	
55	REF. SIG.	1	1	28	A	1	1	.1	.1	
56	REF. SIG.	1	1	28	B	1	1	.1	.1	
57	M. PULSE	1	1	29	A	1	1	REJ.	REJ.	
58	—	2	2	1	B	0	0	REJ.	REJ.	
59	C28-603	2	2	2	A	0	0	1.56	6.4	
60	G1-2	2	2	2	B	0	1	.78	3.2	
61	C39-602	2	2	3	A	0	0	1.56	6.4	
62	—	2	2	3	B	0	0	REJ.	REJ.	
63	C74-602	2	2	4	A	0	1	1.56	6.4	
64	C18-602	2	2	4	B	1	0	1.56	6.4	
65	—	2	2	5	B	1	0	REJ.	REJ	
66	C59-602	2	2	6	B	0	0	1.56	6.4	
67	D11-603	2	2	7	A	1	0	.78	3.2	
68	F3-601	2	2	10	A	0	1	.1	.78	
69	M3-601	2	2	10	B	1	0	1.56	6.4	
70	M19-601	2	2	13	B	0	0	1.56	6.4	
71	—	2	2	14	A	1	0	REJ	REJ.	
72	K_2	2	2	17	A	0	1	ACC.	.1	2A2, 2A3 2B2, 2B3

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 4 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
73	J2-603	2	2	17	B	1	0	.1	.78	
74	H35-603	2	2	19	B	1	1	.1	.78	2A2, 2A3 2B2, 2B3
75	J26-602	2	2	21	A	1	1	.1	.78	
76	M25-603	2	2	22	B	1	0	1.56	6.4	
77	—	3	3	1	B	0	0	REJ.	REJ	
78	C29-603	3	3	2	A	0	0	1.56	6.4	
79	G1-3	3	3	2	B	0	1	.78	3.2	
80	C40-602	3	3	3	A	0	0	1.56	6.4	
81	A4-601	3	3	3	B	0	0	.1	.78	
82	D25-601	3	3	4	A	0	0	.78	3.2	
83	C19-601	3	3	4	B	1	1	1.56	6.4	
84	—	3	3	5	B	1	0	REJ.	REJ.	
85	C60-602	3	3	6	B	0	0	1.56	6.4	
86	D12-603	3	3	7	A	1	1	.78	3.2	
87	F4-603	3	3	16	A	0	1	.1	.78	
88	M6-603	3	3	10	B	1	0	1.56	6.4	
89	M20-601	3	3	13	B	0	0	1.56	6.4	
90	—	3	3	14	A	1	0	REJ.	REJ.	
91	K_3	3	3	17	A	0	1	ACCPT.	.1	2A2, 2A3 2B1, 2B3
92	—	3	3	17	B	1	0	REJ.	REJ.	
93	H36-603	3	3	19	B	1	0	.1	.78	2A2, 2A3 2B1, 2B3
94	J27-602	3	3	21	A	1	1	.1	.78	
95	M26-603	3	3	22	B	1	0	1.56	6.4	
96	C9-601	4	1	1	B	0	0	1.56	6.4	

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 5 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
97	C30-603	4	1	2	A	0	0	1.56	6.4	
98	G1-4	4	1	2	B	0	0	.78	3.2	
99	C41-602	4	1	3	A	0	0	1.56	6.4	
100	A5-603	4	1	3	B	0	1	.1	.78	
101	C51-603	4	1	4	A	0	0	1.56	6.4	
102	C20-601	4	1	4	B	1	0	1.56	6.4	
103	—	4	1	5	B	1	0	REJ.	REJ	
104	D30-601	4	1	6	B	0	0	.78	3.2	
105	M1-603	4	1	7	A	1	0	1.56	6.4	
106	F5-603	4	1	10	A	0	1	.1	.78	
107	M7-603	4	1	10	B	1	0	1.56	6.4	
108	C69-602	4	1	13	B	0	0	1.56	6.4	
109	—	4	1	14	A	1	0	REJ.	REJ.	
110	—	4	1	17	A	0	0	REJ.	REJ.	
111	—	4	1	17	B	1	0	REJ.	REJ.	
112	J67-603	4	1	19	B	1	1	.1	.75	
113	J28-602	4	1	21	A	1	0	.1	.78	
114	M27-603	4	1	22	B	1	0	1.56	6.4	
115	C10-601	5	2	1	B	0	0	1.56	6.4	
116	C31-603	5	2	2	A	0	0	1.56	6.4	
117	G2-1 G2-403	5	2	2	B	0	1	.78	3.2	
118	C42-603	5	2	3	A	0	0	1.56	6.4	
119	R4-602	5	2	3	B	0	1	.1	.78	
120	C52-603	5	2	4	A	0	0	1.56	6.4	

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 6 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
121	C21-603	5	2	4	B	1	0	1.56	6.4	
122	M4-603	5	2	5	B	1	0	1.56	6.4	
123	C64-601	5	2	6	B	0	0	1.56	6.4	
124	C61-602	5	2	7	A	1	0	1.56	6.4	
125	F6-602	5	2	10	A	0	1	.1	.78	
126	M8-603	5	2	10	B	1	0	1.56	6.4	
127	C70-602	5	2	13	B	0	1	1.56	6.4	
128	R10-602	5	2	14	A	1	0	.1	.78	
129	———	5	2	17	A	0	0	REJ.	REJ.	
130	———	5	2	17	B	1	0	REJ.	REJ.	
131	J68-603	5	2	19	B	1	0	.1	.78	
132	J29-602	5	2	21	A	1	1	.1	.78	
133	M28-603	5	2	22	B	1	0	1.56	6.4	
134	C11-601	6	3	1	B	0	0	1.56	6.4	
135	C33-603	6	3	2	A	0	0	1.56	6.4	
136	G2-2	6	3	2	B	6	1	.78	3.2	
137	C43-603	6	3	3	A	0	0	1.56	6.4	
138	R5-602	6	3	3	B	0	1	.1	.78	
139	C53-603	6	3	4	A	0	0	1.56	6.4	
140	C22-602	6	3	4	B	1	0	1.56	6.4	
141	R7-602	6	3	5	B	1	1	.1	.78	
142	C65-601	6	3	6	B	0	0	1.56	6.4	
143	D24-601	6	3	7	A	1	1	.78	3.2	
144	F7-601	6	3	10	A	0	1	.1	.78	

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IV Sheet 7 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
145	M12-601	6	3	10	B	1	0	1.56	6.4	
146	—	6	3	13	B	0	0	REJ.	REJ.	
147	R11-602	6	3	14	A	1	1	.1	.78	
148	K6	6	3	17	A	0	1	ACCPT	.1	2A2; 2B3 2B1, 2B3
149	—	6	3	17	B	1	0	REJ.	REJ.	
150	—	6	3	19	B	1	0	REJ.	REJ.	
151	J30-602	6	3	21	A	1	1	.1	.78	
152	—	6	3	22	B	1	0	REJ.	REJ.	
153	C12-601	7	1	1	B	0	0	1.56	6.4	
154	C34-603	7	1	2	A	0	0	1.56	6.4	
155	G2-3	7	1	2	B	0	0	.78	3.2	
156	C44-603	7	1	3	A	0	0	1.56	6.4	
157	R6-602	7	1	3	B	0	0	.1	.78	
158	C54-603	7	1	4	A	0	0	1.56	6.4	
159	C23-603	7	1	4	B	1	0	1.56	6.4	
160	R8-602	7	1	5	B	1	0	.1	.78	
161	C66-601	7	1	6	B	0	0	1.56	6.4	
162	D17-601	7	1	7	A	1	1	.78	3.2	
163	F8-603	7	1	10	A	0	1	.1	.78	
164	M13-601	7	1	10	B	1	0	1.56	6.4	
165	—	7	1	13	B	0	0	REJ	REJ	
166	R12-60	7	1	14	A	1	1	.1	.78	
167	K7	7	1	17	A	0	1	ACC	.1	2A2, 2B3 2B2, 2B3
168	J8-603	7	1	17	B	1	0	.1	.78	

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 8 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
169	C67-603	7	1	19	B	1	0	1.56	6.4	
170	J31-602	7	1	21	A	1	0	.1	.78	
171	M29-603	7	1	22	B	1	0	1.56	6.4	
172	C13-601	8	2	1	B	0	0	1.56	6.4	
173	C35-601	8	2	2	A	0	0	1.56	6.4	
174	G2-4	8	2	2	B	0	1	.78	3.2	
175	R33-603	8	2	3	A	0	0	.78	3.2	
176	—	8	2	3	B	0	0	REJ.	REJ.	
177	C55-603	8	2	4	A	0	0	1.56	6.4	
178	C24-603	8	2	4	B	1	1	1.56	6.4	
179	R9-602	8	2	5	B	1	0	.1	.78	
180	H54-603	8	2	6	B	0	0	.1	.78	2A2, 2A3 2B1, 2B3
181	D18-601	8	2	7	A	1	1	.78	3.2	
182	F9-602	8	2	10	A	0	1	.1	.78	
183	M14-601	8	2	10	B	1	0	1.56	6.4	
184	—	8	2	13	B	0	0	REJ.	REJ.	
185	R13-602	8	2	14	A	1	1	.1	.78	
186	K_B	8	2	17	A	0	1	ACC.	.1	2A2, 2A3 2B2, 2B3
187	J9-603	8	2	17	B	1	1	.1	.78	
188	K61-603	9	2	19	B	1	1	ACC	.1	2A2, 2A3 2B1, 2B3
189	J32-602	8	2	21	A	1	0	.1	.78	
190	C71-601	8	2	22	B	1	0	1.56	6.4	
191	C15-601	9	3	1	B	0	0	1.56	6.4	
192	C36-601	9	3	2	A	0	0	1.56	6.4	

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 9 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
193	H1-1 H1-403	9	3	2	B	0	0	.1	.78	2A2, 2A3 2B2, 2B3
194	R34-602	9	3	3	A	0	0	.1	.78	
195	—	9	3	3	B	0	0	REJ.	REJ.	
196	C56-603	9	3	4	A	0	0	1.56	6.4	
197	C25-602	9	3	4	B	1	0	1.56	6.4	
198	—	9	3	5	B	1	0	REJ.	REJ.	
199	H55-603	9	3	6	B	0	1	.1	.78	2A2, 2A3 2B2, 2B3
200	—	9	3	7	A	1	0	REJ.	REJ.	
201	F10-601	9	3	10	A	0	1	.1	.78	
202	M16-601	9	3	10	B	1	0	1.56	6.4	
203	—	9	3	13	B	0	0	REJ	REJ.	
204	R14-601	9	3	14	A	1	0	.1	.78	
205	R9/G9	9	3	17	A	0	1	.1	.78	
206	D19-602	9	3	17	B	1	1	.78	3.2	
207	T26-603	9	3	19	B	1	1	ACUM	.1	2A2, 2A3 2B2, 2B3
208	G3-601	9	3	21	A	1	1	.78	3.2	
209	C62-603	9	3	22	B	1	0	1.56	6.4	
210	C16-601	10	1	1	B	0	0	1.56	6.4	
211	C37-601	10	1	2	A	0	0	1.56	6.4	
212	H2-1 H2-403	10	1	2	B	0	1	.1	.78	2A2, 2A3 2B1, 2B3
213	R35-602	10	1	3	A	0	0	.1	.78	
214	—	10	1	3	B	0	0	REJ	REJ	
215	C57-900	10	1	4	A	0	0	1.56	6.4	
216	C26-601	10	1	4	B	1	1	1.56	6.4	

Table A.1

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-202 Vehicle No. IU Sheet 10 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 2A1	PROG 2B1	Prog.
217	——	10	1	5	B	1	0	REJ.	REJ.	
218	H56-603	10	1	6	B	0	1	.1	.78	2A2, 2A3 2B2, 2B3
219	——	10	1	7	A	1	0	REJ.	REJ.	
220	F11-603	10	1	10	A	0	1	.1	.78	
221	M17-601	10	1	10	B	1	0	1.56	6.4	
222	——	10	1	13	B	6	0	REJ.	REJ.	
223	R15-602	10	1	14	A	1	0	.1	.78	
224	R_{10} M_{10} G_{10}	10	1	17	A	0	0	.1	.78	
225	D20-602	10	1	17	B	1	0	.78	3.2	
226	——	10	1	19	B	1	0	REJ.	REJ.	
227	——	10	1	21	A	1	0	REJ.	REJ.	
228	C63-603	10	1	22	B	1	0	1.56	6.4	
229	——									

