ATC-1200Y3

TRANSPONDER and DME TEST SET

OPERATION and MAINTENANCE MANUAL

10200 WEST YORK STREET/WICHITA, KANSAS 67215 U.S.A. /(316) 522-4981/TWX 910-741-6952

1002-1456-900

Manual Part Number: 1002-1456-900

ATC-1200Y3
<u>NOTICE</u>

FOR 115 VAC INPUT OPERATION CONNECT POWER TRANSFORMER
LEADS AS FOLLOWS:
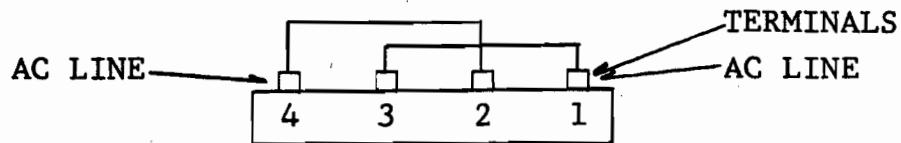
Jumper 1 to 3, 2 to 4.

FOR 230 VAC INPUT OPERATION CONNECT POWER TRANSFORMER
LEADS AS FOLLOWS:

Jumper 2 to 3.

Fig. 1-1   POWER TRANSFORMER LEAD CONNECTIONS   1-0
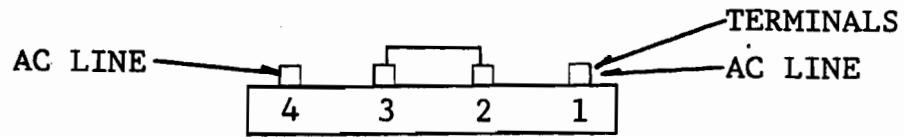
SECTION I

General Information

1-1.   Description.

1-2.   The ATC-1200Y3 is a civil transponder and DME test instrument designed to meet the functional test requirements of a pulse test station. Only a high-quality, dual-trace oscilloscope and a counter are needed in addition to the ATC-1200Y3.

1-3.   The ATC-1200Y3 is equally at home testing the simplest DME, or the sophisticated ARINC transponder or DME of latest design. Transponder tests feature interrogation in all modes including A/C, rapid setting of transmitter frequency and measurement of transmitter power. Receiver sensitivity checks are accurate and fast using the convenient front panel display of % reply.

1-4.   DME tests include accurate range measurements in 0.01 mile steps to 999.89 miles and equally accurate velocity measurements in 10 KT steps to 9990 KTS. Both are crystal controlled. Tests to measure transmitter frequency, transmitter power, decoder window limits and receiver sensitivity are all front panel functions.

1-5.   The built-in L-Band signal generator covers the spectrum of 950 - 1225 MHz. It may be operated in any of three modes: a) a crystal controlled, phase-locked generator with direct frequency readout, b) a crystal controlled, phase-locked generator with paired VOR channel readout, or c) as a continuously variable frequency generator from 950 - 1225 MHz. A CW function allows the test set to be used as a general purpose L-Band generator of high stability and including an accurate output attenuator.

1-6.   Warranty. (See following page)

SECTION II

Specifications

and

Technical Summary

Transponder Section

Interrogation Rate: Variable from 50 Hz to 5000 Hz.
                                       PRF control accuracy ±5%.

Interrogation Modes: A/C, A, B, C, and D, per FAA
                                       TSO C-74a. Pulse spacing re-
                                       lative to leading edge of P1:

                                       Mode A   8us ±0.05us
                                       Mode B   17us ±0.06us
                                       Mode C   21us ±0.06us
                                       Mode D   25us ±0.08us
                                       Mode A/C   8us ±0.06us
                                                  21us ±0.08us

Transponder Pulse Characteristics:

   Pulse rise times should be 100ns or less for P1, P2 and
   P3. When the leading edge of P2 is within 0.6us or less
   of the trailing edge of P1, the rise time of P2 degrades
   to greater than 100ns. If P2 is within 0.3us of the trail-
   ing edge of P1, and P1 and P2 will deform. P2 may vanish.

