#396

Xfer to CDDIS

GEOS-C

SATELLITE TO SATELLITE TRACKING

75-027A-06A ESGP-00088

Table of Contents

----

1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents — To find associated documents you will need to know the document ID number and then click here. http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

GEOS 3

SAT. TO SAT. TRACKING DATA ON TAPE

75-027A-06A ESGP-00088

THIS DATA SET HAS BEEN RESTORED. THERE WAS ORIGINALLY ONE 9-TRACK, 1600 BPI TAPE WRITTEN IN EBCDIC. THERE IS ONE RESTORED TAPE, WRITTEN IN ASCII. THE DR TAPE IS A 3480 CARTRIDGE AND THE DS TAPE IS 9-TRACK, 6250 BPI. THE ORIGINAL TAPE WAS CREATED ON AN IBM 360 COMPUTER AND WAS RESTORED ON AN IBM 9021 COMPUTER. THE DR AND DS NUMBER ALONG WITH THE CORRESPONDING D NUMBER AND TIME SPAN IS AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR005901	DS005901	D025192	16	04/13/75 - 04/18/76

REQ. AGENT	RAND NO.	ACQ. AGENT
CMP	RC6860	JRJ

GEOS-C

SATELLITE TO SATELLITE TRACKING

75-027A-06A

ASCII

This data set contains 1 tape. The tape is 9-track, 1600 BPI, ~~EBCDIC~~, with 16 files. The tape format is in the "User's Guide for Satellite to Satellite System Observations and Data Formats."

The 'D' and 'C' numbers along with the time spans is as follows:

D#	C#	TIME SPAN
D-25192	C-19279	~~04/09/75 - 12/23/75~~ 4/13/75 - 4/18/76

75-027A-06A

X-932-75-78

75-027A-06A

GEOS-C

A USER'S GUIDE FOR SATELLITE TO SATELLITE SYSTEM OBSERVATIONS AND DATA FORMATS

J. W. BRYAN

J. J. LYNN

A. O. HINELY

MARCH 1975

GSFC

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

A USER'S GUIDE FOR SATELLITE TO SATELLITE SYSTEM OBSERVATIONS AND DATA FORMATS

J. W. Bryan
J. J. Lynn
A. O. Hinely

March 1975

Goddard Space Flight Center
Greenbelt, Md. 20771

CONTENTS

ILLUSTRATIONS

TABLES

A USER'S GUIDE FOR SATELLITE TO SATELLITE SYSTEM OBSERVATIONS AND DATA FORMATS

J. W. Bryan
J. J. Lynn
A. O. Hinely

ABSTRACT

This document provides a description of the observations, data formats, and system parameters associated with the Satellite to Satellite Tracking Data Preprocessor Program. The operational Satellite to Satellite Tracking System and Trajectory computation software discussed in this document is the result of a systematic evolution of applied technology which had its beginning in early 1968. The document describes the two types of observations, Range and Doppler, and their functional relation to the satellite states. An appendix provides a complete description of the available (input/output) data formats and the associated system parameters.

SYSTEM DESCRIPTION

The satellite to satellite tracking (SST) system (refs 1, 2 & 3) used to derive the data described in this document consists of; (1) the ground based Application Technology Satellite Ranging (ATSR) system, (modified for satellite to satellite tracking) (2) the wideband communication transponder on the ATS-6 geosynchronous spacecraft and (3) the ranging transponder on the low orbiting satellite. The ATSR system generates the interrogating signals and measures range sum and range sum rate from the returned signals. In the SST configuration the ATSR system generates two C-band radio frequency signals, (1) a beacon carrier used to phase lock the ATS-6 transponder ossillator and (2) a range tone modulated carrier used to measure the range sum and range sum rate. These signals are radiated toward ATS-6 from either Rosman, N.C., Mojave, Calif. or Madrid, Spain ATSR site.

The signals are received by the ATS-6 spacecraft via an earth coverage antenna. Using the phase locked oscillator as a reference frequency, the ATS-6 transponder frequency translates the ranging carrier to S-band. Communications between the ATS-6 and the low orbiting satellite is accomplished using a 9 meter (36 dB gain, 1.4° beamwidth) parabolic antenna on the ATS-6 spacecraft. The low orbiting spacecraft is equipped with either a crystal transponder (NIMBUS) or a phase locked frequency multiplying transponder (GEOS-C and Apollo). The ranging signal received by the low satellite ~~is~~ transponded and radiated back to ATS-6. This return link signal is frequency translated, using the phase locked frequency reference, to C-band in the ATS-6 transponder and radiated by the earth coverage antenna to the ATSR system.

The ATSR system measures the propagation delay by determining the elapsed time between zero crossings of the transmitted and received range tone. This elapsed time is the range sum data output. Since the lowest frequency tone used is 8 Hz, the range measurement is ambiguous for delay times greater than 125 milliseconds. The Doppler is measured using a cycle counting technique. The actual derived Doppler is added to a bias frequency to preserve the sign of the Doppler. The measurement is the time required to accumulate a known number of Doppler plus bias frequency cycles. The Doppler thus determined is the sum of the Doppler offsets on; (1) the 6 GHz ground to ATS-6 link (2) the 2.GHz ATS-6 to low orbiter link, (3) the 2.25 GHz low orbiter to ATS-6 link and (4) the 4GHz ATS-6 to ground link due to the relative velocities between elements of the individual links.

DESCRIPTION OF THE TRACKING DATA

Range Measurement

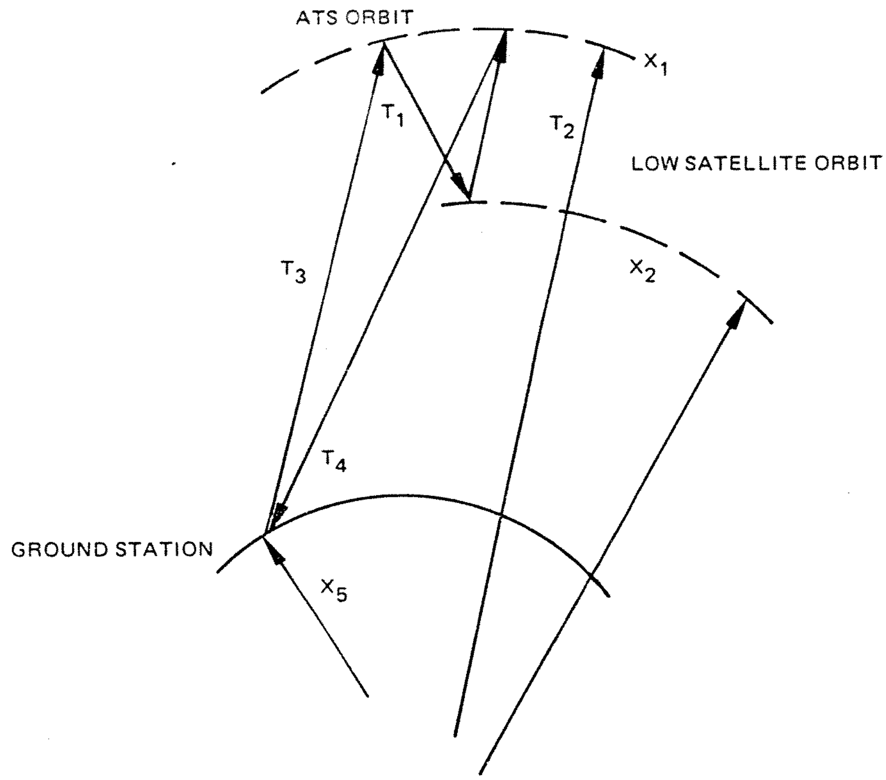
The basic observational equation for ranging is simply an expression relating the observed measurement, namely the indicated elapsed time interval, to a so called computed measurement which is a function of the positions of the two satellites at the respective times of signal arrival, the position coordinates of the ground station antenna, and other possible system parameters (e.g. transponder delays, refraction delay). The required relation follows directly from the analysis of the signal geometry which is illustrated in Figure 1.

Let:

τ be the measured or observed time interval for ranging
t be the recorded observation time based on the ground station clock
$X_1(u)$, $X_2(u$, $X_s(u)$ be the geocentric position coordinate vectors for the high satellite, low satellite, and ground station respectively at arbitrary time u.

Then the reference tone which is transmitted from the ground station at time t will reach the high (ATS) satellite at time $t + T_3$, where T_3 represents the transit delay over the link between the ground transmitter and the high (ATS) synchronous satellite. The ATS transponder retransmits the signal after a transponder delay of TD_1 to the low satellite where it arrives at time $t + T_3 + TD_1 + T_1$, where T_1 represents the high to low satellite transit delay. The signal is then retransmitted after a transponder delay TD_2 to the ATS arriving there at time $t + T_3 + TD_1 + T_1 + TD_2 + T_2$, where T_2 represents the low to high satellite transit delay. The signal is finally transponded with delay TD_3 from the ATS to the ground receiver where it arrives at time $t + T_3 + TD_1 + T_2 + TD_2 + T_1 + TD_3 + T_4$, where T_4 represents the signal transit delay over the ATS to ground receiver link. The propagation delays T_3 and T_4 must be corrected for atmospheric refraction, and in the crystal transponder mode the subcarrier receiver delay must be removed from T_4. Each of the above transit delays is expressible in terms of satellite and ground station position coordinates (for the sake of simplicity, we have neglected other system parameter delays) as follows;

$$
\begin{aligned}
T_3 &= |X_1(t + T_3) - X_s(t)|/C \\
T_1 &= |X_2(t + T_3 + T_1) - X_1(t + T_3)|/C \\
T_2 &= |X_1(t + T_3 + T_1 + T_2) - X_2(t + T_3 + T_1)|/C \\
T_4 &= |X_1(t + T_3 + T_1 + T_2) - X_s(t + T_3 + T_1 + T_2 + T_4)|/C
\end{aligned}
\tag{1}
$$



X_s is the geocentric station position vector.

X_1 is the ATS position vector

X_2 is the low satellite position vector

$U_3 = T_3$ is the signal delay over ground transmitter tc ATS link

$U_1 = T_1$ is the signal transit delay over the ATS to low satellite link

$U_2 = T_2$ is the signal transit delay over the low satellite to ATS link

$U_4 = T_4$ is the signal transit delay over the ATS to ground receiver link

Figure 1. Tracking Geometry

where C is the velocity of signal propagation, and where the expression $|Y|$ means the absolute value of the vector Y.

Finally, then the observed or measured ranging delay τ is expressible in terms of the above as:

$$\text{PLL Mode} \quad \tau = T_1 + T_2 + T_3 + T_4 - n(.125) + \sum_{i=1}^{3} TD_i + T_R \tag{2}$$

$$\text{XTAL Mode} \quad \tau = T_1 + T_2 + T_3 + T_4 - n(.125) + T_{sc} + T_R + \sum_{i=1}^{3} TD_i$$

where n is the unknown number of 8 Hz (or .125 seconds) range ambiguities.

TD_i is the transponder delay (see Appendix)
T_R is atmospheric correction
T_{sc} is the Subcarrier Receiver Delay (see Appendix)

Doppler Measurement

The Doppler measurement is accomplished by determining the elapsed time interval (T) required to accumulate some fixed number (N), of Doppler plus Bias frequency cycles (Destruct Mode). The Doppler measurement system will later be modified to determine the number (N) of Doppler plus bias frequency cycles for a known period (T) of time (Non destruct Mode). This modification will not change the formulations or processes presented in this document. The relationship between this measured time interval T, and the fixed number of cycles N is given by the expression,

$$N = \phi(t + T) - \phi(t) \tag{3}$$

where ϕ (t) represents the phase of the received signal consisting of the Doppler (ref. 3) plus Bias frequency. The entire process undergone by the signal is illustrated in Figure 2 and 3.