Table A. 2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU Sheet 1 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
1	A3-603	1	1	1	A	0	0	3.2		
2	C6-601	1	1	1	B	0	0	6.4		
3	D25-601	1	1	2	A	0	1	3.2		
4	C27-603	1	1	2	B	1	0	6.4		
5	H40-603	1	1	3	A	0	1	REJ		
6	C38-601	1	1	3	B	0	0	6.4		
7	J7-603	1	1	4	A	0	0	.78		
8	C17-603	1	1	4	B	1	0	6.4		
9	H19-602	1	1	5	A	0	1	REJ		
10	F2-601	1	1	5	B	1	1	.78		
11	K4-603	1	1	6	A	0	1	.10		
12	C58-602	1	1	6	B	0	1	6.4		
13	H30-900	1	1	7	A	1	0	.78		
14	G1-2	1	1	7	B	1	1	3.2		
15	H10-603	1	1	8	A	1	1	REJ.		
16	G1-3	1	1	8	B	1	1	3.2		
17	H60-603	1	1	9	A	1	1	REJ.		
18	G1-4	1	1	9	B	1	1	.78		
19	H60-603	1	1	10	A	0	1	REJ.		
20	M2-602	1	1	10	B	1	0	.78		
21	H60-603	1	1	11	A	1	.1	REJ		
22	H10-603	1	1	11	B	1	1	REJ		
23	H71-602	1	1	12	A	1	1	REJ		
24	H11-603	1	1	12	B	1	.1	REJ		

Table A.2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU Sheet 2 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
25	K	1	1	13	A	1	1	.10		
26	H1-1 H1-401	1	1	13	B	0	1	REJ		
27	F9-602	1	1	14	A	1	1	.78		
28	H12-603	1	1	14	D	1	1	REJ.		
29	D35-900	1	1	15	A	0	0	3.2		
30	D25-602	1	1	15	B	1	0	.78		
31	J64-603	1	1	16	A	1	0	.10		
32	H2-1 H2-401	1	1	16	B	0	1	REJ.		
33	K	1	1	17	A	0	1	.10		
34	J1-603	1	1	17	B	0	0	.78		
35	M6-603	1	1	18	A	1	0	.78		
36	G1-1 G1-401	1	1	18	D	1	1	3.2		
37	K9-603	1	1	19	A	0	1	.10		
38	C69-601	1	1	19	B	1	0	6.4		
39	H70-602	1	1	20	A	1	1	REJ.		
40	A2-603	1	1	20	B	1	1	.78		
41	—	1	1	21	A	1	0	REJ.		
42	G2-1 G2-401	1	1	21	B	1	1	3.2		
43	H61-603	1	1	22	A	0	1	REJ		
44	M24-603	1	1	22	B	1	0	.78		
45	H66-603	1	1	23	A	1	1	REJ		
46	G2-2	1	1	23	B	1	1	REJ		
47	H66-603	1	1	24	A	1	1	REJ		
48	G2-3	1	1	24	B	1	1	REJ		

AD/COM-

Table A. 2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU Sheet 3 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
49	H60-603	1	1	25	A	1	1	REJ.		
50	C2-4	1	1	25	B	1	1	REJ.		
51	H61-603	1	1	26	A	1	1	REJ.		
52	D1-GCO	1	1	26	B	1	1	3.2		
53	H42-603	1	1	27	A	1	1	REJ.		
54	D3-GCO	1	1	27	B	1	0	3.2		
55	REF.	1	1	28	A	1	1	.78		
56	REF.	1	1	28	B	1	1	.78		
57	M. PULSE	1	1	29	A	0	1	REJ.		
58	A4-GC2	2	2	1	A	0	0	6.4		
59	C51-GC3	2	2	1	B	0	0	6.4		
60	H1-2	2	2	2	A	0	0	.78		
61	C28-GC3	2	2	2	B	1	0	6.4		
62	C34-GC2	2	2	3	B	0	0	6.4		
63	F10-GC1	2	2	4	A	0	1	.78		
64	C19-GC1	2	2	4	B	1	0	6.4		
65	F3-GC1	2	2	5	B	1	0	.78		
66	C59-GC2	2	2	6	B	0	1	6.4		
67	M31-GOC	2	2	7	A	1	0	.78		
68	M3-601	2	2	10	B	1	0	.78		
69	M1-602	2	2	14	A	1	0	.78		
70	J26-GC2	2	2	15	B	1	0	.78		
71	J2-603	2	2	17	A	0	1	1.60		
72	M12-GC1	2	2	17	B	0	0	.75		

Table A. 2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU Sheet 4 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
73	K8-603	2	2	18	A	1	1	.78		
74	H35-603	2	2	19	B	1	1	.78		
75	M25-603	2	2	22	B	1	0	.78		
76	H54-603	3	3	1	A	0	1	.78		
77	C52-603	3	3	1	B	0	0	6.4		
78	C11-601	3	3	2	A	0	0	6.4		
79	C29-603	3	3	2	B	1	0	6.4		
80	C40-602	3	3	3	B	0	0	6.4		
81	R4-602	3	3	4	A	0	1	.78		
82	C20-601	3	3	4	B	1	0	6.4		
83	P1-603	3	3	5	B	1	1	.78		
84	C60-602	3	3	6	B	0	0	6.4		
85	4-900	3	3	7	A	1	0	6.4		
86	R10-602	3	3	10	B	1	1	.78		
87	M4-603	3	3	14	A	1	0	.78		
88	J27-602	3	3	15	B	1	0	.78		
89	—	3	3	17	A	0	1	.10		
90	M13-601	3	3	17	B	0	0	RES.		
91	K5-603	3	3	18	A	1	0	.78		
92	H36-603	3	3	19	B	1	1	.78		
93	M26-603	3	3	22	B	1	0	.78		
94	H55-603	4	1	1	A	0	1	.78		
95	C9-601	4	1	1	B	0	0	6.4		
96	D29-601	4	1	2	A	0	1	3.2		

Table A. 2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU Sheet 5 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
97	C24-603	4	1	2	B	1	0	6.4		
98	C4-602	4	1	3	B	0	0	6.4		
99	R4-602	4	1	4	A	0	1	.78		
100	C20-601	4	1	4	B	1	0	6.4		
101	F4-603	4	1	5	B	1	1	.78		
102	C60-602	4	1	6	B	0	1	6.4		
103	L4-900	4	1	7	A	1	0	3.2		
104	R10-602	4	1	10	B	1	1	.78		
105	M4-603	4	1	14	A	1	1	3.2		
106	T27-602	4	1	15	B	1	0	.78		
107	——	4	1	17	A	0	1	.10		
108	M13-601	4	1	17	B	0	0	RES.		
109	K8-603	4	1	18	A	1	0	.78		
110	1136-603	4	1	19	B	1	0	.78		
111	1126-603	4	1	22	B	1	0	.78		
112	1156-603	5	2	1	A	0	1	.78		
113	C10-601	5	2	1	B	0	0	6.4		
114	A5-603	5	2	2	A	0	1	3.2		
115	C33-603	5	2	2	B	1	0	6.4		
116	C42-602	5	2	3	B	0	0	6.4		
117	R6-602	5	2	4	A	0	1	.78		
118	C22-602	5	2	4	B	1	0	6.4		
119	F6-602	5	2	5	B	1	1	.78		
120	C64-601	5	2	6	B	0	0	6.4		

Table A. 2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU Sheet 6 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
121	H20-603	5	2	7	A	1	1	.178		
122	D33-902	5	2	10	B	1	1	3.2		
123	A8-603	5	2	14	A	1	1	.10		
124	C72-606	5	2	15	B	1	0	6.4		
125	—	5	2	17	A	0	1	.1		
126	M16-601	5	2	17	B.	0	0	REJ		
127	K5-603	5	2	18	A	1	0	.78		
128	J68-603	5	2	19	B	1	0	.78		
129	M28-603	5	2	22	B	1	0	.178		
130	D27-900	6	3	1	A	0	1	3.2		
131	F12-900	6	3	1	B	0	1	.78		
132	J30-602	6	3	2	A	0	0	.75		
133	C35-601	6	3	2	B	1	1	6.4		
134	C43-603	6	3	3	B	0	0	6.4		
135	C53-603	6	3	4	A	0	0	6.4		
136	C23-603	6	3	4	B	1	0	6.4		
137	F7-601	6	3	5	B	1	1	.78		
138	C65-601	6	3	6	B	0	0	6.4		
139	H24-603	6	3	7	A	1	1	.78		
140	R11-602	6	3	10	B	1	1	.75		
141	D24-601	6	3	14	A	1	1	3.2		
142	—	6	3	15	B	1	0	REJ		
143	—	6	3	17	A	0	1	.10		
144	M17-601	6	3	17	B	0	0	REJ.		

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU Sheet 7 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A.		Prog.
145	K5-603	6	3	18	A	1	0	.78		
146	—	6	3	19	B	1	0	REF.		
147	J32-602	6	3	22	B	1	0	.78		
148	D25-601	7	1	1	A	0	1	3.2		
149	C12-601	7	1	1	B	0	0	6.4		
150	F1-601	7	1	2	A	0	0	6.4		
151	C36-601	7	1	2	B	1	0	6.4		
152	C44-603	7	1	3	B	0	0	6.4		
153	C15-601	7	1	4	A	0	0	6.4		
154	C34-603	7	1	4	B	1	0	6.4		
155	F5-603	7	1	5	B	1	1	.78		
156	C16-601	7	1	6	B	0	0	6.4		
157	H25-603	7	1	7	A	1	1	.78		
158	R4-602	7	1	10	B	1	0	.78		
159	D10-603	7	1	14	A	1	0	3.2		
160	C74-602	7	1	15	B	1	1	6.4		
161	J5-603	7	1	17	A	0	1	.10		
162	M15-601	7	1	17	B	0	0	.78		
163	K5-603	7	1	18	A	1	1	.78		
164	C67-603	7	1	19	B	1	0	6.4		
165	M29-603	7	1	22	B	1	0	.78		
166	C21-603	8	2	1	A	0	0	6.4		
167	C13-601	8	2	1	B	0	0	6.4		
168	A11-603	8	2	2	A	0	1	.78		

Table A.2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU. Sheet 8 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog
169	C37-601	8	2	2	B	1	0	6.4		
170	R33-602	8	2	3	B	0	1	.78		
171	C55-603	8	2	4	A	0	0	6.4		
172	C77-900	8	2	4	B	1	0	6.4		
173	C74-900	8	2	5	B	1	0	6.4		
174	K	8	2	6	B	0	1	.10		
175	A13-900	8	2	7	A	1	0	.78		
176	R7-602	8	2	10	B	1	0	.78		
177	D11-603	8	2	14	A	1	1	3.2		
178	A8-603	8	2	15	B	1	1	.10		
179	J9-603	8	2	17	A	0	1	.10		
180	M19-601	8	2	17	B	0	0	.10		
181	K8-603	8	2	18	A	1	0	.78		
182	A61-603	8	2	19	B	1	1	.10		
183	C71-601	8	2	22	B	1	0	6.4		
184	C95-602	9	3	1	A	0	0	6.4		
185	C54-603	9	3	1	B	0	0	6.4		
186	H2-3	9	3	2	A	0	0	.78		
187	C56-603	9	3	2	B	1	0	6.4		
188	R34-602	9	3	3	B	0	0	.78		
189	C31-603	9	3	4	A	0	0	6.4		
190	D15-601	9	3	4	B	1	1	3.2		
191	C96-901	9	3	5	B	1	1	6.4		
192	D31-900	9	3	6	B	0	0	3.2		

Table A. 2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU. Sheet 9 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
193	A14-602	9	3	7	A	1	0	.78		
194	R14-602	9	3	10	B	1	0	.78		
195	D12-602	9	3	14	A	1	0	3.2		
196	H9-603	9	3	15	B	1	0	.78		
197	D19-602	9	3	17	A	0	0	.10		
198	M20-601	9	3	17	B	0	1	3.2		
199	K129-601	9	3	18	A	1	0	.78		
200	K62-603	9	3	19	B	1	0	.10		
201	C12-603	9	3	22	B	1	0	6.4		
202	C2E-601	10	1	1	A	0	0	6.4		
203	C1-603	10	1	1	B	0	0	6.4		
204	H2-4	10	1	2	A	0	1	.78		
205	C57-602	10	1	2	B	1	0	6.4		
206	R35-602	10	1	3	B	0	0	.78		
207	C34-603	10	1	4	A	0	0	6.4		
208	C78-602	10	1	4	B	1	0	6.4		
209	F11-603	10	1	5	B	1	1	.78		
210	D12-602	10	1	6	B	0	1	3.2		
211	A15-602	10	1	7	A	1	1	.78		
212	R15-602	10	1	10	B	1	0	.78		
213	D17-601	10	1	14	A	1	0	3.2		
214	A10-603	10	1	15	B1	1	0	.78		
215	D2E-602	10	1	17	A	0	0	.10		
216	C69-602	10	1	17	B	0	1	3.2		

AU/COM

Table A. 2

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. 203 Vehicle No. IU. Sheet 10 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG A		Prog.
217	—	10	1	18	A	1	0	6.4		
218	J31-602	10	1	19	B	1	0	.78		
219	G.3-603	10	1	22	B	1	0	6.4		