Variable Pulse Spacing: P2 and P3 variable ±1.0us from
                                       each nominal position. Control
                                       accuracy ±0.05us at 0 setting
                                       and ±0.lus at +1 and -lus settings.

Variable Pulse Width: Variable width (of all three
                                       pulses simultaneously) from 0.4us
                                       to 1.2us. Control accuracy ±0.05us.

Side Lobe Suppression: Side Lobe pulse spaced 2us rela-
                                       tive to P1. Spacing accuracy ±0.05us.
                                       Variable in amplitude relative to
                                       P1 from -10dB to +1dB, control acc-
                                       uracy ±.5dB at +1dB and 0dB; and
                                       ±1dB at -6 and -10dB. P2 pulse may
                                       be turned off.

Pre Pulse: Selectable On or Off by Front
                                    Panel switch. Equal in Amplitude
                                    and Width to P1 and P3. Time be-
                                    fore P1 adjustable to 5us by the
                                    CAL $\emptyset$ control

Calibration Mark Gen: Crystal controlled 1.0us or 1.45us
                                    time marks. Crystal tolerance
                                    ±.01%. 1us frequency = 1 MHz.
                                    1.45us frequency = .689650 MHz.
                                    Output pulse amplitude adjustable
                                    to 1V P-P with 51 ohm load.

Sync Pulses: T_O: Negative sync pulses are
                                         provided approximately 5us
                                         prior to the leading edge of P1.

                                    T_D: Negative sync pulses are
                                         provided on the leading
                                         edge P3 for monitoring of
                                         all reply pulses.

                                    Nominal amplitude is -15V.
                                    Pulse width is 0.5 to 3us.

Transmitter Frequency   Transmitter frequency is measured
    Check: by heterodyne method through
                                    diode mixers. Frequency settable
                                    to 500 kHz at 1090 MHz.

Transmitter RF Power: Measured by calibrated slide-back
                                    power meter. Power at any point
                                    of the reply pulse may be measured.
                                    Accuracy of power control is 12%
                                    at 2.5 kW and 15% at 50 watts.

Transponder % Reply: Meter readout 0 to 100%
                                    Accuracy ±2%.

Suppressor Pulse: Coincident with P1 of interrogation
                                    pulse train. Pulse width is 50us,
                                    ±2us. Amplitude nominal 19 V, ±1 V.

Interrogation RF Pulse   Less than 100 ns. Overshoot 5%
    Risetime: maximum.

Interrogation RF Pulse   Less than 100ns.
    Decay Time:

RF On/Off Ratio: 80dB minimum, 85dB typical.

DME SECTION

    Squitter: Rate of pulse pairs is variable
                                          from average of 50Hz to 5000Hz.
                                          Squitter has completely random
                                          time distribution. Average rate
                                          accuracy: ±3.5%.

    Ident System: Provides constant ident tone or
                                          coded IDENT signal. Tone fre-
                                          quency is 1350Hz, ±1%. Ident
                                          equalizing pulse is spaced 100us
                                          from first pulse. Spacing
                                          accuracy: ±3us. IDENT signal
                                          is available every 30 seconds,
                                          ±2 sec., of characters I-F-R.
                                          Speed: approximately 7 WPM.

    Sync System: T_0: Negative sync pulses are
                                                provided approximately 1us
                                                after time of input inter-
                                                rogation.

                                          T_D: Sync Range - Negative sync
                                                pulses are provided (approxi-
                                                mately 5us before) with each
                                                range reply pulse to permit
                                                viewing the reply pulses.

                                                Sync Squitter - Negative
                                                sync pulses are provided
                                                at leading edge of P1
                                                pulse to permit viewing
                                                squitter pulses.