The designated path delays are identical with the ones depicted geometrically in Figure 1. Tables I and II list the respective phase of the signal at each reference point of Figures 2 and 3 for a transponder in the XTAL mode of operation, (ref. 2). Similarly, Table III provides the signal phase information for a transponder in the PLL mode, (ref. 3). The required relationship between the observed time delay T, the fixed number N, and the path delays is obtained by substituting the phase of the signal at reference point 6 of Figure 3 into expression (3).

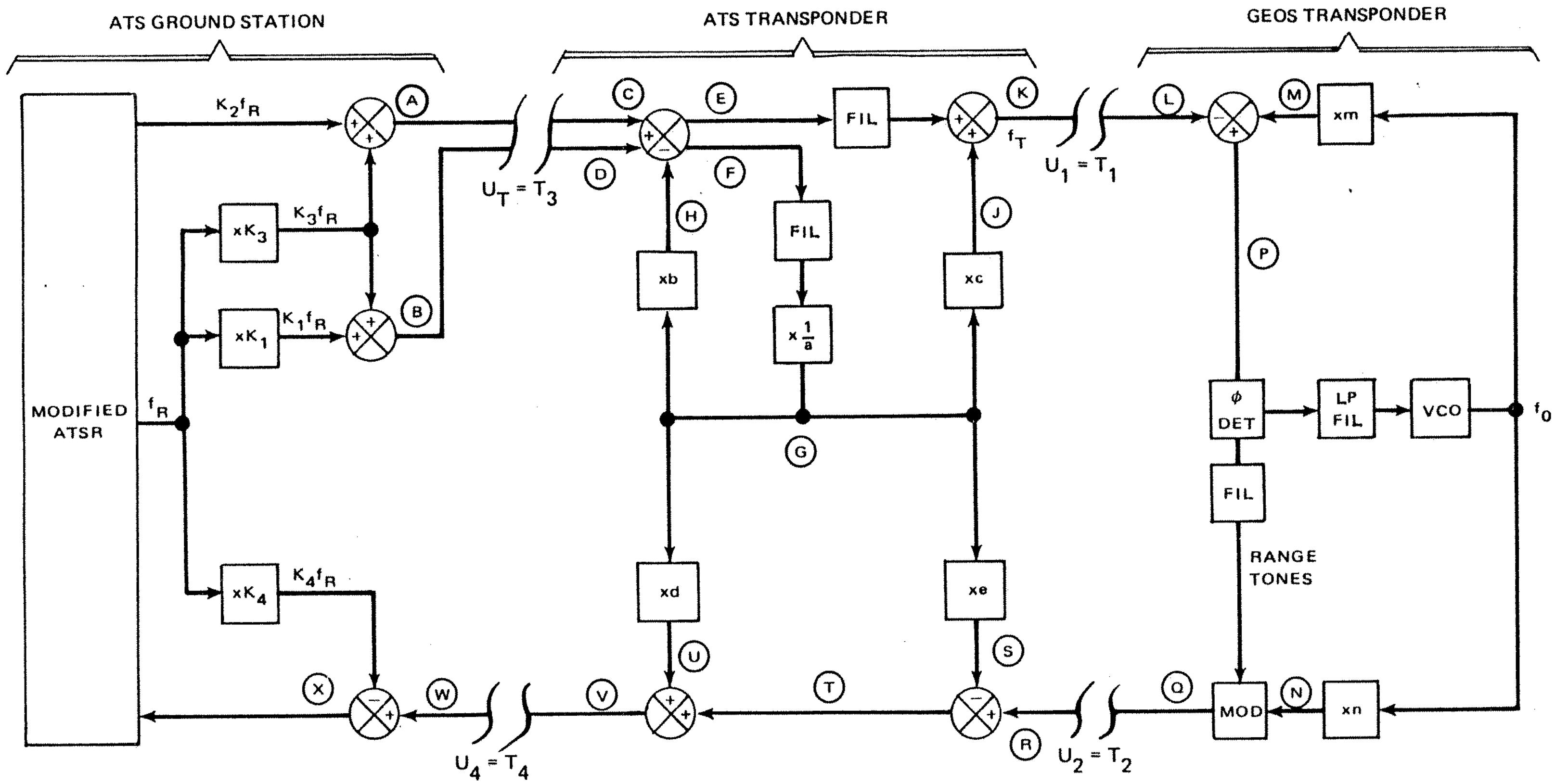
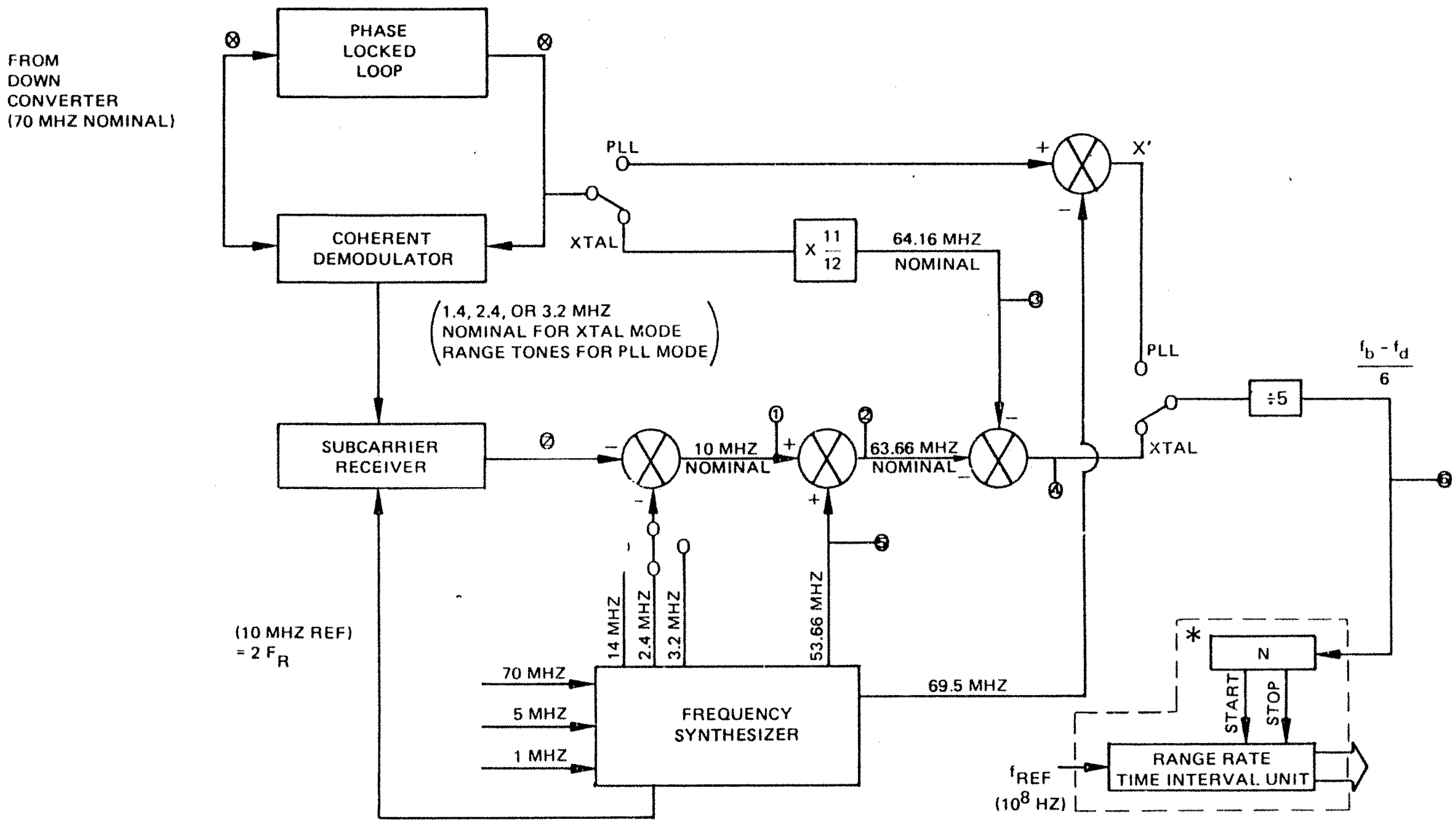


Figure 2. Data Relay Signal Flow Diagram



*TO BE MODIFIED TO INCLUDE CONTINUOUS COUNT SYSTEM

Figure 3. Received Signal Processing and Doppler Extraction Diagram

Table I. Phases for Figure 2 (XTAL Mode)

Fig. 2 Ref. Point	CARRIER PHASE	SUBCARRIER PHASE
A	$(k_2 + k_3)\, F_R\, t$	
B	$(k_1 + k_3)\, F_R\, t$	
C	$(k_2 + k_3)\, F_R (t - U_3)$	
D	$(k_1 + k_3)\, F_R (t - U_3)$	
E	$\left(\frac{1}{a + b}\right) a(k_2 + k_3) + b(k_2 - k_1)]\ F_R \cdot (t - U_3)$	
F	$\left(\frac{1}{a + b}\right) [a(k_1 + k_3)]\ F_R (t - U_3)$	
G	$\left(\frac{1}{a + b}\right) (k_1 + k_3)\, F_R (t - U_3)$	

Table I (Continued)

Fig. 2 Ref. Point	CARRIER PHASE	SUBCARRIER PHASE
H	$\left(\frac{1}{a+b}\right) [bk_1 + k_3)]\ F_R(t - U_3)$	
J	$\left(\frac{1}{a+b}\right) [c(k_1 + k_3)]\ F_R(t - U_3)$	
K	$\left(\frac{1}{a+b}\right) [a(k_2 + k_3) + b(k_2 - k_1) + c(k_1 + k_3)]$	
	$F_R \cdot (t - U_3) = F_T(t - U_3)$	
L	$F_T(t - U_3 - U_1)$	
M	$m(F_0 t + \theta)$	
N	$n(F_0 t + \theta)$	

Table I (Continued)

Fig. 2 Ref. Point	CARRIER PHASE	SUBCARRIER PHASE
P	$m(F_0 t + \theta) - F_T(t - U_3 - U_1)$	
Q	$n(F_0 t + \theta)$	$m(F_0 t + \theta) - F_T(t - U_3 - U_1)$
R	$n(F_0(t - U_2) + \theta)$	$m(F_0(t - U_2) + \theta) - F_T(t - U_3 - U_1 - U_2)$
S	$\left(\frac{1}{a + b}\right)[e(k_1 + k_3) F_R(t - U_3)]$	
T	$n(F_0(t - U_2) + \theta) - \left(\frac{1}{a + b}\right)[e(k_1 + k_3)] F_R(t - U_4)$	$m(F_0(t - U_2) + \theta) - F_T(t - U_3 - U_1 - U_2)$
U	$\left(\frac{1}{a + b}\right)[d(k_1 + k_3) F_R(t - U_3)]$	
V	$n(F_0(t - U_2) + \theta) + \left(\frac{d - e}{a + b}\right)(k_1 + k_3) F_R(t - U_3)$	$m(F_0(t - U_2) + \theta) - F_T(t - U_3 - U_1 - U_2)$

Table I (Continued)