Table A. 3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. IU Sheet 1 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
1	A3-603	1	1	1	A	0	0	ACC.	.1	
2	C6-601	1	1	1	B	0	0	1.56	6.4	
3	D25-601	1	1	2	A	0	0	.78	3.2	
4	C27-603	1	1	2	B	1	0	1.54	6.4	
5	H40-603	1	1	3	A	0	1	.1	.78	3A2, 3A3 3B2
6	C38-601	1	1	3	B	0	0	1.56	6.4	
7	J7-603	1	1	4	A	0	0	.1	.78	
8	C17-603	1	1	4	B	1	0	1.56	6.4	
9	H69-602	1	1	5	A	0	1	.1	.78	3A2, 3B2
10	F2-601	1	1	5	B	1	1	.1	.78	
11	K4-603	1	1	6	A	0	1	ACC.	.1	3A2, 3B2
12	C58-602	1	1	6	B	0	0	1.56	6.4	
13	M30-900	1	1	7	A	1	0	1.56	6.4	
14	G1-2	1	1	7	B	1	1	.78	3.2	
15	H60-603	1	1	8	A	1	0	REJ	REJ	3B3
16	G1-3	1	1	8	B	1	0	.78	3.2	
17	H60-603	1	1	9	A	1	0	REJ.	REJ	3B3
18	G1-4	1	1	9	B	1	1	.78	3.2	
19	H60-603	1	1	10	A	0	0	REJ.	REJ	3B3
20	M2-602	1	1	10	B	1	0	1.56	6.4	
21	H60-603	1	1	11	A	1	0	REJ	REJ	3B3
22	H10-603	1	1	11	B	1	1	.1	.78	3A2, 3B2
23	H71-602	1	1	12	A	1	0	.1	.78	"
24	H11-603	1	1	12	B	1	0	.1	.78	"

Table A.3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 · Vehicle No. IU Sheet 2 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
25	K	1	1	13	A	1	1	Acc	.1	3A2 3B2
26	H1-1 H1-401	1	1	13	B	0	1	.1	.78	3A2, 3A3 3B2
27	F9-602	1	1	14	A	1	1	.1	.78	
28	H12-603	1	1	14	B	1	0	.1	.78	3A2, 3A3 3B2
29	D35-900	1	1	15	A	0	1	.78	3.2	
30	J25-602	1	1	15	B	1	0	.1	.78	
31	J69-603	1	1	16	A	1	0	.1	.78	
32	H2-1 H2-401	1	1	16	B	0	1	.1	.78	3A2, 3A3 3B2
33	K	1	1	17	A	0	1	Acc	.1	3A2, 3B2
34	J1-603	1	1	17	B	0	0	.1	.78	
35	H6-603	1	1	18	A	1	0	1.56	6.4	
36	G1-1 G1-401	1	1	18	B	1	1	.78	3.2	
37	K8-603	1	1	19	A	0	1	Acc.	.1	3A2 3B2
38	C68-601	1	1	19	B	1	0	1.56	6.4	
39	H70-602	1	1	20	A	1	0	.1	.78	3A2, 3A3 3B2
40	A2-603	1	1	20	B	1	0	.1	.78	
41	—	1	1	21	A	1	0	REJ	REJ	
42	G2-1 G2-401	1	1	21	B	1	1	.78	3.2	
43	H41-603	1	1	22	A	0	1	.1	.78	3A2, 3A3 3B2
44	M24-603	1	1	22	B	1	0	1.56	6.4	
45	H60-603	1	1	23	A	1	0	REJ.	REJ	3B3
46	G2-2	1	1	23	B	1	1	.78	3.2	
47	H60-603	1	1	24	A	1	0	REJ	REJ	3B3
48	G2-3	1	1	24	B	1	1	.78	3.2	

Table A.3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. IU Sheet 3 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
49	H60-603	1	1	25	A	1	0	REJ	REJ	3B3
50	G2-4	1	1	25	B	1	1	.78	3.2	
51	H60-603	1	1	26	A	1	0	REJ.	REJ.	3B3
52	D1-900	1	1	26	B	1	0	.78	3.2	
53	H42-603	1	1	27	A	1	0	.1	.78	3A2, 3A3 3B2
54	D3-900	1	1	27	B	1	0	.78	3.2	
55	REF.	1	1	28	A	1	1	.1	.1	
56	REF.	1	1	28	B	1	1	.1	.1	
57	M. PULSE	1	1	29	A	0	0	REJ.	REJ	
58	A4-601	2	2	1	A	0	1	.1	.78	
59	C51-603	2	2	1	B	0	0	1.56	6.4	
60	H1-2	2	2	2	A	0	1	.1	.78	3A2, 3A3 3B2
61	C28-603	2	2	2	B	1	0	1.56	6.4	
62	C34-602	2	2	3	B	D	0	1.56	6.4	
63	F10-601	2	2	4	A	0	1	.1	.78	
64	C19-601	2	2	4	B	1	1	1.56	6.4	
65	F3-601	2	2	5	B	1	1	.1	.78	
66	C54-602	2	2	6	B	0	0	1.56	6.4	
67	M31-900	2	2	7	A	1	0	1.56	6.4	
68	M3-601	2	2	10	B	1	0	1.56	6.4	
69	M1-602	2	2	14	A	1	1	1.56	6.4	
70	J26-602	2	2	15	B	1	0	.1	.78	
71	J2-603	2	2	17	A	0	0	.1	.78	
72	M12-601	2	2	17	B	0	0	1.56	6.4	

AD/COM-

Table A. 3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. IU Sheet 4 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
73	IT8-603	2	2	18	A	1	1	Acc	.1	3A2 3B2
74	IH35-603	2	2	19	B	1	0	.1	.78	3A2, 3B3 3B2
75	M25-603	2	2	22	B	1	0	1.56	6.4	
76	IH54-603	3	3	1	A	0	0	.1	.78	3A2, 3A3 3B2
77	C52-603	3	3	1	B	0	0	1.56	6.4	
78	C11-601	3	3	2	A	0	0	1.56	6.4	
79	C29-603	3	3	2	B	1	0	1.56	6.4	
80	C40-602	3	3	3	B	0	0	1.56	6.4	
81	R4-602	3	3	4	A	0	1	.1	.78	
82	C20-601	3	3	4	B	1	0	1.56	6.4	
83	F4-603	3	3	5	B	1	1	.1	.78	
84	C60-602	3	3	6	B	0	1	1.56	6.4	
85	L1-900	3	3	7	A	1	0	1.56	6.4	
86	R10-602	3	3	10	B	1	0	.1	.78	
87	M14-603	3	3	14	A	1	1	1.56	6.4	
88	J27-602	3	3	15	B	1	0	.1	.78	
89	—	3	3	17	A	0	0	REJ.	REJ.	
90	M13-601	3	3	17	B	0	0	1.56	6.4	
91	IT8-603	3	3	18	A	1	1	Acc	.1	3A2 3B2
92	IH36-603	3	3	19	B	1	1	.1	.78	3A2, 3A3 3B2
93	M26-603	3	3	22	B	1	0	1.56	6.4	
94	IH55-603	4	1	1	A	0	0	.1	.78	3A2, 3A3 3B2
95	C9-601	4	1	1	B	0	0	1.56	6.4	
96	D29-601	4	1	2	A	0	0	.78	3.2	

Table A.3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. IU Sheet 5 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 3A1	PROG. 3B1	Prog.
97	C29-603	4	1	2	B	1	0	1.56	6.4	
98	C4-602	4	1	3	B	0	0	1.56	6.4	
99	R4-602	4	1	4	A	0	0	.1	.78	
100	C20-601	4	1	4	B	1	0	1.56	6.4	
101	F4-603	4	1	5	B	1	1	.1	.78	
102	C66-602	4	1	6	B	0	0	1.56	6.4	
103	L1-900	4	1	7	A	1	0	1.56	6.4	
104	R10-602	4	1	10	B	1	1	.1	.78	
105	M4-603	4	1	14	A	1	0	1.56	6.4	
106	S27-602	4	1	15	B	1	0	.1	.78	
107	—	4	1	17	A	0	0	REJ.	REJ.	
108	M13-601	4	1	17	B	0	0	1.56	6.4	
109	K8-603	4	1	18	A	1	1	ACC.	.1	3A2 3B2
110	H36-603	4	1	19	B	1	0	.1	.78	3A2, 3A1 3B2
111	M26-603	4	1	22	B	1	0	1.56	6.4	
112	H56-603	5	2	1	A	0	0	.1	.78	3A2, 3A1 3B2
113	C10-601	5	2	1	B	0	0	1.56	6.4	
114	A5-603	5	2	2	A	0	1	.1	.78	
115	C33-603	5	2	2	B	1	0	1.56	6.4	
116	C42-602	5	2	3	B	0	0	1.56	6.4	
117	R6-602	5	2	4	A	0	1	.78	.1	
118	C22-602	5	2	4	B	1	0	1.56	6.4	
119	F6-602	5	2	5	B	1	1	.1	.78	
120	C64-601	5	2	6	B	0	1	1.56	6.4	

AD/COM-

Table A. 3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. I.U Sheet 6 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
121	H20-603	5	2	7	A	1	0	.1	.78	3A2,3A3 3B2
122	D33-900	5	2	10	B	1	1	.78	3.2	
123	A8-603	5	2	14	A	1	0	.1	.78	
124	C72-604	5	2	15	B	1	0	1.56	6.4	
125	—	5	2	17	A	0	0	REJ	REJ	
126	M16-601	5	2	17	B	0	0	1.56	6.4	
127	K8-603	5	2	18	A	1	1	ACC.	.1	3A2 3B2
128	J68-603	5	2	19	B	1	0	.1	.78	
129	M28-603	5	2	22	B	1	0	1.56	6.4	
130	D27-900	6	3	1	A	0	1	.78	3.2	
131	F12-900	6	3	1	B	0	1	.1	.78	
132	J30-602	6	3	2	A	0	0	.1	.78	
133	C35-601	6	3	2	B	1	1	1.56	6.4	
134	C43-603	6	3	3	B	0	0	1.56	6.4	
135	C53-603	6	3	4	A	0	0	1.56	6.4	
136	C23-603	6	3	4	B	1	0	1.56	6.4	
137	F7-601	6	3	5	B	1	1	.1	.78	
138	C65-601	6	3	6	B	0	0	1.56	6.4	
139	H24-603	6	3	7	A	1	1	.1	.78	3A2, 3A3 3B2
140	R11-602	6	3	10	B	1	0	.1	.78	
141	D24-601	6	3	14	A	1	0	.78	3.2	
142	—	6	3	15	B	1	0	REJ.	REJ	
143	—	6	3	17	A	0	0	REJ.	REJ.	
144	M17-601	6	3	17	B	0	0	1.56	6.4	

Table A.3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. IT Sheet 7 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
145	K8-603	6	3	18	A	1	1	ACC.	.1	3A2 3B2
146	—	6	3	19	B	1	0	REJ.	REJ.	
147	J32-602	6	3	22	B	1	0	.1	.78	
148	D28-601	7	1	1	A	0	1	.78	3.2	
149	C12-601	7	1	1	B	0	0	1.56	6.4	
150	F1-601	7	1	2	A	0	1	.1	.78	
151	C36-601	7	1	2	B	1	0	1.56	6.4	
152	C44-603	7	1	3	B	0	0	1.56	6.4	
153	C15-601	7	1	4	A	0	0	1.56	6.4	
154	C24-603	7	1	4	B	1	0	1.56	6.4	
155	F8-603	7	1	5	B	1	1	.1	.78	
156	C66-601	7	1	6	B	0	0	1.56	6.4	
157	H25-603	7	1	7	A	1	0	.1	.78	3A2, 3A3 3B2
158	R9-602	7	1	10	B	1	0	.1	.78	
159	D10-603	7	1	14	A	1	1	.78	3.2	
160	C74-602	7	1	15	B	1	0	1.56	6.4	
161	J8-603	7	1	17	A	0	0	.1	.78	
162	H18-601	7	1	17	B	0	0	1.56	6.4	
163	K8-603	7	1	18	A	1	1	ACC.	.1	3A2 3B2
164	C67-603	7	1	19	B	1	0	1.56	6.4	
165	H29-603	7	1	22	B	1	0	1.56	6.4	
166	C21-603	8	2	1	A	0	0	1.56	6.4	
167	C13-601	8	2	1	B	0	0	1.56	6.4	
168	A11-603	8	2	2	A	0	1	.1	.78	

Table A.3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. IU Sheet 8 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
169	C37-601	8	2	2	B	1	0	1.56	6.4	
170	R33-602	8	2	3	B	0	1	.1	.78	
171	C55-603	8	2	4	A	0	6	1.56	6.4	
172	C77-900	8	2	4	B	1	0	1.56	6.4	
173	C79-900	8	2	5	B	1	0	1.56	6.4	
174	K	8	2	6	B	0	1	ACC.	.1	3A2 3B2
175	A13-900	8	2	7	A	1	1	.1	.78	
176	R7-602	8	2	10	B	1	6	.1	.78	
177	D11-603	8	2	14	A	1	1	.78	3.2	
178	A8-603	8	2	15	B	1	0	.1	.78	
179	J9-603	8	2	17	A	0	0	.1	.78	
180	M19-601	8	2	17	B	0	0	1.56	6.4	
181	K8-603	8	2	18	A	1	1	ACC.	.1	3A2 3B2
182	K61-603	8	2	19	B	1	1	ACC	.1	3A2 3B2
183	C71-601	8	2	22	B	1	0	1.56	6.4	
184	C25-602	9	3	1	A	0	1	1.56	6.4	
185	C54-603	9	3	1	B	0	0	1.56	6.4	
186	H2-3	9	3	2	A	0	1	.1	.78	3A2, 3A3 3B2
187	C56-603	9	3	2	B	1	0	1.56	6.4	
188	R34-602	9	3	3	B	0	1	.1	.78	
189	C31-603	9	3	4	A	0	0	1.56	6.4	
190	D18-601	9	3	4	B	1	1	.78	3.2	
191	C80-900	9	3	5	B	1	0	1.56	6.4	
192	D31-900	9	3	6	B	0	1	.78	3.2	