                                                Nominal amplitude of all
                                                sync pulses is -15 V.
                                                Pulse width is 2 to 15us.

    Range System: Provides crystal controlled
                                          fixed range distances from
                                          -1 mile to 999.89 N.M. in
                                          0.01 N.M. selectable
                                          increments. Range accuracy:
                                          ±0.025 miles, ±.005% of
                                          range.

Velocity System: Crystal controlled velocity rates
                                     from 0 to 9990 KTS, in 10KT select-
                                     able increments. Velocity accuracy
                                     0.02%. Velocity range 0 to 300 N.M.
                                     with meter readout. Range readout
                                     accuracy ±5 N.M. Electrical slewing
                                     0 to 300 N.M. in approximately 6 sec.

                            NOTE

Due to discrete range steps in Velocity mode of .01 mile
and to range jitter of .01 mile max, the maximum range
uncertainity is .02 mile when measuring velocity on a
time interval counter. If the range-change verses time
measurement is made at 1000 knots for 60 seconds, the
maximum velocity error due to the .02 mile uncertainty
is ±0.12%. See table below.

A. When measuring at a 60 second time interval:

Velocity	Maximum Error
100	1.2%
200	0.6%
500	0.24%
1000	0.12%
5000	0.024%

B. When measuring at a 30 second time interval:

Velocity	Maximum Error
100	2.4%
200	1.2%
500	0.48%
1000	0.48%
5000	0.048%

C. When measuring at a 10 second time interval:

Velocity	Maximum Error
100	7.2%
200	3.6%
500	1.44%
1000	0.72%
5000	0.144%

Percent Reply: Random Reply elimination with
                                     average count down rate variable
                                     from 20% to 100% replies. Control
                                     accuracy ±5%.

Tacan Simulation: Simulation only by amplitude mod-
                                     ulating all output pulses with
                                     60Hz. Modulation level variable
                                     from 0 to 50%.

Suppressor Pulse: Output rate is a constant value
                                     controlled by Squitter PRF control.
                                     Pulse width is 50us ±2us. Ampli-
                                     tude nominal 19V ±1V.

R-NAV Pulses: P1 at time of interrogation; P2
                                     at time of reply. Pulse spacing
                                     at 0 miles is 50 us in X ch.
                                     ±0.25 us, and 56us in Y ch, ±0.25us.
                                     Pulse width is 7us, ±3us, amplitude
                                     15 v, ±3V.

Decoder: An input decoder is incorporated
                                     which will accept input pulse
                                     pairs only with spacings between:

                                     in X ch - 8.5us to 15.5us
                                                 ±0.5us.
                                     in Y ch - 33.5us to 38.5us
                                                 ±1.0us

DME Pulse Widths Characteristics:

DME pulse widths should be 3.5us ±0.25us when on a freq-
uency of 1030 MHz. Typical pulse width variation with
frequency is ±0.5us. For "X" channel operation the spac-
ing cannot be operated in the -4us, -5us or -6us position
without severe pulse distortion because P1 and P2 are being
overlapped.

Output Pulse Spacing: In X channel 12us, ±0.2us. In Y
                                     channel 30us, ±0.2us. Pulse
                                     spacing is adjustable from nominal
                                     12 or 30us in ±0.5, ±3, ±4, ±5
                                     and ±6us steps. Accuracy of incre-
                                     mental spacing is ±0.2us. X or Y
                                     channel spacing by VOR frequency
                                     selected.

Echo Pulses:

Echo Pulse pair injected 30 N.M. from time of interrogation. Range accuracy of echo pulses ±0.5 N.M. Echo pulse amplitude variable from -10 dB to +1dB, control accuracy ±0.5 dB at -10 dB, -6 dB, 0 dB, and +1 dB, relative to normal reply pulse. Normal reply pulses cannot be used within ±5 N.M. of echo pulses. Echo pulse pair may be turned off. All output pulses are square instead of Gaussian shaped when the echo system is activated.