Fig. 2 Ref. Point	CARRIER PHASE	SUBCARRIER PHASE
W	$n(F_0(t - U_2 - U_4) + \theta) + \left(\frac{d - e}{a + b}\right)(k_1 + k_3) F_R(t - U_3 - U_4)$	$m(F_0(t - U_2 - U_4) + \theta) - F_T(t - U_3 - U_1 - U_2 - U_4)$
X	$\phi(\omega) - k_4 F_R t$	$\phi(\omega)$

NOTE: For description of system parameters, See Table A-4

Table II. Phases for Figure 3 (XTAL Mode)

Ref Point	Phase of signal at reference point
Y	$(mF_0 - F_T)\,t - mF_0(U_2 + U_4) + F_T(U_3 + U_1 + U_2 + U_4) + m\theta$
Z	$2F_R t + (mF_0 - F_T)\,t - mF_0(U_2 + U_4) + F_T(U_3 + U_1 + U_2 + U_4) + m\theta$
1	$2F_R t - mF_0(U_2 + U_4) + F_T(U_3 + U_1 + U_2 + U_4) + m\theta$
2	$\frac{382}{30} F_R t - mF_0(U_2 + U_4) + F_T(U_3 + U_1 + U_2 + U_4) + m\theta$
5	$\frac{322}{30} F_R t$
3	$\frac{m}{n}\left\{\left[nF_0 + \left(\frac{d - e}{a + b}\right)(k_1 + k_3)\,F_R - k_4F_R\right] t - nF_0(U_2 + U_4) - \left(\frac{d - e}{a + b}\right)(k_1 + k_3)(2U_4)\,F_R + n\theta\right\}$

Table II (Continued)

Ref. Point	Phase of signal at reference point
4	$\left(mF_0 + \frac{m}{n}\left(\frac{d-e}{a+b}\right)(k_1 + k_3)\,F_R - \frac{m}{n}k_4F_R - \frac{382}{30}F_R\right)t$
	$-\frac{m}{n}\left(\frac{d-e}{a+b}\right)(k_1 + k_3)\,F_R(U_3 + U_4) - F_T(U_3 + U_1 + U_2 + U_4)$
	$= F_B t - \frac{m}{n}\left(\frac{d-e}{a+b}\right)(k_1 + k_3)\,F_R\,(U_3 + U_4) - F_T(U_3 + U_1 + U_2 + U_4)$
6	$\frac{F_B}{5}t - \frac{m}{5n}\left(\frac{d-e}{a+b}\right)(k_1 + k_3)\,F_R(U_3 + U_4) - \frac{F_T}{5}\,(U_3 + U_1 + U_2 + U_4)$

Table III. Phases for Figures 2 & 3 (PLL Mode)

Fig. 2 Ref. Point	
A - L	See Table I
M	$F_T(t - U_3 - U_1)$
N	$\left(\frac{n}{m}\right) F_T(t - U_3 - U_1)$
Q	$\left(\frac{n}{m}\right) F_T(t - U_3 - U_1)$
R	$\left(\frac{n}{m}\right) F_T(t - U_3 - U_1 - U_2)$
S	See Table I
T	$\left(\frac{n}{m}\right) F_T(t - U_3 - U_1 - U_2) - \frac{1}{(a + b)} (e(k_1 + k_3) F_r(t - U_3))$

Table III (Continued)

Fig. 2 Ref. Point	
U	See Table I
W	$\left(\frac{n}{m}\right) F_T (t - U_3 - U_1 - U_2 - U_4) + \frac{(d-e)(k_1+k_3)}{(a+b)} F_r (t - U_3 - U_4)$
X	$\left[\left(\frac{n}{m}\right) F_T - \frac{(d-e)(k_1+k_3)}{(a+b)} F_r - k_4 f_r\right] t - \left(\frac{n}{m}\right) F_T (U_3 + U_1 + U_2 + U_4) - \frac{(d-e)(k_1+k_3)}{(a+b)} F_r (U_3 + U_4)$
X'	$F_B t - \left(\frac{n}{m}\right) F_T (U_1 + U_3 + U_2 + U_4) - \frac{(d-e)(k_1+k_3)}{(a+b)} F_r (U_3 + U_4)$
6	$\frac{F_B}{5} t - \left(\frac{n}{m}\right) \frac{F_T}{5} (U_1 + U_3 + U_2 + U_4) - \frac{(d-e)(k_1+k_3)}{(a+b)} \frac{F_r}{5} (U_3 + U_4)$

NOTE: For description of system parameters see Table A-4.

This yields,

$$N = \frac{f_B}{5} \cdot T + \frac{A_3}{5} \left(T_4(t + T) - T_4(t) + T_3(t + T) - T_3(t)\right)$$

$$+ \frac{A_4}{5} \cdot \sum_{i=1}^{4} \left(T_i(t + T) - T_i(t)\right) \tag{4}$$

where,

f_B = bias frequency (nominal value is .5 MHz)

A_3 and A_4 are two additional frequency terms which are expressible in terms of other system parameters, described in Table A-4 as,

$$A_3 = -\frac{(m)}{(n)} \frac{(d - e)}{(a + b)} (k_1 + k_3) f_R \qquad \text{(XTAL Mode)}$$

$$= -\frac{(d - e)}{(a + b)} (k_1 + k_3) f_R \qquad \text{(PLL Mode)}$$

$$A_4 = -\frac{f_B}{(a + b)} \{a(k_2 + k_3) + b(k_2 - k_1) + c(k_1 + k_3)\} \qquad \text{(XTAL Mode)}$$

$$= -\frac{(n)}{(m)} \frac{f_R}{(a + b)} \{a(k_2 + k_3) + b(k_2 - k_1) + c(k_1 + k_3)\} \qquad \text{(PLL Mode)}$$

Each of the path delays T_i is related to the satellite positions by means of the following nonlinear system of equations,

$$T_4(t) = |X_1(t - T_4(t)) - X_s(t)|/C$$

$$T_2(t) = |X_1(t - T_4(t)) - X_2(t - T_4(t) - T_2(t)|/C$$

$$T_1(t) = |X_2(t - T_4(t) - T_2(t)) - X_1(t - T_4(t) - T_2(t) - T_1(t))|/C \tag{5}$$

$$T_3(t) = |X_1(t - T_4(t) - T_2(t) - T_1(t)) - X_s(t - T_4(t) - T_2(t) - T_1(t) - T_3(t))|/C$$

where C = velocity of signal propagation. The applicable geometry is illustrated in Figure 1 where system delays have been omitted for simplicity.

In order to properly utilize these satellite to satellite observations, it is necessary that the Orbit Determination Program be capable of synthesizing the equivalent "computed" ranging and doppler observations according to the above non linear observation equations. In the existing Navigation Analysis Program (NAP3) currently utilized at GSFC (ref. 5), these computed observations are synthesized by means of an iterative algorithm, with provisions for applying or solving for a comprehensive set of systematic errors.

It should be noted that the time tag associated with both ranging and doppler observations is referenced to the start of the elapsed range interval time unit counter. This is accounted for in the two separate algorithms used for the synthesis of path delays for ranging and doppler observations as given by means of equation sets (1) and (5) respectively.

The actual value of 'N', the fixed number of doppler plus bias frequency cycles being counted, depends on the data recording rate and is given in Table A-6. Selectable values of "T" for the Non destruct Mode will be established when the system is modified. These values will be available from GSFC at that time.

REFERENCES

1. Vonbun, F. O. and Mengel, J. T., "Tracking and Communications for Planetary Manned Mission" AIAA Journal of Spacecraft and Rockets, Vol. 5, No. 7, pp. 863-865, July 1968.

2. Schmid, P. E. and Vonbun, F. O., "The ATS-F/NIMBUS-F Tracking and Orbit Determination Experiment" IEEE Intercon, New York, N. Y., March 26-29, 1974.

3. Bryan, J. W., "ATS-F/GEOS-C Satellite to Satellite Tracking Data Processing Considerations," GSFC X-932-74-146, May 1974.

4. Marini, J. W., "Doppler Factors in Satellite to Satellite Tracking," GSFC X-932-74-93, April 1974.

5. Lynn, J. J., "Navigation Analysis Program" GSFC Contract NAS5-11915, Old Dominion Systems Inc., April 1973.

APPENDIX A

Preprocessor Data Formats and System Parameters

A.1 Input Data

The "Tracking Data Preprocessor" can accept tracking data in three formats; the ATSR teletype format, the NAPSIM format, and the GSFC 60-byte format. These data can be input from magnetic tape, disk file or cards. This Appendix contains a detailed description of each of the three types.

A.1.1 ATSR Teletype Format

The characteristic feature of the ATSR teletype data is that two lines are required for each measurement. Figure A-1 contains the present formats of these data for the Destruct and Non-Destruct Doppler count modes. In addition to the data lines, each pass is preceded by a header record which contains identification information. The format of the header record is described in Figure A-2 which contains a sample of an actual satellite tracking.

The two lines contain: two angle measurements, four range rate measurements, four range measurements, a single time tag, a satellite identification code (SAT), a station identification code (STA) and four additional codes C1, C2, C3 and C4.

The angle measurements are ignored by the preprocessor. The range rate measurement is the time required to accumulate a fixed number of bias-plus-doppler frequency cycles (Destruct), or the number of bias plus Doppler frequency cycles accumulated in a measured time period (Non-Destruct). The range measurement is the time delay from signal transmission to receipt. This is an ambiguous measurement in that the clock cycles to zero every 0.125 seconds. Therefore, an approximation of the true range is required to resolve the actual measurement. Such resolution is not performed by the preprocessor.

The time tag of the first doppler and range measurements is that which appears in the first line of data. The time tag is incremented according to the sample rate (C-2) for the remaining three pairs of measurements.

The SAT code contains a three digit number which defines: the relay satellite, the equipment mode and the target object. Table A-1 contains a matrix which indentifies the elements of SAT. Referring to this table, consider the three digit code 642. Then;

6 = Relay Satellite ID = ATS-6.
4 = Equipment Mode = Crystal on ground, and
2 = Target object = Santiago, Chile.

Also, note from this table that for SAT $\geqslant$ 640, the target object is some ground based transponder. The raw tracking data contains the two digit identification, STA, of the transmitting station. For those data which are relayed through a ground transponder, the Preprocessor constructs an identification code for the transponder. Table A-2 contains the station numbers transponder type and transponder delay valid at the time of this document. The C1 parameter is not used by the preprocessor. The C2 and C3 parameters are used to extract information necessary in the synthesis of the doppler measurement. Table A-3 lists the locations of the stations used thus far in the various SST modes.

The C3 parameter identifies the uplink and downlink frequencies used in the satellite relay tracking. There are four terms of the doppler equation which are dependent on these frequencies. Table A-4 contains for each possible value of C3: the uplink and downlink frequencies, and the values of the four terms. This table also contains the values of nine additional terms which are independent of frequency but are required for the doppler synthesis. These terms are used in the calculation of the doppler constants:

$$A_3 = -\frac{m(d - e)}{n(a + b)}(k_1 + k_3)\, f_r \text{ (XTAL Mode)}$$

$$A_4 = -\frac{f_r}{a + b}\{a(k_2 + k_3) + b(k_2 - k_1) + c(k_1 + k_3)\} \text{ (XTAL Mode)}$$

For PLL mode, A_3 and A_4 are multiplied by the ratio n/m.