Table A. 3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. LV Sheet 9 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
193	A14-900	9	3	7	A	1	1	.1	.78	
194	R14-602	9	3	10	B	1	0	.1	.78	
195	D12-602	9	3	14	A	1	1	.78	3.2	
196	A9-603	9	3	15	B	1	0	.78	.78	
197	D19-602	9	3	17	A	0	1	.78	3.2	
198	M20-601	9	3	17	B	0	0	1.56	6.4	
199	K129-601	9	3	18	A	1	1	ACC	.1	3A2 3B2
200	K62-603	9	3	19	B	1	1	ACC	.1	3A2 3B2
201	C62-603	9	3	22	B	1	0	1.56	6.4	
202	C26-601	10	1	1	A	0	0	1.56	6.4	
203	C16-603	10	1	1	B	0	1	1.56	6.4	
204	H2-4	10	1	2	A	0	1	.1	.78	3A2, 3A3 3B2
205	C57-900	10	1	2	B	1	0	1.56	6.4	
206	R35-602	10	1	3	B	0	1	.1	.78	
207	C34-603	10	1	4	A	0	0	1.56	6.4	
208	C78-900	10	1	4	B	1	0	1.56	6.4	
209	F11-603	10	1	5	B	1	1	.1	.78	
210	D32-900	10	1	6	B	0	1	.78	3.2	
211	A15-900	10	1	7	A	1	1	.1	.78	
212	R15-602	10	1	10	B	1	0	.1	.78	
213	D17-601	10	1	14	A	1	1	.78	3.2	
214	A10-603	10	1	15	B	1	0	.1	.78	
215	D20-602	10	1	17	A	0	1	.78	3.2	
216	C69-602	10	1	17	B	0	0	1.56	6.4	

Table A.3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-203 Vehicle No. IU Sheet 10 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 3A1	PROG 3B1	Prog.
217	—	10	1	18	A	1	0	REJ.	REJ.	
218	J31-602	10	1	19	B	1	0	.1	.78	
219	C63-603	10	1	22	B	1	0	1.56	6.4	

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. IU. Sheet 1 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4A1	PROG. 4B1	Prog.
1	R10-602	1	1	1	A	1	0	.78	.1	
2	D0065-414	1	1	1	B	0	0	.78	3.2	
3	J20-603	1	1	2	A	1	1	.1	.78	
4	D0069-415	1	1	2	B	1	1	.78	3.2	
5	H40-603	1	1	3	A	1	0	REJ	REJ	
6	K0132-407	1	1	3	B	0	1	.1	.1	4A2, 4B2 4B3
7	F9-602	1	1	4	A	1	1	.1	.78	
8	D0045-403	1	1	4	B	1	1	.78	3.2	
9	H69-602	1	1	5	A	1	0	REJ.	REJ.	
10	K0135-404	1	1	5	B	1	1	.1	.1	4A2, 4B2 4B3
11	K4-603	1	1	6	A	1	1	.1	.1	4A2, 4B2 4B3
12	D0015-401	1	1	6	B	1	0	.78	3.2	
13	—	1	1	7	A	1	0	REJ.	REJ.	
14	D0017-401	1	1	7	B	1	1	.78	3.2	
15	H60-603	1	1	8	A	0	0	REJ.	REJ.	
16	D0061-424	1	1	8	B	1	1	.78	3.2	
17	H60-603	1	1	9	A	0	0	REJ.	REJ.	
18	D0118-427	1	1	9	B	1	0	.78	3.2	
19	H60-603	1	1	10	A	0	0	REJ	REJ	
20	C0197-401	1	1	10	B	1	1	1.56	6.4	
21	H60-603	1	1	11	A	1	0	REJ	REJ	
22	K0133-401	1	1	11	B	1	1	.1	.1	4A2, 4B2 4B3
23	H71-602	1	1	12	A	0	0	REJ.	REJ.	
24	C0001-401	1	1	12	B	0	0	1.56	6.4	

Table A.4

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. I U Sheet 2 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4A1	PROG. 4B1	Prog.
25	K5-603	1	1	13	A	0	1	.1	.1	4A2, 4B2 4B3
26	M0014-401	1	1	13	B	0	0	1.56	6.4	
27	R11-602	1	1	14	A	0	1	.1	.78	
28	C0161-424	1	1	14	B	1	0	1.56	6.4	
29	—	1	1	15	A	0	0	REJ.	REJ.	
30	C019-401	1	1	15	B	0	0	1.56	6.4	
31	J69-603	1	1	16	A	0	1	.1	.78	
32	D0009-401	1	1	16	B	1	1	.78	3.2	
33	K	1	1	17	A	1	1	.1	.1	4A2, 4B2 4B3
34	K	1	1	17	B	0	1	.1	.1	"
35	H16-603 H13-603	1	1	18	A	1	0	REJ.	REJ.	
36	K	1	1	18	B	1	1	.1	.1	4A2, 4B2 4B3
37	K	1	1	19	A	1	1	.1	.1	"
38	K	1	1	19	B	1	1	.1	.1	"
39	H70-602	1	1	20	A	1	0	REJ.	REJ.	
40	K	1	1	20	B	1	1	.1	.1	4A2, 4B2 4B3
41	—	1	1	21	A	0	0	REJ.	REJ.	
42	D0121-419	1	1	21	B	1	1	.78	3.2	
43	H41-603	1	1	22	A	0	0	REJ.	REJ.	
44	G0003-401	1	1	22	B	1	1	.78	3.2	
45	H60-603	1	1	23	A	0	0	REJ.	REJ.	
46	—	1	1	23	B	1	0	REJ.	REJ.	
47	H60-603	1	1	24	A	1	0	REJ.	REJ.	
48	K	1	1	24	B	1	1	.1	.1	4A2, 4B2 4B3

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. I U Sheet 3 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4A1	PROG 4B1	Prog.
49	H60-603	1	1	25	A	1	0	REJ.	REJ.	
50	K	1	1	25	B	1	1	.1	.1	4A2, 4B2 4B3
51	H60-603	1	1	26	A	1	0	REJ.	REJ.	
52	K0134-404	1	1	26	B	1	1	.1	.1	4A2, 4B2 4B3
53	H42-603	1	1	27	A	1	0	REJ.	REJ.	
54	M0025-401	1	1	27	B	1	0	1.56	6.4	
55	REF	1	1	28	A	1	0	.1	.1	
56	REF	1	1	28	B	1	0	.1	.1	
57	M. PULSE	1	1	29	A	0	0	.1	.1	
58	AH-600	2	2	1	A	1	0	.1	.78	
59	M8-603	2	2	2	A	1	0	1.56	6.4	
60	F10-601	2	2	4	A	1	1	.1	.78	
61	D0062-424	2	2	8	B	1	0	.78	3.2	
62	D0119-427	2	2	9	B	1	1	.78	3.2	
63	C0198-401	2	2	10	B	1	1	1.56	6.4	
64	C0002-401	2	2	12	B	0	0	1.56	6.4	
65	——	2	2	13	A	0	0	REJ.	REJ.	
66	M0016-411	2	2	13	B	0	0	1.56	6.4	
67	M1-602	2	2	14	A	0	0	1.56	6.4	
68	D0130-424	2	2	14	B	1	1	.78	3.2	
69	C0200-401	2	2	15	B	0	0	1.56	6.4	
70	D0013-401	2	2	16	A	0	1	.78	3.2	
71	J70-603	2	2	16	B	1	1	.1	.78	
72	M12-601	2	2	18	A	1	0	1.56	6.4	

Table A. 4

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. IU Sheet 4 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4A1	PROG. 4B1	Prog.
73	D0122-419	2	2	21	B	1	1	.78	3.2	
74	G0003-401	2	2	22	B	1	1	.78	3.2	
75	D0021-408	2	2	23	B	1	0	.78	3.2	
76	H54-603	3	3	1	A	1	0	REJ.	REJ.	
77	H1-3	3	3	2	A	1	0	REJ.	REJ.	
78	R4-602	3	3	4	A	1	0	.1	.78	
79	C0230-403	3	3	8	B	1	0	1.56	6.4	
80	D0120-427	3	3	9	B	1	1	.78	3.2	
81	P0011-401	3	3	10	B	1	1	.78	3.2	
82	C0006-401	3	3	12	B	0	0	1.56	6.4	
83	K5-603	3	3	13	A	0	1	.1	.1	4A2 4B2 4B3
84	M0019-411	3	3	13	B	0	0	1.56	6.4	
85	J29-602	3	3	14	A	0	0	.1	.78	
86	C0163-424	3	3	14	B	1	0	1.56	6.4	
87	C015-404	3	3	15	B	0	0	1.56	6.4	
88	J71-603	3	3	16	A	0	0	.1	.78	
89	D0004-401	3	3	16	B	1	1	.78	3.2	
90	M13-601	3	3	18	A	1	0	1.56	6.4	
91	D0123-419	3	3	21	B	1	1	.78	3.2	
92	G0005-401	3	3	22	B	1	1	.78	3.2	
93	—	3	3	23	B	1	0	REJ	REJ.	
94	H55-603	4	1	1	A	1	0	REJ.	REJ.	
95	D25-601	4	1	2	A	1	0	.78	3.2	
96	R5-602	4	1	4	A	1	0	.1	.78	

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. I U Sheet 5 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 4A1	PROG 4B1	Prog.
97	M0034-414	4	1	8	B	1	1	1.56	6.4	
98	D0143-403	4	1	9	B	1	1	.78	3.2	
99	D0012-401	4	1	10	B	1	1	.78	3.2	
100	C007-401	4	1	12	B	0	0	1.56	6.4	
101	K5-603	4	1	13	A	0	1	.1	.1	4A2, 4B2 4B3
102	M0021-404	4	1	13	B	0	0	1.56	6.4	
103	G3-601	4	1	14	A	0	0	.78	3.2	
104	D0022-406	4	1	14	B	1	0	.78	3.2	
105	C0159-424	4	1	15	B	0	1	1.56	6.4	
106	J72-603	4	1	16	A	0	0	.1	.78	
107	D0005-401	4	1	16	B	1	1	.78	3.2	
108	M14-601	4	1	18	A	1	0	1.56	6.4	
109	D0124-419	4	1	21	B	1	0	.78	3.2	
110	K	4	1	22	B	1	1	.1	.1	4A2, 4B2 4B3
111	—	4	1	23	B	1	0	REJ.	REJ.	
112	H56-603	5	2	1	A	1	0	REJ.	REJ.	
113	J66-603	5	2	2	A	1	0	.1	.78	
114	R6-602	5	2	4	A	1	1	.1	.78	
115	K	5	2	8	B	1	1	.1	.1	4A2, 4B2 4B3
116	D0144-403	5	2	9	B	1	1	.78	3.2	
117	C0201-401	5	2	10	B	1	0	1.56	6.4	
118	C0011-401	5	2	12	B	0	0	1.56	6.4	
119	K3-603	5	2	13	A	0	1	.1	.1	4A2, 4B2 4B3
120	M0068-411	5	2	13	B	0	0	1.56	6.4	