PRF Measurement:

Interrogation rate of DME read out on meter on 0-30 and 0-300 PRF ranges. PRF accuracy ±3% full scale.

Modulator Pulse Output:

Gaussian-shaped reply pulse pair timed within ±0.3us of RF reply pulses. Amplitude adjustable from 0 V to -10.5 V. D.C. restored to peak of 0 V. Spacing same as RF pulses.

Transmitter Frequency Check:

Transmitter frequency is measured by heterodyne method through diode mixers. Used only to verify proper on-channel frequency to ±1 MHz.

Transmitter RF Power:

Measured by calibrated slide-back power meter. Power at any point of the interrogate pulse may be measured. Accuracy of power control is 12% at 2.5 kW and 15% at 50 watts.

DME RF pulse output:

Gaussian-shaped reply pulses 3.5us, ±0.25us, wide at 50% amplitude point.

RF On/Off Ratio:

85 dB minimum, 95 dB typical.

Signal Generator Section

Frequency:

950 MHz to 1225 MHz

Frequency Control:

1. In GHz position, the front panel frequency switch indicates generator frequency directly in MHz providing decimal point is considered invalid. Phase lock range typically 960 MHz to 1215 MHz. Frequency selected in 1 MHz. increments. Output frequency accuracy ±.008%. DME spacing always X ch in GHz mode.

2. Paired VOR channel readout: Front panel frequencies switch indicates VOR frequencies from 108.00 to 117.95 MHz, and 133.30 to 135.95 MHz selectable in 50 kHz increments. Output frequency from 962 MHz to 1213 MHz paired to VOR channels. Phase lock range 962 to 1213 MHz. Output frequency accuracy ±.008%. All XXX.00 channels select X ch. spacing; all XXX.05 channels select Y ch. spacing.

3. Variable Frequency: Range 950 MHz to 1225 MHz, Drift rate typically less than 2.0 MHz in a one-hour period. An external counter capable of counting 3.25 MHz can display the output frequency. Add 9 MHz to the counter reading and multiply the sum by 100 to obtain the output frequency.

Output Leveling:

For sets S/N 1500 and on, RF output leveled to ±1.0dB for any one attenuator setting in 962 to 1213 MHz frequency range.
For sets prior to S/N 1500, RF output leveled to ±2.0 dB for any one attenuator setting over frequency range 962 to 1213 MHz.

RF Output Level:

Continuously variable from 0 dBm
to -110 dBm. Attenuator accuracy
±1.5 dB referenced to Output Level-
ing. Output level is calibrated at
XMTR/REC connector. Harmonic
content of output 70 dB down from
attenuator is non-linear from 0 dBm
to -30 dBm. Use of attenuator
calibration curve is mandatory for
this region of operation.

General

AC Power Requirements:

105 to 120 VAC or 220 to 250 VAC
50 to 400 Hz. Cooling fan 50/60
Hz only.

Weight:

36 pounds

Dimensions:

7.5" high, 16.75" wide,
18.375" deep.

SECTION II

INSPECTION

2-1. INCOMING INSPECTION. Each IFR Precision Simulator is care-
fully inspected for mechanical and electrical quality be-
fore shipment from the factory. On receipt, the instrument
should be physically free of mars and scratches, and in
perfect mechanical and electrical order. The instrument
should be inspected immediately for possible in-transit
physical damage. A check for supplied accessories, and a
test of the electrical performance of the instrument (as
outlined in Section V of this manual) should also be made.
Any damage or deficiency should be reported immediately to
the carrier and a claim filed, if necessary. Refer to the
LIMITED WARRANTY AND SERVICE INSTRUCTIONS of this manual
for delineation of responsibilities and liabilities. Follow
the directions in the LIMITED WARRANTY AND SERVICE INSTRUC-
TIONS when it becomes necessary to ship the instrument.