There are two additional constants required for the doppler synthesis which are obtained from the tracking data. These are:

f_b = frequency bias and

N = cycle count

The bias frequency consists of a nominal value plus a differential which varies according to the transmitting station, equipment mode, target object and operating frequency.

$$f_b = 5.D5 + df \quad \text{(Hertz)}$$

where: df = bias frequency differential.

The possible values of df for the Rosman and Mojave Mobile transmitters are contained in Table A-5.

The remaining constant N for the Destruct mode of Doppler counting, is dependent on the sample rate which is identified via the C4 parameter. Table A-6 contains the possible values for this parameter. All of the tables discussed in this Appendix are contained in the Preprocessor. The doppler constants, which are dependent on the values of these tables, are computed and output. A more complete description of the mathematics, thus employed, is contained in the main section of this document.

A.1.2 NAPSIM Format

The NAPSIM format is that used by the "Navigation Analysis Program", NAP. This format consists of a header record for each pass, one record which contains the measurements at each time point and a terminal record. Each record contains eight 8-byte binary words.

A.1.2.1 The Leader Record Contains:

Word 1 = 0.D0
- 2 = Arc Number = 1.D0 for all Preprocessed data.
- 3 = Station Number = Two digits station identification number, see Table A-2
- 4 = Pass number = a serial identification associated with each pass for each station.
- 5 = Target Object
  - = -2 if sidetone or coherent ATS tracking
  - = 0 if satellite to satellite tracking otherwise, the two digit remote transponder identification of Table A-2.
- 6 = Name of transmitting site
- 7 = Name of target object
- 8 = Byte 1 = Equipment Mode
  - 2 = Target Object
  - 3 = C1
  - 4 = C2
  - 5 = C3
- 6 - 8 = spares

(See section A.1.1 for further identification)

A.1.2.2 Each Data Record Contains:

Word 1 = Decimal days since January 0, 1950
2 = Seconds of current day
3 = Range measurement
4 = Doppler measurement
5 - 8 = 0.D0

A.1.2.3 The Final Record of Each File Contains:

Word 1 = -1.D0
2 - 8 = 0.D0

A.1.3 GSFC 60-Byte Format

The GSFC 60-byte general data format used by GSFC Code 500 can also be read by the preprocessor. Table A-7 contains a general description of each of the thirteen words comprising this data type. Words 1 and 2 contain identification codes of the receiving and transmitting sites respectively. Table A-8 correlates these codes with the actual sites.

For satellite-to-satellite tracking, word 12 will contain the integer 13, word 6: the doppler count in seconds, word 7: the range sum in kilometers, and word 8: the doppler in hertz.

Word 9 contains additional information extracted from the raw data. Table A-9 summarizes the contents of this word. Each of the variables contained in word 9 is more fully described in Section A.1.1 ATSR teletype format.

A.2 Output Data

The Preprocessor can produce data tapes in the NAPSIM, 60-byte or MTAUF formats. At the user's option, tapes in any or all of the three formats can be output in a single run. The NAPSIM and 60-byte tapes can contain either all of the observations or compacted observations. The compacted observations are obtained from an n^{th} degree polynomial over N data points. The degree of the polynomial and the number of measurements to be compacted is under user control. The data formats are not altered if the data is compacted.

The formats of the NAPSIM and 60-byte tapes are fully described in the Input Data portion of this appendix. The remaining format, the MTAUF, will now be described.

A.2.1 MTAUF Format

The Mission Trajectory and Analysis Unified Format (MTAUF) is an alternate NAP input format. This format is available only for compacted data. The degree of the polynomial and the number of points to be compacted to a single observation are under the user's control. Table A-10 contains the format of this data type. The tape produced by the preprocessor will contain the following:

Word 1 = Two digit ID of transmitting station
2 = 9
3 = Days
4 = Seconds
5 - 8 = 0.D0
9 = Elapsed time for ranging
10 = Elapsed time of N cycles of doppler plus bias
11 = 0.D0

The primary disadvantage to this data format is the absence of: the ID of the receiving site, the equipment mode, the target object, the constant C2 and the constant C3. All of this information is essential for proper processing. Therefore, this information must be obtained from other Preprocessor outputs prior to data reduction.

Table A-1
ATSR Satellite ID, SAT

A-1.1 ATS Identification

SAT	ATS Series
Oxx	ATS-1 VHF
1xx	ATS-1
2xx	ATS-3 VHF
3xx	ATS-3
5xx	ATS-5
6xx	ATS-6

A-1.2 Satellite To Satellite Identification

Equipment Mode	Target Object							
	= 0	= 1	= 2	= 3	= 4	= 5	= 6	= 7
0 = Sidetone	ATS-6			Boresite				
1 = Coherent	Nimbus	GEOS	ASTP	Boresite				
2 = PLL Satellite	GEOS	ASTP						
3 = XTAL Satellite	Nimbus							
4 = XTAL Ground	Rosman	Mojave	Santiago	Mobile	NTTF	Houston	Madrid	Ascension
5 = PLL Ground	Rosman	Mojave	Santiago	Mobile	NTTF	ASTP Houston	ASTP Madrid	

Table A-2
Station Identification

Station Name	Type	ID No.
Rosman	Xmitter	58
Mojave Mobile	Xmitter	66
Madrid Mobile	Xmitter	99
Rosman	Xtal Xpndr	40
Rosman	PLL Xpndr	50
Mojave	Xtal Xpndr	41
Mojave	PLL Xpndr	51
Santiago	Xtal Xpndr	42
Santiago	PLL Xpndr	52
Boresite	Xtal Xpndr	43
Boresite	PLL Xpndr	53
NTTF	Xtal Xpndr	44
NTTF	PLL Xpndr	54
Port Loc	Xtal Xpndr	45
Port Loc	PLL Xpndr	55
Ascension Island	Xtal Xpdr	
Johannesburg	Xtal Xpdr	

Table A-2.1
Summary of Equipment Delays (Nanoseconds)

Station	Type	Total Delay (including cables)
Rosman	ATSR PLL Mode	0
Rosman	ATSR XTAL Mode	780
Madrid	ATSR PLL Mode	0
Madrid	ATSR XTAL Mode	780
Rosman	XTAL XPDR	1719
Mojave	XTAL XPDR	1830
Santiago	XTAL XPDR	1791
Madrid	XTAL XPDR	1625*
Madrid	Apollo XPDR Simulator	to be determined**
Johannesburg	XTAL XPDR	1793
Ascension	XTAL XPDR	1791
NTTF	XTAL XPDR	2731
NTTF	PLL XPDR	1605
ATS-6	C-band to S-band	170
ATS-6	S-band to C-band	190
GEOS-3	PLL XPDR	1580
NIMBUS-F	XTAL XPDR	2541

*Cable Delay not available as of publication date
**Apollo XPDR simulator delay will be measured immediately prior to ASTP mission

Table A-3
Station Locations

Station Name	Geodetic Coordinates		
	Latitude	Longitude	GEOID Height
Rosman (ATSR)	35° 11' 55″.6	277° 07' 27″.5	824 m
Mojave (ATSR)	35° 19' 53″.9	243° 06' 47″.7	886 m
Madrid (ATSR)	40° 27' 19″.7	355° 49' 53″.9	808 m
Ahmedabad (ATSR)	23° 01' 19″.8	72° 30' 54″.9	250 m
Ascension*	-07° 57' 19″	345° 40' 20″.7	528 m
Santiago*	-33° 09' 04″.9	289° 19' 54″.2	703 m
NTTF*	38° 59' 53″.6	283° 09' 27″.8	-1 m
Johannesburg*	-25° 53' 11″.0	27° 42' 26″.9	1542 m

*Transponder locations are approximated

Table A-4
Doppler Synthesis Terms

A-4.1 Frequency Dependent Terms

C3	Frequency (MHz) Uplink/Downlink	k_3	k_4	b	d
0	NOT ATS-6	-	-	-	-
1	5950/3750 (XTAL)	1173.5700	736.6	232	144
	(PLL)	1174.8225	755.4	232	144
2	5950/3950 (XTAL)	1173.5700	776.6	232	152
	(PLL)	1174.8225	775.9	232	152
3	5950/4150 (XTAL)	1173.5700	816.6	232	160
	(PLL)	1174.8225	815.9	232	160
4	6150/3750 (XTAL)	1213.5700	736.6	240	144
	(PLL)	1214.8225	735.4	240	144
5	6150/3950 (XTAL)	1213.5700	776.6	240	152
	(PLL)	1214.8225	775.4	240	152
6	6150/4150 (XTAL)	1213.5700	816.6	240	160
	(PLL)	1214.8225	815.4	240	160
7	6350/3750 (XTAL)	1253.5700	736.6	248	144
	(PLL)	1254.8225	735.4	248	144
8	6350/3950 (XTAL)	1253.5700	776.6	248	152
	(PLL)	1254.8225	775.4	248	152
9	6350/4150 (XTAL)	1253.5700	816.6	248	160
	(PLL)	1254.8225	815.4	248	160

A-4.2 Frequency Independent Terms

$f_r = 5.0$ MHz

$m = 55$ (XTAL)

$= 221$ (PLL)

$a = 6$

$c = 77$

$f_o = 37.55$ MHz

$n = 60$ (XTAL)

$= 240$ (PLL)

$k_2 = 14$

$e = 84$

$k_1 = 16.43$ (XTAL)
$k_1 = 15.1775$ (PLL)

Table A-5

A-5.0.0 Doppler Bias Frequencies

A-5.1.0 Transmitter = Rosman

A-5.1.1 Equipment Mode = Crystal

FREQ.	NIMBUS	FREQ.	NIMBUS
1	-14.29557517	6	22.39718083
2	-28.94252179	7	-14.31895117
3	22.41053164	8	-28.96714011
4	-14.30764303	9	22.38467101
5	-28.95523113		

A-5.1.2 Equipment Mode = Phase Locked Loop

FREQ.	GEOS	ASTP	
1	32.30279344	31.99999907	
2	16.31892826	15.99999888	
3	0.33506251	-0.00000131	
4	32.29294646	31.99999878	
5	16.30855633	15.99999860	
6	0.32416619	-0.00000159	
7	32.28371992	31.99999907	
8	16.29883837	15.99999888	
9	0.31395626	-0.00000131	

A-5.1.3 Equipment Mode = Coherent

FREQ.	NIMBUS	GEOS	ASTP
1	8.40336111	20.30252102	31.99999964
2	-7.57512669	4.31865556	15.99999945
3	-23.55361477	-11.66521105	-0.00000074
4	8.39024364	20.29268285	31.99999964
5	-7.58894362	4.30829272	15.99999945
6	-23.56813116	-11.67609855	-0.00000074
7	8.37795238	20.28346455	31.99999964
8	-7.60189027	4.29858272	15.99999945
9	-23.58173350	-11.68630024	-0.00000074

A-5.2.0 Transmitter = Mojave Mobile (Hybrid)

A-5.2.1 Equipment Mode = Crystal

FREQ.	NIMBUS	FREQ.	NIMBUS
1	-12.83333336	6	7.33333320
2	55.00000054	7	-12.83333364
3	7.33333320	8	55.00000026
4	-12.83333336	9	7.33333292
5	55.00000054		

A-5.2.2 Equipment Mode = Phase Locked Loop

FREQ.	GEOS	ASTP	
1	43.08224459	51.99999930	
2	120.44358994	-0.00000131	
3	71.80493395	-52.00000163	
4	41.03078948	51.99999902	
5	118.28282294	-0.00000159	
6	69.53485507	-52.00000192	
7	39.10855992	51.99999930	
8	116.25816694	-0.00000131	
9	67.40777320	-52.00000163	