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. IU Sheet 6 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4A1	PROG 4B1	Prog.
121	R12-602	5	2	14	A	0	0	.1	.78	
122	—	5	2	14	B	1	0	REJ.	REJ.	
123	F0004-424	5	2	15	B	0	1	.1	.78	
124	—	5	2	16	A	0	0	REJ.	REJ.	
125	D0018-401	5	2	16	B	1	1	.78	3.2	
126	M16-601.	5	2	18	A	1	0	1.56	6.4	
127	D0125-419	5	2	21	B	1	1	.78	3.2	
128	K	5	2	22	B.	1	1	.1	.1	4A2,4B2 4B3
129	D0014-403	5	2	23	B	1	0	.78	3.2	
130	R7-602	6	3	1	A	1	1	.1	.78	
131	T30-602.	6	3	2	A	1	1	.1	.78	
132	C53-603	6	3	4	A	1	0	1.56	6.4	
133	D0105-403	6	3	8	B	1	1	.78	3.2	
134	C0170-414	6	3	9	B	1	0	1.56	6.4	
135	C0202-401	6	3	10	B	1	0	1.56	6.4	
136	C0012-401	6	3	12	B	0	0	1.56	6.4	
137	K6-603	6	3	13	A	0	1	.1	.1	4A2,4B2 4B3
138	N0037-414	6	3	13	B	0	0	1.56	6.4	
139	D24-601	6	3	14	A	0	0	.78	3.2	
140	D0064-414	6	3	14	B	1	1	.78	3.2	
141	F005-404	6	3	15	B	0	1	.1	.78	
142	—	6	3	16	A	0	0	REJ.	REJ.	
143	D0019-401	6	3	16	B	1	1	.78	3.2	
144	M17-601	6	3	18	A	1	0	1.56	6.4	

able A.4

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. IU. Sheet 7 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG 4A1	PROG. 4B1	Prog.
145	D0126-419	6	3	21	B	1	1	.78	3.2	
146	G0008-401	6	3	22	B	1	0	.78	3.2	
147	—	6	3	23	B	1	0	REJ.	REJ.	
148	R8-602	7	1	1	A	1	1	.1	.78	
149	C56-603	7	1	2	A	1	0	1.56	6.4	
150	C15-601	7	1	4	A	1	0	1.56	6.4	
151	—	7	1	8	B	1	0	REJ.	REJ.	
152	C0171-415	7	1	9	B	1	0	1.56	6.4	
153	D0034-401	7	1	10	B	1	1	.78	3.2	
154	C0013-401	7	1	12	B	0	0	1.56	6.4	
155	K7-603	7	1	13	A	0	1	.1	.1	4A2,4B2 4B3
156	N0038-415	7	1	13	B	0	0	1.56	6.4	
157	D10-603	7	1	14	A	0	1	.78	3.2	
158	K	7	1	14	B	1	1	.1	.1	4A2,4B2 4B3
159	C0230-401	7	1	15	B	0	0	1.56	6.4	
160	—	7	1	16	A	0	0	REJ.	REJ.	
161	D0160-405	7	1	16	B	1	1	.78	3.2	
162	M18-601	7	1	18	A	1	1	1.56	6.4	
163	D0157-402	7	1	21	B	1	1	.78	3.2	
164	M0006-401	7	1	22	B	1	0	1.56	6.4	
165	—	7	1	23	B	1	0	REJ.	REJ.	
166	R9-602	8	2	1	A	1	0	.1	.78	
167	H2-2	8	2	2	A	1	0	REJ.	REJ.	
168	C55-603	8	2	4	A	1	0	1.56	6.4	

Table A.4

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. IU. Sheet 8 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4A1	PROG. 4B1	Prog.
169	K	8	2	8	B	1	1	.1	.1	4A2/4B2 4B3
170	D0106-416	8	2	9	B	1	0	.78	3.2	
171	D0086-401	8	2	10	B	1	1	.78	3.2	
172	C0215-401	8	2	12	B	0	0	1.56	6.4	
173	—	8	2	13	A	0	0	REJ.	REJ.	
174	N0010-415	8	2	13	B	0	1	1.56	6.4	
175	D11-603	8	2	14	A	0	1	.78	3.2	
176	—	8	2	14	B	1	0	REJ.	REJ.	
177	C0237-404	8	2	15	B	0	0	1.56	6.4	
178	—	8	2	16	A	0	0	REJ.	REJ.	
179	D0053-401	8	2	16	B	1	1	.78	3.2	
180	M19-601	8	2	18	A	1	0	1.56	6.4	
181	D0153-402	8	2	21	B	1	0	.78	3.2	
182	M0007-401	8	2	22	B	1	0	1.56	6.4	
183	—	8	2	23	B	1	0	REJ.	REJ.	
184	C25-602	9	3	1	A	1	0	1.56	6.4	
185	H2-3	9	3	2	A	1	0	REJ.	REJ.	
186	C31-603	9	3	4	A	1	1	1.56	6.4	
187	K	9	3	8	B	1	1	.1	.1	4A2/4B2 4B3
188	D0107 418	9	3	9	B	1	1	.78	3.2	
189	D0007-401	9	3	10	B	1	1	.78	3.2	
190	C0133-401	9	3	12	B	0	0	1.56	6.4	
191	—	9	3	13	A	0	0	REJ.	REJ.	
142	C0168-414	9	3	13	B	0	0	1.56	6.4	

Table A. 4

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

No. AS-204 Vehicle No. IU Sheet 9 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4A1	PROG. 4B1	Prog.
193	D12-603	9	3	14	A	0	1	.78	3.2	
194	C0203-403	9	3	14	B	1	0	1.56	6.4	
195	C023-404	9	3	15	B	0	0	1.56	6.4	
196	——	9	3	16	A	0	0	REJ.	REJ.	
197	D0057-401	9	3	16	B	1	0	.78	3.2	
198	M20-601	9	3	18	A	1	1	1.56	6.4	
199	D0159-402	9	3	21	B	1	1	.78	3.2	
200	G0009-401	9	3	22	B	1	1	.78	3.2	
201	D0223-403	9	3	23	B	1	0	.78	3.2	
202	C26-601	10	1	1	A	1	0	1.56	6.4	
203	H2-4	10	1	2	A	1	0	REJ.	REJ.	
204	C34-603	10	1	4	A	1	0	1.56	6.4	
205	D0179-424	10	1	8	B	1	1	.78	3.2	
206	D0108-417	10	1	9	B	1	0	.78	3.2	
207	D0003-401	10	1	10	B	1	1	.78	3.2	
208	C0134-401	10	1	12	B	0	0	1.56	6.4	
209	——	10	1	13	A	0	0	REJ.	REJ.	
210	C0169-415	10	1	13	B	0	0	1.56	6.4	
211	D17-601	10	1	14	A	0	0	.78	3.2	
212	C0204-403	10	1	14	B	1	0	1.56	6.4	
213	D0050-403	10	1	15	B	0	1	.78	3.2	
214	——	10	1	16	A	0	0	REJ.	REJ.	
215	D0058-401	10	1	16	B	1	1	.78	3.2	
216	C69-602	10	1	18	A	1	0	1.56	6.4	

Table A.4

DATA CHANNEL PROGRAM INFORMATION TO DATA COMPRESSOR

Flight No. AS-204 Vehicle No. IU Sheet 10 of 10

Item	Meas. No.	Frame	Mux.	Chan.	Group	Stored Add. Bit	Priority	PROG. 4B1	PROG 4B1	Prog.
217	D0065-415	10	1	21	B	1	1	.78	3.2	
218	G0010-401	10	1	22	B	1	1	.78	3.2	
219	—	10	1	23	B	1	0	REJ.	REJ.	

Appendix B

BUFFER FULLNESS VALUES PLOTTED

The tables presented in this appendix list the values plotted in the various figures of the report. These points for the various test runs were derived from the buffer fullness curves recorded on the visicorder records. The buffer fullness level was read every half second and tabulated in the "Buffer Fullness" column of the report. These values were then converted into input words to the buffer and recorded in the "Input to Buffer" column of the table.

Tables B.1, B.2 and B.3 list the plotted values derived from the various test runs for Flight AS-202, AS-203 and AS-204 respectively.

Range Time	Run No. 202-4 Buffer Fullness (Words)	Run No. 202-4 Input to Buffer (Words)	Run No. 202-5 Buffer Fullness (Words)	Run No. 202-5 Input to Buffer (Words)
17:15:30.0	21		0	
30.5	28	329	16	391
31.0	128	322	70	429
31.5	288	482	170	475
32.0	432	466	264	469
32.5	550	440	358	439
33.0	640	412	366	413
33.5	716	398	400	409
34.0	796	402	421	396
34.5	856	382	436	390
35.0	936	402	454	393
35.5	SAT.	—	464	385
36.0	↑	—	484	395
36.5		—	494	385
37.0		—	504	355
37.5		—	512	383
38.0		—	516	379
38.5		—	516	375
39.0		—	500	359
39.5		—	496	361
40.0		—	458	347
40.5		—	456	373
41.0		—	437	356
41.5	↓	—	409	347
42.0	SAT.	—	362	328
42.5	956	—	318	331
43.0	948	314	272	329
43.5	SAT.	—	222	315
44.0	949	—	168	321
17:15:45.5	951	329	116	323

Range Time	Run No. 202-6 Buffer Fullness (Words)	Run No. 202-6 Input to Buffer (Words)	Run No. 202-7 Buffer Fullness (Words)	Run No. 202-7 Input to Buffer (Words)
17:15:30.0	0	—	0	—
30.5	0	—	16	579
31.0	18	468	70	617
31.5	42	475	172	665
32.0	50	458	264	655
32.5	58	458	332	631
33.0	24	416	364	595
33.5	0	426	392	591
34.0	↑	—	416	557
34.5		—	432	579
35.0		—	446	577
35.5		—	456	573
36.0		—	472	579
36.5		—	480	571
37.0		—	488	571
37.5		—	488	563
38.0		—	489	564
38.5		—	486	560
39.0		—	477	554
39.5		—	464	550
40.0		—	440	539
40.5		—	432	555
41.0		—	416	547
41.5		—	368	515
42.0		—	328	523
42.5		—	286	521
43.0		—	224	501
43.5		—	184	523
44.0	↓	—	123	502
17:15:44.5	0	—	72	512

Range Time	Run No. 202-10 Buffer Fullness (Words)	Run No. 202-10 Input to Buffer (Words)	Run No. 202-11 Buffer Fullness (Words)	Run No. 202-11 Input to Buffer (Words)
17:15:30.0	10		10	
30.5	30	395	19	384
31.0	72	417	74	430
31.5	178	481	168	469
32.0	266	463	236	443
32.5	336	445	302	441
33.0	374	413	328	401
33.5	405	406	344	391
34.0	425	395	352	383
34.5	445	395	360	383
35.0	458	388	369	383
35.5	468	385	372	379
36.0	486	393	376	379
36.5	496	355	384	383
37.0	512	391	376	369
37.5	520	383	368	367
38.0	520	375	360	367
38.5	520	375	338	353
39.0	504	359	296	331
39.5	488	359	282	361
40.0	460	347	276	369
40.5	453	365	246	345
41.0	436	358	214	343
41.5	411	350	172	333
42.0	360	324	116	319
42.5	316	331	70	329
43.0	264	328	34	339
43.5	220	331	9	350
44.0	168	323	8	374
17:15:44.5	118	325	8	375

Range Time	Run No. 202-12 Buffer Fullness (Words)	Run No. 202-12 Input to Buffer (Words)	Run No. 202-13 Buffer Fullness (Words)	Run No. 202-13 Input to Buffer (Words)
17:15:30.0	10	—	8	—
30.5	20	355	20	387
31.0	70	425	72	427
31.5	168	473	130	433
32.0	222	429	130	375
32.5	280	433	128	373
33.0	304	399	128	375
33.5	317	388	128	375
34.0	327	385	126	373
34.5	328	376	128	377
35.0	334	381	128	375
35.5	336	377	128	375
36.0	332	371	128	375
36.5	330	373	120	367
37.0	324	369	120	375
37.5	321	372	122	377
38.0	312	366	108	361
38.5	302	365	108	375
39.0	276	359	98	365
39.5	240	339	88	365
40.0	214	349	60	347
40.5	200	361	56	371
41.0	176	351	34	353
41.5	136	335	12	353
42.0	100	339	8	371
42.5	60	335	10	377
43.0	12	327	10	375
43.5	10	373	8	373
44.0	10	375	9	370
17:15:44.5	10	375	9	375

Range Time	Run No. 202-14 Buffer Fullness (Words)	Run No. 202-14 Input to Buffer (Words)	Run No. 202-15 Buffer Fullness (Words)	Run No. 202-15 Input to Buffer (Words)
17:15:30.0	24	—	23	
30.5	30	381	32	384
31.0	128	473	128	471
31.5	148	395	144	391
32.0	148	375	144	375
32.5	144	371	136	367
33.0	128	359	128	367
33.5	128	375	↑	375
34.0	↑	↑	↑	↑
34.5	↑	↑	↑	↑
35.0	↑	↑	↑	↑
35.5	↑	↑	↑	↑
36.0	↑	↑	↑	↑
36.5	↑	↑	↑	↑
37.0	↑	↑	↑	↑
37.5	↑	↑	↑	↑
38.0	↑	↑	↑	↑
38.5	↑	↑	↑	↑
39.0	↑	↑	↑	↑
39.5	↑	↑	↑	↑
40.0	↑	↑	↓	↓
40.5	↑	↑	128	375
41.0	↑	↑	116	363
41.5	↓	↑	128	357
42.0	128	↓	128	375
42.5	128	375	120	367
43.0	106	353	128	383
43.5	128	397	112	361
44.0	110	357	128	391
17:15:44.5	117	382	114	361

Range Time	Run No. 202-19 Buffer Fullness (Words)	Run No. 202-19 Input to Buffer (Words)	Run No. 202-20 Buffer Fullness (Words)	Run No. 202-20 Input to Buffer (Words)
17:15:30.0	8		8	
30.5	18	573	20	575
31.0	144	589	160	703
31.5	198	617	282	685
32.0	190	555	352	633
32.5	176	549	400	611
33.0	152	539	408	571
33.5	128	539	340	495
34.0	112	547	280	503
34.5	128	579	240	523
35.0	114	549	234	557
35.5	114	563	192	521
36.0	104	553	136	507
36.5	106	565	118	545
37.0	88	545	96	541
37.5	76	551	80	547
38.0	50	537	56	539
38.5	62	575	66	573
39.0	54	555	60	557
39.5	24	533	24	527
40.0	8	547	8	547
40.5	8	563	8	563
41.0	8	563	8	563
41.5				
42.0				
42.5				
43.0				
43.5				
44.0				
17:15:44.5				