2-2. GROUNDING REQUIREMENTS. To protect operating personnel, the
National Electrical Manufacturer's Association (NEMA) recom-
mends that the instrument panel and cabinet be grounded.
All IFR instruments are equipped with a three-conductor
power cord which, when plugged into an appropriate receptacle,
grounds the instrument. The offset pin on the power cord
three-prong connector is the ground wire.

2-2-1. To preserve this protection feature when operating the instru-
ment from a two-contact outlet, use a three-prong to two-
prong adapter and connect the green pigtail on the adapter
to ground.

2-3. CLEANING. It is wise to clean the dust, cobwebs, and other
debris out of the test set prior to periodic inspection,
repair or calibration. Some shops clean their test equip-
ment on a regular basis such as biannual or annual proof-
of-performance checks. Annual recalibration of the set is
advisable.

2-3-1. Dust removal is best done with a hand controlled dry air
jet of 25 to 50 psi (1.827 kg/cm^2 to 3.653 kg/cm^2). The
Rear Panel should be cleaned with a dry cloth only. The
Front Panel may be cleaned whenever necessary with a lint-
free cloth moistened with rubbing alcohol.

2-3-2. CARE MUST BE TAKEN TO AVOID BREAKING WIRES OR SHORTING
COMPONENT LEADS TOGETHER DURING CLEANING.

2-7.   Repackaging for Shipment.

2-8.   The following is a general guide for repackaging for ship-
       ment.   If you have any questions, contact the IFR Shipping
       Department.   (See Section I, Paragraph K)

───────────── NOTE ─────────────

       If the instrument is to be shipped to IFR for
       service or repair, attach a tag to the instru-
       ment identifying the owner and indicating the
       service or repair to be accomplished; include the
       model number and full serial number of the instru-
       ment.   In any correspondence identify the instru-
       ment by prefix, model and serial number.

Place instrument in original container if available.   If
original container is not available, contact IFR for
shipping instructions.

Do not return the instrument or its component parts to
IFR, Inc. for repair without first receiving authorization
from IFR, Inc.   Refer to paragraph 1-H for complete instruc-
tions.

I.   Transformer. Inspect the transformer for signs of
     excessive heating, broken or charred insulation, and
     loose mounting hardware.

J.   Wiring. Inspect all the wiring of the chassis for
     broken or loose ends and connections and for proper
     dress relative to other chassis parts. All the
     laced wiring should be tight with the ends securely
     tied.

2-5.   REPACKING FOR SHIPPING. The LIMITED WARRANTY AND SERVICE
        INSTRUCTIONS contain detailed directions for repacking
        and shipping. Additional questions may be directed to the
        IFR Shipping Department.

                              NOTE

           Any instrument shipped to IFR for any reason
           MUST be tagged with (1) its owner's identi-
           fication, (2) the service or repair required,
           (3) its model number, and (4) its full serial
           number. Identify the instrument by prefix,
           model, and serial number in ALL correspondence.

2-5-1. IFR Precision Simulators should be shipped ONLY in their
        original containers. If the original container is not
        available, contact IFR for shipping instructions.

2-5-2. DO NOT return an instrument or its component parts to IFR
        without first receiving authorization from the IFR Customer
        Service Department. Refer to the LIMITED WARRANTY AND
        SERVICE INSTRUCTIONS for complete directions.

A. Chassis. Includes anything mechanical or made from metal. Inspect for tightness of sub-assemblies, damaged connectors, corrosion or damage to the metal surfaces, etc. Surface corrosion may indicate damage inside the affected part.

B. Capacitors. Inspect for loose mounting, body damage, ca: damage, leakage or corrosion around leads.

C. Jacks. Inspect all coax jacks for loose or broken parts cracked insulation, bad contacts, etc. Do not disassemb: connectors within the test set.