A-5.2.3 Equipment Mode = Coherent

FREQ.	NIMBUS	GEOS	ASTP
1	-25.99999948	85.02520996	-2.00000062
2	48.00000096	36.38655426	-54.00000009
3	-4.00000022	113.74789847	19.99999864
4	-25.99999948	82.97560993	-2.00000062
5	48.00000096	34.22764206	-54.00000009
6	-4.00000022	111.47967439	19.99999949
7	-26.00000005	81.05511807	-2.00000034
8	48.00000039	32.20472405	-54.00000009
9	-4.00000022	109.35433079	19.99999949

A-5.3.0 Identification of FREQ. Codes

Frequency	Uplink (MHz)	Downlink (MHz)
1	5950	3750
2	5950	3950
3	5950	4150
4	6150	3750
5	6150	3950
6	6150	4150
7	6350	3750
8	6350	3950
9	6350	4150

Table A-6
ATSR Sample Rate

C4	N	Sample Rate
0	51192	1 / sec
1	25596	2 / sec
2	12798	4 / sec
3	6399	8 / sec
4	511920	6 / min

Table A-7
Word Definition

Word	Content	Byte	Type
1	Station ID and equipment type (downlink)	1-2	I*2
2	Station ID and equipment type (uplink)	3-4	I*2
3	Year of observation	5-6	I*2
4	Day of year of observation	7-8	I*2
5	Frame time of observation	9-16	R*8
6	Doppler count interval	17-24	R*8
7	Observation 1	25-32	R*8
8	Observation 2	33-40	R*8
9	Data flags	41-44	I*4
10	Data corrections	45-48	I*4
11	SIC/NORAD ID	49-52	I*4
12	Data type	53-54	I*2
13	Spares	55-60	–

Table A-8
ATSR Site Identification Codes, 60-Byte Data

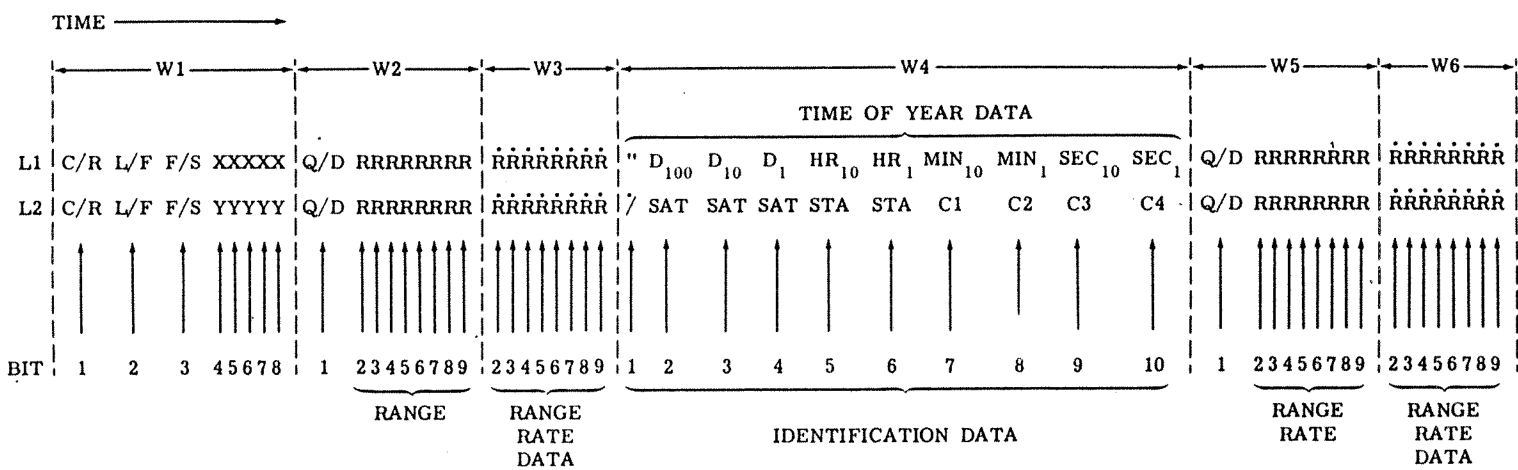
60-Byte Index Number	Station Name	NAPSIM Station Code
55	Rosman	58
56	Kashima	68
57	Mobile	66 = Mojave Mobile 99 = Madrid Mobile

Table A-9
Word 9, 60-Byte Data

Byte	Bits	Value	Contents
1	1-4		Equipment Mode ~ See Table A-1.2
	5-8		Target Object ~ See Table A-1.2
2	1-4		C1 parameter ~ Not used by Preprocessor
	5-8		Q/D Flag ~ Not used by Preprocessor
3	1-5	0	Set to zero
	6-8		C2 parameter ~ See Table A-6
4	1-4		Satellite ID character 1, See Table A-1.1
	5-8		C3 parameter: Frequency indicator
		0	ATS-1, 3 and 5
		1	5950 and 3750 MHz
		2	5950 and 3950 MHz
		3	5950 and 4150 MHz
		4	6150 and 3750 MHz
		5	6150 and 3750 MHz
		6	6150 and 4150 MHz
		7	6350 and 3750 MHz
		8	6350 and 3950 MHz
		9	6350 and 4150 MHz

Table A-10
MTAUF Format

Data Word	Type	Description
1	I*4	Station Identification
2	I*4	Number of R*8 words to follow
3	R*8	Julian Days since 1950
4	R*8	Seconds of day
5	R*8	X-angle
6	R*8	Y-angle
7	R*8	Azimuth
8	R*8	Elevation
9	R*8	Range
10	R*8	Range Rate
11	R*8	Δt associated with average range rate



C/R	CARRIAGE RETURN		HR	HOURS (00-23)
L/F	LINE FEED		D	DAYS (000-365)
F/S	FIGURE SHIFT		Y	ANTENNA POSITION (SIGN AND FOUR DECIMAL DIGITS OR FIVE DECIMAL DIGITS)
X	ANTENNA POSITION (SIGN AND FOUR DECIMAL DIGITS OR FIVE DECIMAL DIGITS)		SAT	SATELLITE IDENTIFICATION (000-999)
Q/D	QUALITY DATA (SPACE INDICATES ALL LOOPS LOCKED)		STA	STATION IDENTIFICATION (00-99)
R	RANGE (00000000-99999999)		C1	AMBIGUITY AND RESOLUTION (1-9)
Ṙ	RANGE RATE (00000000-99999999)		C2	SAMPLE RATE (0-4)
SEC	SECONDS (00-59)		C3	FREQUENCY INDICATOR
MIN	MINUTES (00-59)		C4	SPARE (0-9)

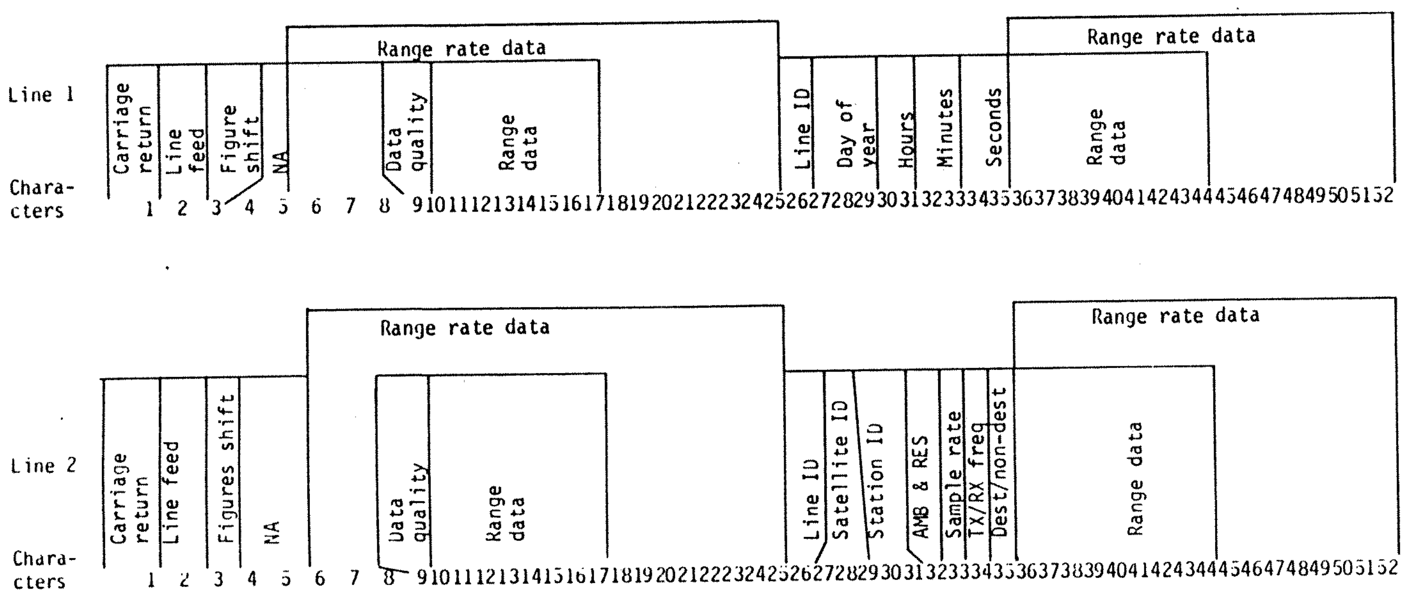
NOTE: DATA IS PUNCHED IN STANDARD BAUDOT 5-LEVEL TELETYPE CODE.

THERE ARE 52 CHARACTERS IN EACH LINE, MAKING A TOTAL OF 104 CHARACTERS TO BE TRANSMITTED SERIALLY.

ANTENNA POSITION CONSISTS OF SIGN AND FOUR DECIMAL DIGITS FOR X-Y CONFIGURATION AND FIVE DIGITS FOR Az-El CONFIGURATION.