Table B.1

Range Time	Run No. 201-21 Buffer Fullness (Words)	Run No. 201-21 Input to Buffer (Words)	Run No. 202-22 Buffer Fullness (Words)	Run No. 202-22 Input to Buffer (Words)
17:15: 30.0	5	[illegible]	8	
30.5	24	579	10	566
31.0	192	631	134	659
31.5	464	515	128	555
32.0	680	799	128	563
32.5	548	731	128	563
33.0	SAT.	—	128	563
33.5	SAT.	—	128	563
34.0	952	—	112	547
34.5	SAT.	—	128	579
35.0	952	—	106	541
35.5	954	565	118	575
36.0	936	545	104	549
36.5	950	577	103	562
37.0	912	525	80	540
37.5	595	549	62	545
38.0	864	529	30	513
38.5	564	563	44	577
39.0	556	557	40	559
39.5	824	531	8	531
40.0	752	491	5	563
40.5	692	503	8	
41.0	600	471		
41.5	520	483		
42.0	426	469		
42.5	316	453		
43.0	218	465		
43.5	66	411		
44.0	8	504		
17:15: 44.5				

Table B.1

Range Time	Run No. 202-23 Buffer Fullness (Words)	Run No. 202-23 Input to Buffer (Words)	Run No. 202-24 Buffer Fullness (Words)	Run No. 202-24 Input to Buffer (Words)
17:15: 30.0	12		0	
30.5	56	419	32	407
31.0	212	531	172	515
31.5	376	539	240	443
32.0	512	511	292	427
31.5	602	465	304	357
33.0	654	457	316	357
33.5	704	395	274	333
34.0	712	353	228	329
34.5	734	397	208	355
35.0	792	433	206	373
35.5	802	385	172	341
36.0	776	349	128	331
36.5	710	359	128	375
37.0	728	343	128	375
37.5	694	341	128	375
38.0	672	353	128	375
38.5	664	367	128	375
39.0	648	359	128	375
39.5	618	345	128	375
40.0	586	343	128	375
40.5	560	349	128	375
41.0	496	311	128	375
41.5	470	349	128	375
42.0	446	351	128	375
42.5	408	335	128	375
43.0	356	323	128	375
43.5	366	265	128	375
44.0	184	293	128	375
17:15: 44.5	128	319	128	375

Table B.1

Range Time	Run No. 2-25 Buffer Fullness (Words)	Run No. 2-25 Input to Buffer (Words)	Run No. Buffer Fullness (Words)	Run No. Input to Buffer (Words)
17:15:30.0	92			
30.5	144	374		
31.0	232	410		
31.5	366	450		
32.0	456	418		
32.5	508	374		
33.0	550	394		
33.5	590	332		
34.0	604	336		
34.5	632	350		
35.0	688	378		
35.5	702	336		
36.0	740	360		
36.5	760	342		
37.0	755	317		
37.5	745	312		
38.0	745	322		
38.5	762	339		
34.0	784	344		
39.5	796	334		
40.0	792	328		
40.5	798	328		
41.0	760	284		
41.5	776	338		
42.0	786	332		
42.5	765	304		
43.0	745	294		
43.5	688	265		
44.0	640	274		
17:15:44.5	592	274		

Range Time	Run No. 203-26 Buffer Fullness (Words)	Run No. 203-26 Input to Buffer (Words)	Run No. 202-27 Buffer Fullness (Words)	Run No. 202-27 Input to Buffer (Words)
17:17:37.0	704		128	
37.5	680	304	115	309
38.0	648	294	83	298
38.5	634	308	155	397
39.0	648	336	134	298
39.5	619	293	108	300
40.0	620	323	108	322
40.5	592	294	76	291
41.0	587	317	76	322
41.5	561	296	50	296
42.0	560	321	44	316
42.5	552	314	24	302
43.0	552	322	30	328
43.5	550	320	32	324
44.0	566	338	46	336
44.5	574	330	50	326
45.0	569	317	55	327
45.5	550	303	28	295
46.0	557	329	36	330
46.5	576	303	56	342
47.0	608	354	88	354
47.5	602	316	80	314
48.0	569	289	50	292
48.5	546	299	27	299
49.0	564	340	48	343
49.5	542	300	24	298
50.0	534	314	22	320
50.5	520	310	8	308
51.0	496	298	8	322
17:17:51.5	494	310	10	324

Range Time	Run No. 22-25 Buffer Fullness (Words)	Run No. 22-25 Input to Buffer (Words)	Run No. Buffer Fullness (Words)	Run No. Input to Buffer (Words)
17:17:37.0	104			
37.5	78	296		
38.0	44	288		
38.5	40	318		
39.0	40	322		
39.5	20	302		
40.0	18	320		
40.5	16	314		
41.0	22	334		
41.5	10	310		
42.0	8	320		
42.5	8	322		
43.0	26	340		
43.5	24	320		
44.0	40	338		
44.5	48	330		
45.0	42	316		
45.5	20	300		
46.0	29	331		
46.5	56	349		
47.0	55	354		
47.5	74	308		
48.0	48	296		
48.5	24	298		
49.0	40	338		
49.5	16	298		
50.0	16	322		
50.5	8	314		
51.0	9	323		
17:17:51.5	10	323		

Range Time	Run No. 202-24 Buffer Fullness (Words)	Run No. 202-24 Input to Buffer (Words)	Run No. 202-30 Buffer Fullness (Words)	Run No. 202-30 Input to Buffer (Words)
17:15:30.0	18		112	
30.5	16	171	117	166
31.0	55	245	216	260
31.5	200	285	342	297
32.0	356	329	466	255
32.5	409	225	565	263
33.0	454	219	627	220
33.5	468	187	668	202
34.0	475	180	680	173
34.5	486	184	702	173
35.0	512	199	733	192
35.5	544	205	780	208
36.0	548	177	823	204
36.5	572	197	856	194
37.0	586	187	853	188
37.5	599	186	913	191
38.0	590	164	913	161
38.5	588	171	924	172
39.0	584	169	931	168
39.5	580	169	940	170
40.0	587	180	960	181
40.5	590	176	SAT.	—
41.0	555	171	SAT.	—
41.5	582	167	SAT.	—
42.0	576	167	SAT.	—
42.5	562	159	SAT.	—
43.0	544	155	948	—
43.5	520	149	936	149
44.0	490	143	926	151
17:15:44.5	477	100	925	160

Table B.1

Range Time	Run No. 2c2-31 Buffer Fullness (Words)	Run No. 2c2-31 Input to Buffer (Words)	Run No. 2c2-32 Buffer Fullness (Words)	Run No. 2c2-32 Input to Buffer (Words)
17:15:30.0	10		8	
30.5	8	156	8	205
31.0	71	251	56	253
31.5	173	290	146	295
32.0	251	266	205	207
32.5	342	279	250	277
33.0	358	234	302	227
33.5	358	188	290	187
34.0	372	172	274	189
34.5	374	190	244	175
35.0	355	199	274	195
35.5	392	195	222	193
36.0	392	188	211	194
36.5	401	197	203	197
37.0	410	197	192	194
37.5	405	183	170	183
38.0	378	161	130	165
38.5	358	168	96	171
39.0	344	174	66	175
39.5	326	170	38	180
40.0	320	182	16	183
40.5	313	181	8	197
41.0	294	169	8	205
41.5	280	174	8	205
42.0	244	152	8	205
42.5	226	170	8	205
43.0	156	148	8	205
43.5	152	154	8	205
44.0	110	146	8	205
17:15:44.5	82	160		

Table B.1

Range Time	Run No. 2C3-33 Buffer Fullness (Words)	Run No. 2C3-33 Input to Buffer (Words)	Run No. 2C2-34 Buffer Fullness (Words)	Run No. 2C2-34 Input to Buffer (Words)
17:15:30.0	16		16	
30.5	10	167	4	161
31.0	80	243	80	249
31.5	180	273	148	241
32.0	242	235	160	155
32.5	300	231	164	177
33.0	332	205	184	183
33.5	330	171	162	151
34.0	314	157	144	155
34.5	316	175	128	157
35.0	310	167	128	173
35.5	310	173	136	151
36.0	310	173	128	164
36.5	305	171	125	173
37.0	320	185	128	173
37.5	320	173	128	173
38.0	296	149	118	163
38.5	288	165	110	164
39.0	278	163	112	175
39.5	245	143	112	173
40.0	246	171	112	173
40.5	244	171	120	181
41.0	234	163	112	165
41.5	214	155	106	167
42.0	198	155	98	164
42.5	150	155	86	161
43.0	152	145	64	151
43.5	128	149	44	153
44.0	108	153	26	155
17:15:44.5	92	163		

Range Time	Run No. 202-3.5 Buffer Fullness (Words)	Run No. 202-3.5 Input to Buffer (Words)	Run No. Buffer Fullness (Words)	Run No. Input to Buffer (Words)
17:15:30.0	88			
30.5	102	164		
31.0	148	196		
31.5	176	178		
32.0	194	168		
32.5	210	166		
33.0	224	164		
33.5	212	138		
34.0	206	144		
34.5	198	142		
35.0	184	136		
35.5	184	150		
36.0	168	134		
36.5	168	150		
37.0	160	142		
37.5	152	142		
38.0	130	128		
38.5	128	148		
39.0	128	150		
39.5	128	150		
40.0	130	152		
40.5	128	148		
41.0	128	150		
41.5	128	150		
42.0	128	150		
42.5	132	154		
43.0	128	146		
43.5	116	136		
44.0	115	152		
17:15:44.5	120	152		

Range Time	Run No. 202-36 Buffer Fullness (Words)	Run No. 202-36 Input to Buffer (Words)	Run No. 202-37 Buffer Fullness (Words)	Run No. 202-37 Input to Buffer (Words)
17:17:40.0	206		5	
40.5	191	135	10	152
41.0	191	150	21	161
41.5	189	148	21	150
42.0	178	139	10	139
42.5	162	134	8	148
43.0	161	149	18	140
43.5	164	153	20	152
44.0	160	146	22	152
44.5	162	152	20	148
45.0	152	140	14	143
45.5	146	146	8	144
46.0	136	140	8	150
46.5	145	162	22	164
47.0	137	134	8	136
47.5	128	141	20	162
48.0	113	135	8	138
48.5	104	141	14	156
49.0	102	148	16	152
49.5	96	144	42	176
50.0	91	145	40	148
50.5	87	146	34	144
51.0	80	143	24	145
51.5	83	153	33	154
52.0	110	177	61	175
52.5	118	158	65	154
53.0	129	161	72	157
53.5	125	149	68	146
54.0	116	138	64	146
17:17:54.5	121	155	64	150

Table B.1

Range Time	Run No. 202-38 Buffer Fullness (Words)	Run No. 202-38 Input to Buffer (Words)	Run No. Buffer Fullness (Words)	Run No. Input to Buffer (Words)
17:17:40.0	155	1		
40.5	144	127		
41.0	147	141		
41.5	152	143		
42.0	155	141		
42.5	153	136		
43.0	164	149		
43.5	173	147		
44.0	180	145		
44.5	184	142		
45.0	179	133		
45.5	184	143		
46.0	186	140		
46.5	204	156		
47.0	206	140		
47.5	212	144		
48.0	208	134		
48.5	205	135		
49.0	211	144		
49.5	208	135		
50.0	211	141		
50.5	219	146		
51.0	221	145		
51.5	240	152		
52.0	275	176		
52.5	285	145		
53.0	290	143		
53.5	295	136		
54.0	296	146		
17:17:54.5	297	134		

Table B.1

Range Time	Run No. 2C2-41 Buffer Fullness (Words)	Run No. 2C2-41 Input to Buffer (Words)	Run No. 2C2-43 Buffer Fullness (Words)	Run No. 2C2-43 Input to Buffer (Words)
17:15:27.0	0	—	0	—
27.5	0	—	0	—
28.0	0	—	0	—
28.5	0	—	0	
29.0	0	—	0	
29.5	0	—	0	
30.0	0	—	0	—
30.5	0	—	0	—
31.0	68	343	68	343
31.5	172	479	162	469
32.0	248	451	208	421
32.5	332	459	240	407
33.0	368	411	264	399
33.5	366	373	234	345
34.0	360	369	208	349
34.5	362	377	196	363
35.0	364	377	174	353
35.5	364	375	168	369
36.0	366	377	148	355
36.5	374	383	130	357
37.0	392	393	130	375
37.5	384	367	119	363
38.0	349	340	92	344
38.5	330	356	75	358
39.0	316	361	60	360
39.5	299	358	40	355
40.0	284	365	30	365
40.5	256	366	15	363
41.0	260	355	0	357
17:15:41.5	230	345	0	375

Range Time	Run No. 2C 2-44 Buffer Fullness (Words)	Run No. 2C 2-44 Input to Buffer (Words)	Run No. 2C 2-45 Buffer Fullness (Words)	Run No. 2C 2-45 Input to Buffer (Words)
17:15:27.0	0	—	446	
27.5	0	—	454	330
28.0	0	—	470	338
28.5	0	—	470	322
29.0	0	—	464	316
29.5	0	—	450	338
30.0	0	—	504	348
30.5	68	473	508	346
31.0	152	459	576	370
31.5	170	393	678	424
32.0	188	393	744	388
32.5	242	429	824	402
33.0	216	349	880	378
33.5	178	337	914	356
34.0	156	353	920	328
34.5	130	349	928	330
35.0	128	373	950	344
35.5	114	361	SAT.	—
36.0	128	389	↑	—
36.5	128	375		—
37.0	128	375		—
37.5	96	~~Fail~~ 343		—
38.0	76	355		—
38.5	60	359		—
39.0	44	359		—
39.5	36	367		—
40.0	24	363		—
40.5	0	351		
41.5	0	375	↓	
41.5	0	—	SAT.	