D. Potentiometers. Any potentiometer that feels rough when rotated or produces circuit or voltage irregulariti should be checked with an ohmmeter for proper operation.

E. Resistors. Inspect all types of resistors for cracked, broken or charred or blistered bodies and loose or corroded soldering connections.

F. Printed Circuit Boards. Check connectors for corrosion and damage and the mating plugs for similiar damage. Inspect all mounted componets for damage including crystals and IC's. The board should be free of all foreign material.

G. Semiconductors. Inspect all diodes, rectifiers and transistors for cracked, broken, charred or discolored bodies. Check ends of components for seals around leads.

H. Switches. Examine all toggle switches for loose levers and terminals, loose body to frame condition. The line switch contacts should not be bent nor the switch actior too loose. The thumbwheel switches should have definate detents and not feel loose.

I. Transformer. Inspect the transformer for signs of excessive heating, broken or charred insulation, loose mounting hardware and other abnormal conditions.

J. Wiring. Inspect all wiring of chassis for broken or loose ends and connections and proper dress relative to other chassis parts. All laced wiring should be tight ends securely tied.
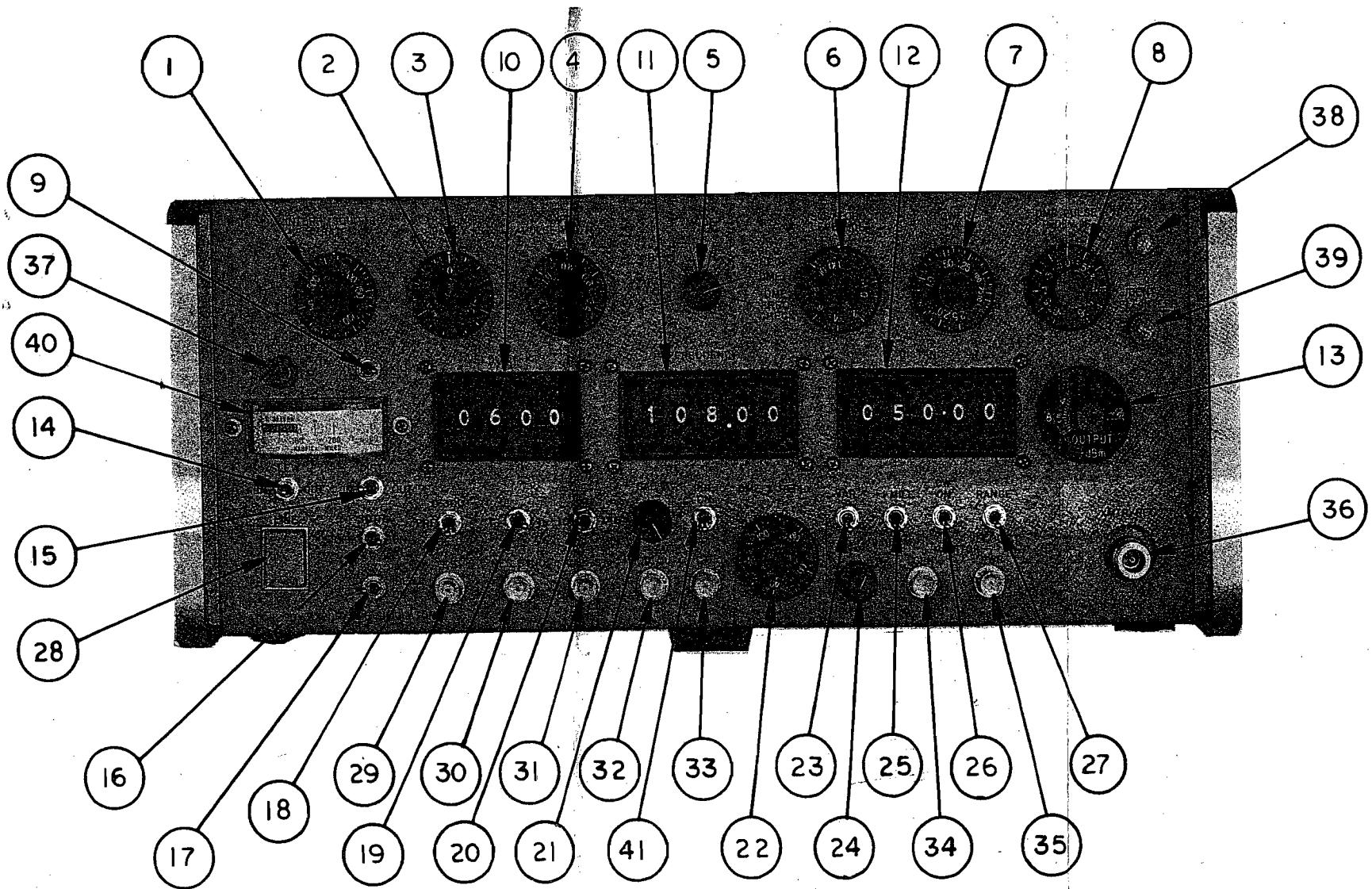
FRONT PANEL CONTROLS, CONNECTORS, AND INDICATORS