ATSR DATA FORMAT

Figure A-1.1



Legend

1. Characters 4 and 5, lines 1 and 2 are not applicable and will indicate (99).

2. A space in the data quality indicates all loops locked.

3. Range data (00000000-99999999).

4. Range rate data (00000000000-99999999999).

5. Line 1 ID ("), line 2 ID (/).

6. Ambiguity and resolution (1-9).

7. Sample rate 6/min will indicate (0).

8. Transmit/receive base frequencies (1-9).

9. Destruct mode (0), Non-destruct (1).

Note

1. Data is punched in Baudot 5-level teletype code.

2. There are 52 characters in each line making a total of 104 characters to be transmitted serially.

Fibure A-1.2. Tracking Data Format for Non-destruct Mode

	Data ID Code	International Designator	Date of Tracking
Header Record	..ATSR	7403901'	750112

		Range	Doppler	Day	Hr	Mn	Sec	Range	Doppler
First Data Line	3377	'0014441451196626''0121101'00'						'0014441251196616'	

		Range	Doppler		SAT	STA	C1	C2	C3	C4	Range	Doppler
Second Data Line	-3762	0014441051196647/600473050									0014440951196653	

Sample Pass

..ATSR	7403901	740606	
-1984	1236218951174105	157183931	1236219651174577
-3903	1236220351174141/600583C4C		1236221051174252
~~-1984~~	~~1236221751174569~~	~~157133835~~	~~1236222351174105~~
-3903	1236223051174247/600583C40		1236223751174613
-1982	1236224451174097	157183839	1236225151174275
~~-3904~~	~~1236225851174521/600583C4C~~		~~1236226451174011~~
-1983	1236227251174391	157183843	1236227951174521
-3904	1236228551173956/600583C4C		1236229351174376
-1984	1236230051174512	157183847	1236230751173982
-3903	1236231451174401/60058304C		1236232051174468
~~-1983~~	~~1236232751173990~~	~~157183851~~	~~1236233451174518~~
-3905	1236234151174362/600583C4C		1236234851174147
-1983	1236235551174631	157183855	1236236151174313
~~-3905~~	~~1236236951174067/60058304C~~		~~1236237651174530~~
-1984	1236238251174169	157183859	1236238951174263
-3903	1236239651174451/60058304C		1236240351174090
-1983	1236241051174223	157183903	1236241751174543
-3904	1236242451173999/600583C4C		1236243051174210
~~-1983~~	~~1236243751174564~~	~~157183907~~	~~1236244551174025~~
-3905	1236245251174379/600583040		1236245851174472
-1985	1236246551174039	157183911	1236247251174467
~~-3904~~	~~1236247851174436/600583C4C~~		~~1236248551174066~~
-1984	1236249251174435	157183915	1236249951174475
-3904	1236250651174066/60058304C		1236251351174430
-1982	1236252151174305	157183919	1236252751174115
-3905	1236253451174539/60058304C		1236254151174115
~~-1984~~	~~1236254851174095~~	~~157183923~~	~~1236255551174551~~
-3905	1236256251174207/60058304C		1236256951174177
-1985	1236257651174489	157183927	1236258351174070
~~-3904~~	~~1236259051174132/600583C40~~		~~1236259751174604~~
-1984	1236260451174059	157183931	1236261151174265
-3904	1236261751174539/600583C4C		1236262451173908
-1983	1236263151174414	157183935	1236263851174528
-3905	1236264651174022/60058304C		1236265251174349
~~-1984~~	~~1236265951174431~~	~~157183939~~	~~1236266651174110~~
-3905	1236267351174378/600583C4C		1236267951174367
-1985	1236268751174034	157183943	1236269451174442
~~-3905~~	~~1236270051174301/600583C4C~~		~~1236270851174032~~
-1983	1236271451174613	157183947	1236272151174248
-3904	1236272851174081/60058304C		1236273551174517

Figure A-2. Annotated Sample of ATSR Non-Destruct Teletype Data

```
IEF285I   SYS1.PL1LIB                                   KEPT
IEF285I   VOL SER NOS= K3SYS1.
IEF285I   SYS1.FORTSSP                                  KEPT
IEF285I   VOL SER NOS= K3SYS2.
IEF285I   SYS2.COBLIB                                   KEPT
IEF285I   VOL SER NOS= M2JOBQ.
IEF285I   SYS1.ALGLIB                                   KEPT
IEF285I   VOL SER NOS= K3SYS1.
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.LODMOD        PASSED
IEF285I   VOL SER NOS= K3SCR5.
IEF285I   SYS77159.T171726.SV000.YZRWPMA2.R0000457      SYSOUT
IEF285I   VOL SER NOS= K3SCR4.
IEF285I   SYS77159.T171726.SV000.YZRWPMA2.R0000458      SYSOUT
IEF285I   VOL SER NOS= K3SCR5.
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.R0000459      DELETED
IEF285I   VOL SER NOS= K3SCR3.
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.S0000460      SYSIN
IEF285I   VOL SER NOS= K3SCR3.
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.S0000460      DELETED
IEF285I   VOL SER NOS= K3SCR3.
IEF373I STEP /LINK     / START 77159.2003
IEF374I STEP /LINK     / STOP  77159.2004 CPU    0MIN 00.99SEC MAIN 130K LCS    0K
- STEP 01 -      RETURN CODE = 0000                                STEP TIME =      .20 MINS=(CPU=      .01,IO=      .19)
                                           IO IN SECS. DISK=   11.87,DRUM=        .00,TAPE=      .00,CEL_=      .00,OTHR=      .18
- SURCHARGES=(DRIVES ALOC=000,TAPE MOUNTS=000,CORE=000,PAPER=000,PRIORITY=00000)SECS.    TOTAL STP TIME=      .20 MINS.  -
      XXGO         EXEC PGM=*.LINK.SYSLMOD,COND=(4,LT),REGION=70K              00000240
      XXFT05F001 DD DDNAME=DATA5                                               00000250
      XXFT06F001 DD SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE)     00000260
      IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=7265)
      XXFT07F001 DD SYSOUT=B,DCB=(RECFM=FB,BLKSIZE=7280,LRECL=80)              00000270
      XXSYSPRINT DD SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE),    00000280
      IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=7265),
      XX            SPACE=(CYL,(0,1)),UNIT=(DISK,3)                            00000290
      XXSYSUDUMP DD SYSOUT=A,SPACE=(CYL,(0,5))                                 00000300
      //GO.FT08F001 DD UNIT=(9TRACK,,DEFER),LABEL=(,BLP,,IN),DISP=OLD,
      //        DCB=(BLKSIZE=32000,RECFM=U,DEN=3),
      //           VOL=SER=JJ0097
      //GO.DATA5 DD *
      //
IEF236I ALLOC. FOR YZRWPMA2 GO
IEF237I 333    ALLOCATED TO PGM=*.DD
IEF237I 231    ALLOCATED TO FT05F001
IEF237I 333    ALLOCATED TO FT06F001
IEF237I 333    ALLOCATED TO FT07F001
IEF237I 331    ALLOCATED TO SYSPRINT
IEF237I 231    ALLOCATED TO SYSPRINT
IEF237I 232    ALLOCATED TO SYSPRINT
IEF237I 333    ALLOCATED TO SYSUDUMP
IEF237I 005    ALLOCATED TO FT08F001
```

<

```
                                  RECORD      1   OF FILE    1
                                  LENGTH =   1800  BYTES
```

9 403901

750413

3332

001084175120200T 103080030

ATSR

SAT ED

```
4B4BC1E3  F2D940F7  F4F0F3F9  F0F140F7  F5F0F4F1  F3404040  40404040  40404040  40404040  40404040
40404040  40404040  40404040  40404040  40404040  40404040  40404040  40404040  40F3F3F3  F240F0F0
F1F0F8F4  F7F7F5F1  F2F0F2F0  F0F17FF1  F0F3F0F8  F0F0F3F0  40F0F0F1  F0F8F3F3  F4F5F1F2  F0F1F9F0
F7404040  40404040  40404040  40404040  40404040  40404040  60F3F6F9  F640F0F0  F1F0F8F3  F3F0F5F1
F2F0F1F8  F9F361F6  F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F3F2  F6F5F1F2  F0F1F9F2  F3404040  40404040
40404040  40404040  40404040  40404040  40F3F3F3  F240F0F0  F1F0F8F3  F2F2F5F1  F2F0F1F9  F5F27FF1
F0F3F0F8  F0F0F3F4  40F0F0F1  F0F8F3F1  F8F5F1F2  F0F1F9F8  F6404040  40404040  40404040  40404040
40404040  40404040  60F3F6F9  F540F0F0  F1F0F8F3  F1F4F5F1  F2F0F1F9  F4F761F6  F0F0F4F7  F3F0F5F0
40F0F0F1  F0F8F3F1  F0F5F1F2  F0F1F8F9  F2404040  40404040  40404040  40404040  40404040  40404040
40F3F3F3  F240F0F0  F1F0F8F3  F0F7F5F1  F2F0F1F9  F0F27FF1  F0F3F0F8  F0F0F3F8  40F0F0F1  F0F8F3F0
F3F5F1F2  F0F1F9F6  F5404040  40404040  40404040  40404040  40404040  40404040  60F3F6F9  F540F0F0
F1F0F8F2  F9F9F5F1  F2F0F1F9  F7F561F6  F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F2F9  F5F5F1F2  F0F1F9F5
F9404040  40404040  40404040  40404040  40404040  40404040  40F3F3F3  F340F0F0  F1F0F8F2  F9F1F5F1
F2F0F1F9  F3F07FF1  F0F3F0F8  F0F0F4F2  40F0F0F1  F0F8F2F8  F8F5F1F2  F0F1F8F6  F5404040  40404040
40404040  40404040  40404040  40404040  60F3F6F9  F540F0F0  F1F0F8F2  F8F3F5F1  F2F0F1F9  F5F461F6
F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F2F7  F9F5F1F2  F0F1F9F8  F8404040  40404040  40404040  40404040
40404040  40404040  40F3F3F3  F240F0F0  F1F0F8F2  F7F6F5F1  F2F0F1F9  F6F17FF1  F0F3F0F8  F0F0F4F6
40F0F0F1  F0F8F2F7  F3F5F1F2  F0F1F9F3  F3404040  40404040  40404040  40404040  40404040  40404040
60F3F6F9  F540F0F0  F1F0F8F2  F6F8F5F1  F2F0F1F9  F0F961F6  F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F2F6
F4F5F1F2  F0F1F9F2  F1404040  40404040  40404040  40404040  40404040  40404040  40F3F3F3  F240F0F0
```

```
F1F0F8F2  F6F0F5F1  F2F0F1F9  F7F67FF1  F0F3F0F8  F0F0F5F0  40F0F0F1  F0F8F2F5  F6F5F1F2  F0F1F9F8
F6404040  40404040  40404040  40404040  40404040  40404040  60F3F6F9  F540F0F0  F1F0F8F2  F5F2F5F1
F2F0F1F9  F2F861F6  F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F2F4  F9F5F1F2  F0F1F9F0  F3404040  40404040
40404040  40404040  40404040  40404040  40F3F3F3  F340F0F0  F1F0F8F2  F4F4F5F1  F2F0F1F9  F3F57FF1
F0F3F0F8  F0F0F5F4  40F0F0F1  F0F8F2F4  F0F5F1F2  F0F1F9F7  F4404040  40404040  40404040  40404040
40404040  40404040  60F3F6F9  F540F0F0  F1F0F8F2  F3F6F5F1  F2F0F2F0  F0F461F6  F0F0F4F7  F3F0F5F0
40F0F0F1  F0F8F2F3  F3F5F1F2  F0F1F9F4  F5404040  40404040  40404040  40404040  40404040  40404040
40F3F3F3  F240F0F0  F1F0F8F2  F2F9F5F1  F2F0F1F8  F7F07FF1  F0F3F0F8  F0F0F5F8  40F0F0F1  F0F8F2F2
F5F5F1F2  F0F1F9F2  F9404040  40404040  40404040  40404040  40404040  40404040  60F3F6F9  F440F0F0
F1F0F8F2  F2F1F5F1  F2F0F1F9  F8F461F6  F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F2F1  F7F5F1F2  F0F1F9F8
F3404040  40404040  40404040  40404040  40404040  40404040  40F3F3F3  F240F0F0  F1F0F8F2  F1F4F5F1
F2F0F1F9  F5F07FF1  F0F3F0F8  F0F1F0F2  40F0F0F1  F0F8F2F1  F0F5F1F2  F0F1F8F6  F9404040  40404040
40404040  40404040  40404040  40404040  60F3F6F9  F540F0F0  F1F0F8F2  F0F7F5F1  F2F0F1F9  F1F261F6
F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F2F0  F2F5F1F2  F0F1F9F5  F0404040  40404040  40404040  40404040
40404040  40404040  40F3F3F3  F240F0F0  F1F0F8F1  F9F8F5F1  F2F0F2F0  F0F47FF1  F0F3F0F8  F0F1F0F6
40F0F0F1  F0F8F1F9  F4F5F1F2  F0F1F9F3  F5404040  40404040  40404040  40404040  40404040  40404040
60F3F6F9  F540F0F0  F1F0F8F1  F9F0F5F1  F2F0F1F9  F2F361F6  F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F1F8
F6F5F1F2  F0F1F9F2  F7404040  40404040  40404040  40404040  40404040  40404040  40F3F3F3  F240F0F0
F1F0F8F1  F8F2F5F1  F2F0F1F9  F7F77FF1  F0F3F0F8  F0F1F1F0  40F0F0F1  F0F8F1F7  F8F5F1F2  F0F1F9F9
F0404040  40404040  40404040  40404040  40404040  40404040  60F3F6F9  F540F0F0  F1F0F8F1  F7F5F5F1
F2F0F1F9  F6F561F6  F0F0F4F7  F3F0F5F0  40F0F0F1  F0F8F1F7  F1F5F1F2  F0F1F9F1  F8404040  40404040
40404040  40404040  40404040  40404040  40F3F3F3  F340F0F0  F1F0F8F1  F6F7F5F1  F2F0F1F9  F5F07FF1
F0F3F0F8  F0F1F1F4  40F0F0F1  F0F8F1F6  F3F5F1F2  F0F1F9F5  F3404040  40404040  40404040  40404040
40404040  40404040  60F3F6F9  F440F0F0  F1F0F8F1  F5F9F5F1  F2F0F1F9  F7F061F6  F0F0F4F7  F3F0F5F0
40F0F0F1  F0F8F1F5  F5F5F1F2  F0F1F9F7  F1404040  40404040  40404040  40404040  40404040  40404040
```