Range Time	Run No. 202-46 Buffer Fullness (Words)	Run No. 202-46 Input to Buffer (Words)	Run No. 202-47 Buffer Fullness (Words)	Run No. 202-47 Input to Buffer (Words)
17:17:40.0	94		0	—
40.5	75	131		—
41.0	115	193		—
41.5	112	144		—
42.0	160	138		—
42.5	86	136		—
43.0	84	150		—
43.5	88	152		—
44.0	88	150		—
44.5	84	146		—
45.0	74	142		—
45.5	69	143		—
46.0	66	147		—
46.5	68	152		—
47.0	60	142		—
47.5	58	148		—
48.0	44	136		—
48.5	34	140		—
49.0	36	152		—
49.5	24	138		—
50.0	20	146		—
50.5	17	147		—
51.0	16	149	0	—
51.5	16	150	39	200
52.0	42	176	64	156
52.5	46	1541	59	156
53.0	54	158	54	156
53.5	51	147	43	150
54.0	45	144	27	145
17:17:54.5	52	157	22	156

Range Time	Run No. 200-53 Buffer Fullness (Words)	Run No. 200-53 Input to Buffer (Words)	Run No. Buffer Fullness (Words)	Run No. Input to Buffer (Words)
17:17:40.0	720			
40.5	692	294		
41.0	658	318		
41.5	672	306		
42.0	666	316		
42.5	650	312		
43.0	666	332		
43.5	672	328		
44.0	690	340		
44.5	702	334		
45.0	704	324		
45.5	655	308		
46.0	701	335		
46.5	722	343		
47.0	768	368		
47.5	756	310		
48.0	724	290		
48.5	532	[illegible]		
49.0	555	430		
49.5	536	300		
50.0	532	318		
50.5	528	318		
51.0	524	318		
51.5	524	322		
52.0	596	344		
52.5	944	370		
53.0	SAT.	—		
53.5	SAT.	—		
54.0	956	—		
17:17:54.5	SAT	—		

Table B.2

Range Time	Run No. 113-71 Buffer Fullness (Words)	Run No. 113-71 Input to Buffer (Words)	Run No. 213-22 Buffer Fullness (Words)	Run No. 213-22 Input to Buffer (Words)
14:53:13.0	25		28	
13.5	40	465	36	458
14.0	32	442	32	446
14.5	40	458	36	454
15.0	51	461	50	464
15.5	68	467	64	464
16.0	205	590	184	570
16.5	356	598	288	554
17.0	490	584	364	526
17.5	612	572	436	522
18.0	702	540	484	498
18.5	713	461	470	436
19.0	708	445	450	430
19.5	696	438	420	420
20.0	662	416	376	406
20.5	626	416	332	406
21.0	604	428	306	424
21.5	582	428	272	416
22.0	552	420	228	406
22.5	496	396	174	396
23.0	460	414	125	394
23.5	424	414	45	417
24.0	394	420	66	421
24.5	340	396	15	402
25.0	392	502	5	440
25.5	234	292	5	450
26.0	180	396	8	450
26.5	130	400	10	452
27.0	69	388	8	443
14:53 27.5				

Table B.2

Range Time	Run No. 2C3-23 Buffer Fullness (Words)	Run No. 2C3-23 Input to Buffer (Words)	Run No. 2C3-14 Buffer Fullness (Words)	Run No. 2C3-14 Input to Buffer (Words)
14:53:13.0	24		15	
13.5	36	462	18	750
14.0	26	440	15	747
14.5	36	460	14	749
15.0	48	462	17	753
15.5	64	466	18	751
16.0	184	570	168	540
16.5	308	574	196	538
17.0	416	558	264	818
17.5	458	522	310	796
18.0	555	517	330	770
18.5	552	447	294	786
19.0	542	440	236	692
19.5	514	422	172	656
20.0	472	408	95	673
20.5	438	416	32	687
21.0	416	408	16	734
21.5	350	414	16	750
22.0	342	412	16	750
22.5	292	400	16	750
23.0	248	406	16	750
23.5	210	412		
24.0	176	416		
24.5	124	398		
25.0	74	400		
25.5	32	408		
26.0	8	426		
26.5	9	451		
27.0	5	449		
14:53:27.5				

Table B.2

Range Time	Run No. 203-25 Buffer Fullness (Words)	Run No. 203-25 Input to Buffer (Words)	Run No. 203-26 Buffer Fullness (Words)	Run No. 203-26 Input to Buffer (Words)
14:53:13.0	17		16	
13.5	15	748	16	
14.0	16	751	16	750
14.5	14	748	10	744
15.0	15	751	13	753
15.5	24	759	26	763
16.0	104	830	100	824
16.5	214	860	178	828
17.0	314	850	218	800
17.5	392	828	248	780
18.0	438	796	260	762
18.5	408	720	208	698
19.0	366	708	148	680
19.5	308	693	92	694
20.0	236	678	20	675
20.5	172	686	14	743
21.0	108	686	13	749
21.5	42	684	14	751
22.0	14	722	14	750
22.5	14	750		
23.0				
23.5				
24.0				
24.5				
25.0				
25.5				
26.0				
26.5				
27.0				
14:53:27.5				

Range Time	Run No. 203-32 Buffer Fullness (Words)	Run No. 203-32 Input to Buffer (Words)	Run No. 203-34 Buffer Fullness (Words)	Run No. 203-34 Input to Buffer (Words)
14:55:18.0	960 (SAT)	—	648	
18.5	"	—	612	339
19.0	948	—	560	323
19.5	932	306	486	301
20.0	912	302	417	306
20.5	934	344	257	215
21.0	916	304	312	377
21.5	876	282	232	295
22.0	864	310	178	321
22.5	900	358	163	360
23.0	884	306	88	300
23.5	858	296	60	347
24.0	860	324	65	350
24.5	876	332	65	375
25.0	886	338	64	374
25.5	875	314	65	376
26.0	916	360	68	378
26.5	960 (SAT.)	—	88	395
27.0	956	—	64	351
27.5	950	316	64	375
28.0	956	328	64	375
28.5	947	313	64	375
29.0	958	311	64	375
29.5			70	381
30.0			60	365
30.5			66	381
31.0			69	375
31.5			64	370
32.0			66	377
14:55:32.5			69	375

Table B.4 Sheet 5 of 6

Range Time	Run No. 203-35 Buffer Fullness (Words)	Run No. 203-35 Input to Buffer (Words)	Run No. Buffer Fullness (Words)	Run No. Input to Buffer (Words)
14:55:18.0	64			
18.5	62	448		
19.0	63	451		
19.5	4	391		
20.0	52	498		
20.5	63	459		
21.0	24	411		
21.5	63	459		
22.0	8	395		
22.5	61	503		
23.0	6	395		
23.5	48	492		
24.0	64	466		
24.5	46	432		
25.0	64	468		
25.5	24	410		
26.0	64	490		
26.5	60	446		
27.0	63	453		
27.5	42	439		
28.0	64	428		
28.5	52	438		
29.0	62	460		
29.5	56	444		
30.0	62	456		
30.5	60	445		
31.0	8	398		
31.5	62	504		
32.0	20	408		
14:55:32.5	64	494		

Range Time	Run No. 203-41 Buffer Fullness (Words)	Run No. 203-41 Input to Buffer (Words)	Run No. 203-47 Buffer Fullness (Words)	Run No. 203-47 Input to Buffer (Words)
14:53:13.0	37		34	
13.5	50	463	44	235
14.0	50	450	46	227
14.5	58	458	56	235
15.0	58	450	59	228
15.5	60	452	62	228
16.0	200	590	150	343
16.5	330	580	286	331
17.0	440	560	360	299
17.5	542	552	460	305
18.0	624	532	500	285
18.5	660	486	512	237
19.0	640	430	476	189
19.5	620	430	450	199
20.0	600	430	414	189
20.5	570	420	362	173
21.0	552	432	328	191
21.5	534	432	296	193
22.0	516	432	278	207
22.5	490	424	234	181
23.0	454	444	216	207
23.5	464	430	178	187
24.0	436	428	148	195
24.5	412	426	116	193
25.0	366	394	84	193
25.5	336	420	54	195
26.0	306	420	26	197
26.5	276	420	14	212
27.0	224	398	8	220
14:53:27.5	215	441		

Table B.2

Range Time	Run No. 203-45 Buffer Fullness (Words)	Run No. 203-45 Input to Buffer (Words)	Run No. 203-49 Buffer Fullness (Words)	Run No. 203-49 Input to Buffer (Words)
14:53:13.0	42		35	
13.5	54	237	48	238
14.0	57	228	50	227
14.5	62	230	58	233
15.0	63	226	58	225
15.5	68	230	62	229
16.0	152	239	130	293
16.5	205	311	136	231
17.0	328	285	138	227
17.5	394	291	130	217
18.0	444	275	128	223
18.5	442	223	128	225
19.0	412	195	106	203
19.5	362	175	90	209
20.0	320	153	70	205
20.5	272	177	43	198
21.0	224	177	24	206
21.5	190	191	11	212
22.0	158	194	11	225
22.5	125	195	11	225
23.0	120	217	12	226
23.5	102	207	8	221
24.0	76	199	10	227
24.5	52	201	8	223
25.0	20	194	8	225
25.5	8	212	10	227
26.0			8	223
26.5			12	229
27.0				
14:53:27.5				

Table B. 2

Range Time	Run No. 2C3-5C		Run No. 2C3-5I	
	Buffer Fullness (Words)	Input to Buffer (Words)	Buffer Fullness (Words)	Input to Buffer (Words)
14:53:13.0	285		960(SAT.)	—
13.5	294	156	↑	—
14.0	295	154		—
14.5	302	154		—
15.0	308	156		—
15.5	310	152		—
16.0	372	212		—
16.5	448	226		—
17.0	528	230		—
17.5	554	206		—
18.0	614	180	↓	—
18.5	624	160	960(SAT.)	—
19.0	616	142	956	—
19.5	610	144	958	190
20.0	600	140	960	190
20.5	592	142	958	186
21.0	584	142	960(SAT.)	—
21.5	586	152	↑	—
22.0	592	156		—
22.5	592	150		—
23.0	594	152	↓	—
23.5	594	150	960(SAT.)	—
24.0	594	150	958	—
24.5	594	150	958	188
25.0	590	146	956	186
25.5	584	144	952	184
26.0	588	152	954	190
26.5	582	144	952	186
27.0	576	144	940	176
14:53:27.5				

Range Time	Run No. 204-7 Buffer Fullness (Words)	Run No. 204-7 Input to Buffer (Words)	Run No. 204-8 Buffer Fullness (Words)	Run No. 204-8 Input to Buffer (Words)
22:48:05.0	64		4	
05.5	72	742	30	776
06.0	66	744	24	744
06.5	120	804	80	806
07.0	188	818	128	798
07.5	206	768	128	750
08.0	240	784	156	778
08.5	304	814	184	778
09.0	292	738	152	718
09.5	310	768	152	750
10.0	344	784	168	766
10.5	405	811	192	774
11.0	396	741	168	726
11.5	408	762	160	742
12.0	440	782	168	758
12.5	442	752	148	730
13.0	512	820	160	762
13.5	556	794	170	760
14.0	564	758	160	740
14.5	596	782	170	760
15.0	595	749	160	740
15.5	624	779	170	760
16.0	624	779	156	736
16.5	592	718	128	722
17.0	592	750	128	750
17.5	592	750	128	750
18.0	600	758	128	750
18.5	618	768	154	776
19.0	612	744	132	728
22:48:19.5	582	720	100	718