3-1

Front Panel

S-18
SELF-INTERROGATE
R-NAV
ON/OFF

DME SYNC
S-19

Q1, Q2 & Q3
COVER

R-NAV
OUT
J-9

FUSE
FL-1
1 AMP
SLO-BLO

R-11   TACAN   SUPPRESSOR   AC
TACAN   ON/OFF   OUT   POWER
LEVEL   S-20   J-10   PLUG
                                     P-11

ATC-1200Y3 REAR PANEL

Fig 3-2

SECTION III

Operation

3-1.   INTRODUCTION

3-2.   The ATC-1200Y3 is a self-contained, complete pulse test
instrument for transponder and DME systems. All neces-
sary test signals and their variations are generated with
the one set. Only an oscilloscope and counter are re-
quired as peripheral equipment.

3-3.   CONTROLS, CONNECTORS, AND INDICATORS

3-4.   Location of all controls, connectors, and indicators is
shown in Figure 3-1 and Figure 3-2. The following para-
graphs explain their functions in detail.

3-5.   FRONT PANEL

3-6.   Interr./Squitter Rate Control. Known also as the PRF
Control, it varies the frequency of a temperature-
stabilized oscillator from 50 to 500 Hz, and 500 to 5000
Hz. The range is selected by the X1/X10 switch directly
below the control. See paragraph 3-14. The oscillator
is used for three purposes: a) To determine the inter-
rogation rate of a transponder in Transponder Modes of
operation, b) to determine the average squitter rate in
DME Modes of operation, and c) to determine the interro-
gation rate of the ATC-1200Y3 itself in R-NAV operation,
to permit using the test set as a DME in testing of R-NAV
computers. Also when in DME Mode, the control directly
determines the rate of suppressor output pulses. See
paragraph 3-51, Suppressor Output Connector.

3-7.   P2 DEV. us Control. The spacing of P2 (SLS pulse) rela-
tive to P1 is controlled by the smaller, outer knob of
concentric controls. Actual P2 deviation is read rela-
tive to the large, inner knob with that knob set to 0.0us
deviation. At 0.0 indicated, spacing is 2us, and is
variable ±1.2us.

3-8.   P3 DEV us Control. The spacing in us of P3 relative to
P1 is controlled by the large, inner knob of concentric
controls. When at 0.0 indicated, P3 spacing is the
nominal time in us commanded by the mode of interroga-
tion - A, B, etc. P3 spacing may be varied by ±1.2us from
any mode spacing.

3-9. XPDR Pulse Width us Control. This control determines
      the pulse width of P1, P2, and P3 simultaneously.
      Nominal width is 0.8us, and may be varied from 0.4 to
      1.2us.