<

RECORD   375 OF FILE   1
LENGTH =   288 BYTES

```
60F1F6F6  F240F0F0  F0F0F0F0  F0F0F4F5  F4F6F2F3  F9F37FF1  F1F2F1F0  F2F3F4F0  40F0F0F0  F0F0F0F0
F0F4F4F6  F7F5F5F7  F7404040  40404040  40404040  40404040  40404040  40404040  60F3F9F5  F140F0F0
F0F0F0F0  F0F0F4F3  F8F7F5F3  F5F161F6  F2F0F5F9  F2F4F5F0  40F0F0F0  F0F0F0F0  F0F4F3F0  F6F2F2F2
F2404040  40404040  40404040  40404040  40404040  40404040  60F1F6F6  F240F0F0  F0F0F0F0  F0F0F4F2
F2F4F1F2  F2F17FF1  F1F2F1F0  F2F4F2F0  40F0F0F0  F0F0F0F0  F0F3F9F3  F7F6F7F2  F4404040  40404040
40404040  40404040  40404040  40404040  60F3F9F5  F040F0F0  F0F0F0F0  F0F0F3F6  F5F2F9F0  F5F961F6
F2F0F5F9  F2F4F5F0  40FCF0F0  F0F0F0F0  F0F3F6F4  F3F7F6F1  F9404040  40404040  40404040  40404040
40404040  40404040
```

375 RECORDS IN FILE   1 OF TAPE

<

RECORD   1 OF FILE 16
LENGTH =   1800 BYTES

60418

```
4B4BC1E3  E2D940F7  F4F0F3F9  F0F140F7  F6F0F4F1  F8404040  40404040  40404040  40404040  40404040
40404040  40404040  40404040  40404040  40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0
F1F8F3F2  F4F3F5F1  F1F9F3F2  F4F27FF1  F0F9F0F6  F3F0F0F1  40F0F0F1  F8F3F2F4  F3F5F1F1  F9F3F2F1
F3404040  40404040  40404040  40404040  40404040  40404040  F0F4F0F4  F540F0F0  F1F8F3F2  F4F2F5F1
F1F9F3F2  F7F761F6  F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F4  F3F5F1F1  F9F3F1F7  F3404040  40404040
40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0  F1F8F3F2  F4F1F5F1  F1F9F3F2  F3F67FF1
F0F9F0F6  F3F0F0F5  40F0F0F1  F8F3F2F4  F1F5F1F1  F9F3F3F1  F7404040  40404040  40404040  40404040
40404040  40404040  F0F4F0F4  F540F0F0  F1F8F3F2  F4F0F5F1  F1F9F3F2  F7F661F6  F0F0F5F7  F3F0F2F0
40F0F0F1  F8F3F2F4  F0F5F1F1  F9F3F2F0  F3404040  40404040  40404040  40404040  40404040  40404040
F2F4F2F8  F940F0F0  F1F8F3F2  F3F9F5F1  F1F9F3F3  F1F97FF1  F0F9F0F6  F3F0F0F9  40F0F0F1  F8F3F2F3
F9F5F1F1  F9F3F2F4  F9404040  40404040  40404040  40404040  40404040  40404040  F0F4F0F4  F540F0F0
F1F8F3F2  F3F8F5F1  F1F9F3F1  F8F761F6  F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F3  F8F5F1F1  F9F3F2F7
F8404040  40404040  40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0  F1F8F3F2  F3F7F5F1
F1F9F3F2  F0F27FF1  F0F9F0F6  F3F0F1F3  40F0F0F1  F8F3F2F3  F7F5F1F1  F9F3F1F9  F6404040  40404040
40404040  40404040  40404040  40404040  F0F4F0F4  F640F0F0  F1F8F3F2  F3F6F5F1  F1F9F3F2  F4F861F6
F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F3  F6F5F1F1  F9F3F3F2  F6404040  40404040  40404040  40404040
40404040  40404040  F2F4F2F8  F940F0F0  F1F8F3F2  F3F5F5F1  F1F9F3F2  F6F87FF1  F0F9F0F6  F3F0F1F7
40F0F0F1  F8F3F2F3  F5F5F1F1  F9F3F1F9  F7404040  40404040  40404040  40404040  40404040  40404040
F0F4F0F4  F640F0F0  F1F8F3F2  F3F4F5F1  F1F9F3F2  F4F861F6  F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F3
F4F5F1F1  F9F3F2F7  F8404040  40404040  40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0
F1F8F3F2  F3F2F5F1  F1F9F3F1  F9F27FF1  F0F9F0F6  F3F0F2F1  40F0F0F1  F8F3F2F3  F3F5F1F1  F9F3F2F5
F7404040  40404040  40404040  40404040  40404040  40404040  F0F4F0F4  F440F0F0  F1F8F3F2  F3F2F5F1
F1F9F3F3  F0F261F6  F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F3  F2F5F1F1  F9F3F2F8  F3404040  40404040
40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0  F1F8F3F2  F3F1F5F1  F1F9F3F2  F4F67FF1
```

```
F0F9F0F6  F3F0F2F5  40FCF0F1  F8F3F2F3  F1F5F1F1  F9F3F2F1  F2404040  40404040  40404040  40404040
40404040  40404040  F0F4F0F4  F640F0F0  F1F8F3F2  F3F0F5F1  F1F9F3F2  F3F361F6  F0F0F5F7  F3F0F2F0
40F0F0F1  F8F3F2F3  F0F5F1F1  F9F3F2F4  F7404040  40404040  40404040  40404040  40404040  40404040
F2F4F2F8  F940F0F0  F1F8F3F2  F2F9F5F1  F1F9F3F2  F8F97FF1  F0F9F0F6  F3F0F2F9  40F0F0F1  F8F3F2F2
F9F5F1F1  F9F3F2F8  F6404040  40404040  40404040  40404040  40404040  40404040  F0F4F0F4  F540F0F0
F1F8F3F2  F2F8F5F1  F1F9F3F2  F1F361F6  F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F2  F8F5F1F1  F9F3F2F0
F2404040  40404040  40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0  F1F8F3F2  F2F7F5F1
F1F9F3F2  F4F87FF1  F0F9F0F6  F3F0F3F3  40F0F0F1  F8F3F2F2  F7F5F1F1  F9F3F2F7  F8404040  40404040
40404040  40404040  40404040  40404040  F0F4F0F4  F440F0F0  F1F8F3F2  F2F6F5F1  F1F9F3F1  F7F761F6
F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F2  F6F5F1F1  F9F3F2F4  F9404040  40404040  40404040  40404040
40404040  40404040  F2F4F2F8  F940F0F0  F1F8F3F2  F2F5F5F1  F1F9F3F2  F3F37FF1  F0F9F0F6  F3F0F3F7
40F0F0F1  F8F3F2F2  F5F8F4F2  F5F2F2F0  F7404040  40404040  40404040  40404040  40404040  40404040
F0F4F0F4  F640F0F0  F1F8F3F2  F2F4F5F1  F1F9F3F2  F6F861F6  F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F2
F4F5F1F1  F9F3F2F1  F3404040  40404040  40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0
F1F8F3F2  F2F4F5F1  F1F9F3F2  F6F77FF1  F0F9F0F6  F3F0F4F1  40F0F0F1  F8F3F2F2  F3F5F1F1  F9F3F2F0
F7404040  40404040  40404040  40404040  40404040  40404040  F0F4F0F4  F540F0F0  F1F8F3F2  F2F3F5F1
F1F9F3F3  F5F361F6  F0F0F5F7  F3F0F2F0  40F0F0F1  F8F3F2F2  F2F5F1F1  F9F3F2F6  F7404040  40404040
40404040  40404040  40404040  40404040  F2F4F2F8  F940F0F0  F1F8F3F2  F2F2F5F1  F1F9F3F3  F0F27FF1
F0F9F0F6  F3F0F4F5  40F0F0F1  F8F3F2F2  F1F5F1F1  F9F3F2F5  F7404040  40404040  40404040  40404040
40404040  40404040  F0F4F0F4  F340F0F0  F1F8F3F2  F2F1F5F1  F1F9F3F2  F6F961F6  F0F0F5F7  F3F0F2F0
40F0F0F1  F8F3F2F2  F0F5F1F1  F9F3F2F9  F6404040  40404040  40404040  40404040  40404040  40404040
```