Table B.3

Range Time	Run No. 204-9 Buffer Fullness (Words)	Run No. 204-9 Input to Buffer (Words)	Run No. 204-12 Buffer Fullness (Words)	Run No. 204-12 Input to Buffer (Words)
22:48:05.0	12		0	
05.5	26	764	26	776
06.0	12	736	20	744
06.5	72	810	80	810
07.0	128	806	128	798
07.5	128	750	128	750
08.0	148	770	128	750
08.5	164	766	128	750
09.0	128	714	106	728
09.5	128	750	112	756
10.0	148	770	128	766
10.5	164	766	128	750
11.0	128	714	96	718
11.5	128	750	108	762
12.0	134	756	128	770
12.5	120	736	112	734
13.0	130	760	128	766
13.5	130	750	128	750
14.0	128	748	128	750
14.5	132	754	128	750
15.0	128	746	114	736
15.5	128	750	120	756
16.0	128	750	114	744
16.5	92	714	82	718
17.0	88	746	80	748
17.5	86	748	80	750
18.0	90	754	80	750
18.5	108	768	112	782
19.0	104	746	104	742
22:48:19.5	72	718	78	724

Table B.3

Range Time	Run No. 2 14-13 Buffer Fullness (Words)	Run No. 2 14-13 Input to Buffer (Words)	Run No. 2 14-14 Buffer Fullness (Words)	Run No. 2 14-14 Input to Buffer (Words)
22:45:05.0	0		16	
05.5	24	774	22	256
06.0	24	750	30	258
06.5	78	804	96	316
07.0	114	786	178	332
07.5	116	752	242	314
08.0	128	762	312	320
08.5	128	750	366	304
09.0	112	734	412	376
09.5	116	754	462	300
10.0	128	762	494	232
10.5	128	750	562	318
11.0	104	766	600	258
11.5	116	762	626	276
12.0	128	762	678	302
12.5	112	734	706	278
13.0	128	766	736	280
13.5	120	742	788	302
14.0	128	758	812	274
14.5	122	744	846	284
15.0	116	744	872	276
15.5	128	762	902	280
16.0	106	728	936	284
16.5	80	724	946	260
17.0	80	750	956	250
17.5	80	750	954	298
18.0	80	750	954	250
18.5	104	774	956	252
19.0	96	742	950	244
22:45:19.5	70	724	954	254

Range Time	Run No. 264-15 Buffer Fullness (Words)	Run No. 264-15 Input to Buffer (Words)	Run No. 264-16 Buffer Fullness (Words)	Run No. 264-16 Input to Buffer (Words)
22:45:05.0	0	—	0	—
05.5	4	280	0	—
06.0	0	~~272~~ —	4	—
06.5	59	—	16	334
07.0	96	319	30	336
07.5	150	336	28	320
08.0	180	312	24	318
08.5	206	308	18	316
09.0	212	288	8	312
09.5	232	302	6	320
10.0	256	306	10	326
10.5	284	310	16	328
11.0	290	288	4	310
11.5	296	288	0	—
12.0	310	296	↑	—
12.5	312	284		—
13.0	316	286		—
13.5	332	298		—
14.0	328	278		—
14.5	332	286		—
15.0	332	282		—
15.5	328	275		—
16.0	328	282		—
16.5	312	266		—
17.0	296	266		—
17.5	280	266		—
18.0	256	258		—
18.5	234	260		—
19.0	208	256	↓	—
22:45:19.5	192	266	0	—

Table B. 3

Range Time	Run No. 264-25		Run No. 264-26	
	Buffer Fullness (Words)	Input to Buffer (Words)	Buffer Fullness (Words)	Input to Buffer (Words)
22:48:05.0	18	—	0	—
05.5	24	256	0	
06.0	30	256	0	
06.5	94	314	52	~~324~~
07.0	164	320	92	322
07.5	194	280	128	318
08.0	214	280		282
08.5	232	268		↑
09.0	240	258		|
09.5	256	266		|
10.0	276	270		|
10.5	290	264		|
11.0	298	258		|
11.5	304	256		↓
12.0	318	264	128	282
12.5	316	248	116	270
13.0	320	254	118	284
13.5	328	258	128	292
14.0	316	238	114	268
14.5	318	252	114	282
15.0	322	254	128	296
15.5	324	252	112	266
16.0	330	256	108	278
16.5	330	250	90	264
17.0	336	256	76	268
17.5	334	248	62	268
18.0	336	252	43	263
18.5	342	256	16	265
19.0	334	242	0	—
22:48:19.5	326	242	0	—

Table B.3

Range Time	Run No. 2c4-23 Buffer Fullness (Words)	Run No. 2c4-23 Input to Buffer (Words)	Run No. 2c4-24 Buffer Fullness (Words)	Run No. 2c4-24 Input to Buffer (Words)
22:45:05.0	0	—	4	
05.5	0	—	24	270
06.0	0	—	34	260
06.5	45	—	58	304
07.0	100	333	168	330
07.5	130	311	210	242
08.0	144	293	244	284
08.5	148	285	286	292
09.0	134	287	304	268
09.5	130	277	328	274
10.0	130	281	352	274
10.5	144	295	354	282
11.0	130	267	410	266
11.5	128	279	420	260
12.0	128	281	442	272
12.5	128	281	450	258
13.0	128	281	462	262
13.5	128	281	478	276
14.0	116	269	480	252
14.5	128	293	496	266
15.0	128	281	520	274
15.5	118	271	542	272
16.0	116	279	542	250
16.5	100	265	544	252
17.0	82	263	564	270
17.5	64	263	574	260
18.0	48	265	576	252
18.5	30	263	580	254
19.0	0	251	576	246
22:45:19.5	0	251	574	248

Table B.3

Range Time	Run No. 204-28 Buffer Fullness (Words)	Run No. 204-28 Input to Buffer (Words)	Run No. 204-29 Buffer Fullness (Words)	Run No. 204-29 Input to Buffer (Words)
22:45:05.0	0		14	
05.5	0		24	260
06.0	0		32	258
06.5	50		96	314
07.0	96	317	176	330
07.5	128	313	216	290
08.0	128	281	248	282
08.5	128	281	240	292
09.0	128	281	310	270
09.5	118	271	336	276
10.0	128	291	356	270
10.5	128	281	354	278
11.0	120	276	414	280
11.5	120	281	424	260
12.0	128	289	442	268
12.5	118	271	450	258
13.0	120	283	462	262
13.5	128	289	480	268
14.0	112	265	483	253
14.5	120	289	502	269
15.0	118	279	514	262
15.5	109	272	542	278
16.0	104	276	556	264
16.5	90	267	560	254
17.0	72	263	568	258
17.5	60	269	570	252
18.0	38	259	576	256
18.5	24	269	550	254
19.0	6	263	576	296
22:45:19.5	0	275	576	250

Range Time	Run No. 2002-30		Run No. 2004-31	
	Buffer Fullness (Words)	Input to Buffer (Words)	Buffer Fullness (Words)	Input to Buffer (Words)
22:48:05.0	54		4	
05.5	62	258	26	272
06.0	76	264	32	258
06.5	128	302	94	312
07.0	↑	250	128	284
07.5	↑	↑	↑	250
08.0	↑	↑	↑	↑
08.5	↑	↑	↑	↑
09.0	↑	↑	↑	↑
09.5	↑	↑	↑	↑
10.0	↑	↑	↑	↑
10.5	↑	↑	↑	↑
11.0	↑	↑	↑	↑
11.5	↑	↑	↑	↑
12.0	↑	↑	↑	↑
12.5	↑	↑	↑	↑
13.0	↑	↑	↑	↑
13.5	↑	↑	↑	↑
14.0	↑	↑	↑	↑
14.5	↑	↑	↑	↑
15.0	↑	↑	↑	↑
15.5	↑	↑	↑	↑
16.0	↑	↑	↑	↑
16.5	↑	↑	↑	↑
17.0	↑	↑	↑	↑
17.5	↑	↑	↑	↑
18.0	↓	↓	↓	↓
18.5	128	250	128	250
19.0	116	238	116	238
22:48:19.5	120	254	128	262

Range. Time	Run No. 204-22 Buffer Fullness (Words)	Run No. 204-22 Input to Buffer (Words)	Run No. 204-54 Buffer Fullness (Words)	Run No. 204-54 Input to Buffer (Words)
22:48:05.0	20		0	
05.5	32	199	4	209
06.0	40	195	0	201
06.5	82	229	48	253
07.0	104	269	94	251
07.5	216	239	148	259
08.0	276	247	184	241
08.5	305	219	198	219
09.0	324	203	198	205
09.5	330	193	192	199
10.0	356	207	194	207
10.5	366	203	196	207
11.0	368	189	182	193
11.5	372	191	172	195
12.0	404	219	176	209
12.5	404	187	172	201
13.0	418	201	170	203
13.5	428	197	152	193
14.0	426	185	136	189
14.5	432	193	128	197
15.0	440	195	110	187
15.5	451	198	106	201
16.0	451	187	92	191
16.5	452	188	77	190
17.0	462	197	72	200
17.5	466	191	64	197
18.0	466	187	48	189
18.5	474	195	40	197
19.0	466	169	16	191
22:48:19.5	456	177	0	189

Table B.3

Range Time	Run No. 204-35 Buffer Fullness (Words)	Run No. 204-35 Input to Buffer (Words)	Run No. 204-36 Buffer Fullness (Words)	Run No. 204-36 Input to Buffer (Words)
22:48:05.0	198		20	
05.5	224	199	32	200
06.0	248	197	40	196
06.5	318	243	88	236
07.0	410	265	158	258
07.5	475	238	186	216
08.0	540	235	218	220
08.5	590	233	236	206
09.0	618	201	236	188
09.5	652	207	238	190
10.0	680	201	244	194
10.5	710	203	246	190
11.0	728	191	244	186
11.5	744	189	242	186
12.0	788	217	256	202
12.5	802	187	256	188
13.0	826	197	256	188
13.5	848	189	256	188
14.0	860	185	240	172
14.5	878	191	244	192
15.0	908	203	246	190
15.5	934	199	256	198
16.0	948	187	240	172
16.5	SAT.	—	234	182
17.0	↑	—	232	186
17.5	|	—	228	184
18.0	|	—	220	180
18.5	|	—	220	188
19.0	↓	—	206	174
22:48:19.5	SAT.	—	192	174

Range Time	Run No. 204-37 Buffer Fullness (Words)	Run No. 204-37 Input to Buffer (Words)	Run No. 204-38 Buffer Fullness (Words)	Run No. 204-38 Input to Buffer (Words)
22:48:05.0	96		248	
05.5	~~87~~ 110	201	286	211
06.0	112	193	300	187
06.5	148	219	336	209
07.0	182	221	412	249
07.5	194	199	456	215
08.0	216	219	500	217
08.5	202	193	542	215
09.0	220	195	554	185
09.5	216	183	570	187
10.0	218	189	590	193
10.5	216	185	604	187
11.0	206	177	614	183
11.5	198	179	624	183
12.0	204	193	660	209
12.5	196	179	664	177
13.0	198	189	686	195
13.5	194	183	694	181
14.0	186	179	702	181
14.5	196	187	716	197
15.0	178	179	728	185
15.5	178	187	746	191
16.0	168	177	754	181
16.5	158	177	764	183
17.0	156	185	784	193
17.5	144	175	788	187
18.0	130	173	796	181
18.5	130	187	806	183
19.0	110	173	804	171
22:45:19.5	107	178	806	175

Range Time	Run No. 204-30 Buffer Fullness (Words)	Run No. 204-30 Input to Buffer (Words)	Run No. 204-44 Buffer Fullness (Words)	Run No. 204-44 Input to Buffer (Words)
22:48:05.0	128		70	
05.5		173	86	204
06.0		↑	94	196
06.5			128	222
07.0			↑	188
07.5				188
08.0				188
08.5			↓	188
09.0			128	188
09.5			120	180
10.0			128	196
10.5			128	188
11.0			116	176
11.5			128	200
12.0			128	188
12.5			114	174
13.0			128	202
13.5			↑	188
14.0				188
14.5				188
15.0			↓	188
15.5			128	188
16.0			118	178
16.5			114	184
17.0			128	202
17.5			128	188
18.0			128	188
18.5			128	188
19.0		↓	114	174
22:48:19.5	128	173	114	178

Table B.3

Range Time	Run No. 204-40 Buffer Fullness (Words)	Run No. 204-40 Input to Buffer (Words)	Run No. 204-31 Buffer Fullness (Words)	Run No. 204-31 Input to Buffer (Words)
22:52:10.0	794		56	
10.5	794	173	68	199
11.0	792	171	68	187
11.5	808	179	50	199
12.0	814	179	74	181
12.5	815	174	65	181
13.0	804	162	65	187
13.5	800	169	65	187
14.0	792	165	68	187
14.5	794	165	68	187
15.0	780	169	68	187
15.5	776	169	66	185
16.0	756	163	65	189
16.5	754	171	67	186
17.0	740	159	65	188
17.5	738	161	68	187
18.0	736	171	68	187
18.5	725	165	65	187
19.0	712	157	66	185
19.5	658	149	55	179
20.0	650	165	64	193
20.5	664	157	52	175
21.0	662	171	65	203
21.5	662	173	68	187
22.0	666	177	68	187
22.5	648	155	65	187
23.0	626	151	66	185
23.5	628	175	68	189
24.0	648	193	70	189
22:52:24.5	624	149	64	181