<

RECORD 148 OF FILE 16
LENGTH = 1008 BYTES

```
F3F9F0F0  F840F0F0  F8F5F0F3  F2F2F6F9  F7F1F5F8  F5F67FF1  F1F9F2F0  F4F1F4F0  F0F0F0F8  F5F0F3F1
F7F6F9F7  F6F9F0F8  F3404040  40404040  40404040  40404040  40404040  40404040  F3F9F0F1  F240F0F0
F8F5F0F3  F1F3F6F9  F8F2F2F9  F3F461F6  F1F1F9F9  F2F4F5F1  F4F0F0F8  F5F0F3F0  F8F6F9F8  F7F6F2F1
F5404040  40404040  40404040  40404040  40404040  40404040  F3F9F0F1  F640F0F0  F8F5F0F3  F0F3F6F9
F9F2F9F5  F1F17FF1  F1F9F2F0  F4F2F2F0  F8F0F0F8  F5F0F2F9  F8F6F9F9  F8F2F8F2  F9404040  40404040
40404040  40404040  40404040  40404040  F3F9F0F2  F040F0F0  F8F5F0F2  F9F3F7F0  F0F3F6F1  F7F661F6
F1F1F9F9  F2F4F5F1  F2F0F0F8  F5F0F2F8  F9F7F0F0  F8F9F5F4  F2404040  40404040  40404040  40404040
40404040  40404040  F3F9F0F2  F440F0F0  F8F5F0F2  F8F4F7F0  F1F4F2F9  F2F77FF1  F1F9F2F0  F4F3F0F0
F6F0F0F8  F5F0F2F7  F9F7F0F1  F9F6F3F3  F9404040  40404040  40404040  40404040  40404040  40404040
F3F9F0F2  F840F0F0  F8F5F0F2  F7F4F7F0  F2F4F9F7  F7F561F6  F1F1F9F9  F2F4F5F1  F0F0F0F8  F5F0F2F6
F9F7F0F3  F0F3F2F3  F1404040  40404040  40404040  40404040  40404040  40404040  F3F9F0F3  F240F0F0
F8F5F0F2  F6F4F7F0  F3F5F6F7  F0F37FF1  F1F9F2F0  F4F3F4F0  F4F0F0F8  F5F0F2F6  F0F7F0F4  F1F0F2F1
F0404040  40404040  40404040  40404040  40404040  40404040  F3F9F0F3  F640F0F0  F8F5F0F2  F5F5F7F0
F4F6F3F7  F3F361F6  F1F1F9F9  F2F4F5F1  F8F0F0F8  F5F0F2F5  F0F7F0F5  F1F7F2F8  F0404040  40404040
40404040  40404040  40404040  40404040  F3F9F0F4  F040F0F0  F8F5F0F2  F4F4F7F0  F5F7F0F8  F4F97FF1
F1F9F2F0  F4F4F2F0  F2F0F0F8  F5F0F2F4  F0F7F0F6  F2F4F4F3  F8404040  40404040  40404040  40404040
40404040  40404040  F3F9F0F4  F440F0F0  F8F5F0F2  F3F5F7F0  F6F7F8F0  F5F661F6  F1F1F9F9  F2F4F5F1
F6F0F0F8  F5F0F2F3  F0F7F0F7  F3F1F6F8  F7404040  40404040  40404040  40404040  40404040  40404040
F3F9F0F4  F840F0F0  F8F5F0F2  F2F5F7F0  F7F8F5F3  F4F97FF1  F1F9F2F0  F4F5F0F0  F0F0F0F8  F5F0F2F1
F9F7F0F8  F3F9F0F2  F6404040  40404040  40404040  40404040  40404040  40404040  F3F9F0F5  F240F0F0
F8F5F0F2  F1F5F7F0  F8F9F2F7  F3F161F6  F1F1F9F9  F2F4F5F1  F4F0F0F8  F5F0F2F1  F0F7F0F9  F4F6F4F5
F6404040  40404040  40404040  40404040  40404040  40404040  F3F9F0F5  F640F0F0  F8F5F0F2  F0F4F7F1
F0F0F0F2  F0F67FF1  F1F9F2F0  F4F5F4F0  F8F0F0F8  F5F0F1F9  F9F7F1F0  F5F3F9F7  F9404040  40404040
40404040  40404040  40404040  40404040  F3F9F0F6  F040F0F0  F8F5F0F1  F9F5F7F1  F1F0F7F7  F6F861F6
F1F1F9F9  F2F4F5F1  F2F0F0F8  F5F0F1F9  F0F7F1F1  F6F1F5F8  F3404040  40404040  40404040  40404040
40404040  40404040
```

148 RECORDS IN FILE 16 OF TAPE

<

```
IEF142I - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.LODMOD        PASSED
IEF285I   VOL SER NOS= K3SCR5.
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.S0000466      SYSIN
IEF285I   VOL SER NOS= K3SCR2.
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.S0000466      DELETED
IEF285I   VOL SER NOS= K3SCR2.
IEF285I   SYS77159.T171726.SV000.YZRWPMA2.R0000461      SYSOUT
IEF285I   VOL SER NOS= K3SCR5.
IEF285I   SYS77159.T171726.SV000.YZRWPMA2.R0000462      DELETED
IEF285I   VOL SER NOS= K3SCR5.
IEF285I   SYS77159.T171726.SV000.YZRWPMA2.R0000463      DELETED
IEF285I   VOL SER NOS= K3SCR4.
IEF285I   SYS77159.T171726.SV000.YZRWPMA2.R0000464      DELETED
IEF285I   VOL SER NOS= K3SCR5.
IEF285I   SYS77159.T171726.RV000.YZRWPMA2.R0000465      KEPT
IEF285I   VOL SER NOS= JJ0097.
```

```
IEF285I   SYS1.PL1LIB                                         KEPT
IEF285I   VOL SER NOS= K3SYS1.
IEF285I   SYS1.FORTSSP                                        KEPT
IEF285I   VOL SER NOS= K3SYS2.
IEF285I   SYS2.COBLIB                                         KEPT
IEF285I   VOL SER NOS= M2JOBO.
IEF285I   SYS1.ALGLIB                                         KEPT
IEF285I   VOL SER NOS= K3SYS1.
IEF285I   SYS77160.T103906.RV000.YZRWPMA2.LODMOD              PASSED
IEF285I   VOL SER NOS= K3SCR2.
IEF285I   SYS77160.T103906.SV000.YZRWPMA2.R0000285            SYSOUT
IEF285I   VOL SER NOS= K3SCR3.
IEF285I   SYS77160.T103906.SV000.YZRWPMA2.R0000286            SYSOUT
IEF285I   VOL SER NOS= K3SCR4.
IEF285I   SYS77160.T103906.RV000.YZRWPMA2.R0000287            DELETED
IEF285I   VOL SER NOS= K3SCR4.
IEF285I   SYS77160.T103906.RV000.YZRWPMA2.S0000288            SYSIN
IEF285I   VOL SER NOS= K3SCR2.
IEF285I   SYS77160.T103906.RV000.YZRWPMA2.S0000288            DELETED
IEF285I   VOL SER NOS= K3SCR2.
IEF373I STEP /LINK      / START 77160.1542
IEF374I STEP /LINK      / STOP  77160.1543 CPU    0MIN 01.04SEC MAIN 130K LCS    0K
- STEP 01 -        RETURN CODE = 0000                                     STEP TIME =       .20 MINS=(CPU=      .01,IO=       .19)
                                               IO IN SECS. DISK=    11.77,DRUM=       .00,TAPE=       .00,CELL=       .00,OTHR=       .18
- SURCHARGES=(DRIVES ALOC=000,TAPE MOUNTS=000,CORE=000,PAPER=000,PRIORITY=00000)SECS.    TOTAL STP TIME=       .20 MINS.  -
     XXGO          EXEC PGM=*.LINK.SYSLMOD,COND=(4,LT),REGION=70K                     00000240
     XXFT05F001 DD  DDNAME=DATA5                                                      00000250
     XXFT06F001 DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE)            00000260
     IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=7265)
     XXFT07F001 DD  SYSOUT=B,DCB=(RECFM=FB,BLKSIZE=7280,LRECL=80)                     00000270
     XXSYSPRINT DD  SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE),           00000280
     IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=7265),
     XX            SPACE=(CYL,(0,1)),UNIT=(DISK,3)                                    00000290
     XXSYSUDUMP DD  SYSOUT=A,SPACE=(CYL,(0,5))                                        00000300
     //GO.FT08F001 DD UNIT=(9TRACK,,DEFER),LABEL=(,BLP,,IN),DISP=OLD,
     //      DCB=(BLKSIZE=32000,RECFM=U,DEN=3),
     //             VOL=SER=JJ0097
     //GO.DATA5 DD *
     //
IEF236I ALLOC. FOR YZRWPMA2 GO
IEF237I 231    ALLOCATED TO PGM=*.DD
IEF237I 232    ALLOCATED TO FT05F001
IEF237I 333    ALLOCATED TO FT06F001
IEF237I 333    ALLOCATED TO FT07F001
IEF237I 331    ALLOCATED TO SYSPRINT
IEF237I 231    ALLOCATED TO SYSPRINT
IEF237I 232    ALLOCATED TO SYSPRINT
IEF237I 333    ALLOCATED TO SYSUDUMP
IEF237I 0D4    ALLOCATED TO FT08F001

                                                                                                                          <

                                       RECORD       1   OF FILE    2
                                       LENGTH =    1800   BYTES
                          ATS
   4B4BC1E3  E2D940F7  F4F0F3F9  F0F1F340  40404040  40404040  40404040  40404040  40404040  40404040
   40404040  40404040  40404040  40404040  40404040  40404040  40404040  40404040  60F8F6F7  F940F0F0
   F0F0F2F3  F9F6F5F1  F1F9F1F9  F9F27FF1  F1F7F1F7  F5F5F3F0  40F0F0F0  F0F2F3F9  F6F5F1F1  F9F1F9F9
   F0404040  40404040  40404040  40404040  40404040  40404040  40F3F9F5  F940F0F0  F0F0F2F3  F9F6F5F1
   F1F9F1F9  F9F061F6  F0F3F4F7  F3F0F0F0  40F0F0F0  F0F2F3F9  F6F5F1F1  F9F1F9F8  F5404040  40404040
   40404040  40404040  40404040  40404040  60F8F6F7  F940F0F0  F0F0F2F3  F9F5F5F1  F1F9F2F0  F0F47FF1
   F1F7F1F7  F5F6F3F4  40F0F0F0  F0F2F3F9  F5F5F1F1  F9F2F0F0  F2404040  40404040  40404040  40404040
   40404040  40404040  40F3F9F5  F940F0F0  F0F0F2F3  F9F5F5F1  F1F9F2F0  F0F261F6  F0F3F4F7  F3F0F0F0
   40F0F0F0  F0F2F3F9  F6F5F1F1  F9F1F9F9  F6404040  40404040  40404040  40404040  40404040  40404040
   60F8F6F7  F940F0F0  F0F0F2F3  F9F6F5F1  F1F9F2F0  F0F17FF1  F1F7F1F7  F5F6F3F8  40F0F0F0  F0F2F3F9
   F5F5F1F1  F9F1F9F9  F2404040  40404040  40404040  40404040  40404040  40404040  40F3F9F5  F940F0F0
   F0F0F2F3  F9F6F5F1  F1F9F2F0  F1F461F6  F0F3F4F7  F3F0F0F0  40F0F0F0  F0F2F3F9  F6F5F1F1  F9F1F9F8
   F5404040  40404040  40404040  40404040  40404040  40404040  60F8F6F7  F940F0F0  F0F0F2F3  F9F6F5F1
   F1F9F1F9  F8F07FF1  F1F7F1F7  F5F6F4F2  40F0F0F0  F0F2F3F9  F5F5F1F1  F9F1F9F9  F6404040  40404040
   40404040  40404040  40404040  40404040  40F3F9F5  F940F0F0  F0F0F2F3  F9F5F5F1  F1F9F2F0  F1F061F6
   F0F3F4F7  F3F0F0F0  40F0F0F0  F0F2F3F9  F6F5F1F1  F9F1F9F8  F0404040  40404040  40404040  40404040
   40404040  40404040  60F8F6F7  F940F0F0  F0F0F2F3  F9F5F5F1  F1F9F2F0  F0F37FF1  F1F7F1F7  F5F6F4F6
   40F0F0F0  F0F2F3F9  F5F5F1F1  F9F1F9F9  F2404040  40404040  40404040  40404040  40404040  40404040
   40F3F9F5  F940F0F0  F0F0F2F3  F9F5F5F1  F1F9F1F9  F8F251F6  F0F3F4F7  F3F0F0F0  40F0F0F0  F0F2F3F9
   F6F5F1F1  F9F1F9F9  F3404040  40404040  40404040  40404040  40404040  40404040  60F8F6F7  F940F0F0
```