3-10. Mode Switch. The Mode switch controls whether the ATC-
      1200Y3 operation is for Transponder or DME testing.
      Transponder modes are A/C, A, B, C, D, and FREQ. CHECK.
      Interrogation mode is A in frequency check. DME modes
      are DME and DME FREQ. CHECK. In frequency check position
      the internal signal generator is allowed to heterodyne
      with the incoming DME transmitter signal to determine
      the transmitter frequency.

3-11. SLS/ECHO Level - dB Control. In Transponder modes this
      control varies the R.F. level of the SLS Pulse, P2, rela-
      tive to P1 and P3. Control range is +1 to -10 dB. At 0
      the P2 level is the same as P1, which is determined by the
      Output - dBm control. See paragraph 3-18. In the OFF
      position P2 is completely turned off. In DME mode the
      control turns on or off a pulse pair with the same spacing
      as the normal reply pulse pair (12 or 30 us) and at a
      fixed range of 30 miles relative to time of interrogation.
      In addition the control varies the R.F. level of the echo
      pulse pair relative to the normal pulse pair from +1 to -10
      dB. At 0 the echo pulses are the same amplitude as the
      normal reply pulses, which is determined by the Output -
      dBm control.

3-12. Power KW Control. This control varies the power meter
      slide-back voltage and is used in measuring both trans-
      ponder and DME transmitter power levels, either peak or
      at any other point on the output waveform. The output
      power is read directly from the control scale when the
      point on the waveform to be measured is reduced to the base
      line of an oscilloscope display.

3-13. DME Pulse P2 DEV us Control. The DME reply pulse pairs
      nominally have a spacing of 12 or 30 us. The P2 DEV us
      control enables the test set operator to vary this spacing
      to less than nominal (-DEV) or greater than nominal (+DEV).
      Discrete steps are provided of ±0.5, ±3, ±4, ±5, and
      ±6us. P1 is the ranging pulse and always remains in
      nominal position, with P2 changing its position relative
      to P1.

3-14.   X1/X10 PRF Switch. The PRF X1/X10 switch changes the dial
        reading of the Interr./Squitter Rate control by 10 and the
        frequency of the PRF oscillator by 10. See paragraph 3-6.

3-15.   VELOCITY-KTS Switch. This switch determines the velocity
        rate the test set is simulating when in velocity mode.
        Velocity rates are in 10KT increments from 0 to 9990 KTS.
        Velocity range and inbound or outbound directions are
        determined by other controls. See paragraph 3-19 and
        3-20. Velocity mode is selected by the Range/Velocity
        switch, paragraph 3-32.

3-16.   Frequency Switch. The Frequency switch controls the
        signal generator frequency in phase-locked operation, and
        also determines generator frequency readout mode and
        DME X or Y channel reply spacing. The four left digits
        always select frequency. The right digit selects the
        mode. When in 0 position, the switch readout will be VOR
        paired frequencies from 108.00 thru 117.90 and 133.00
        to 135.90 MHz, and the test set will be in X ch. DME
        reply spacing (12 us). When in 5 position, the readout is
        also in VOR paired frequencies only from 108.05 to 117.95
        and 133.05 to 135.95 MHz (50 KHz spacing channels), and
        the test set will be in Y ch. DME reply spacing (30 us).
        When in Gz position, the readout decimal point must be
        moved mentally two places to the left, and the resultant
        display will be the output frequency in Gz. In this mode,
        the generator covers from .960 to 1.215 Gz. The Gz position
        is normally used for transponder modes but if used in DME
        mode (for frequency check for other purposes), the DME
        reply spacing is always X ch. (12 us).

3-17.   Distance Switch. The precise range delay from interroga-
        tion to reply is selected by the Distance switches, Range
        distances are selected in 0.01 mile steps from 0 to 999.89
        N.M. The switch is used only in fixed Range mode selected
        by the Range/Velocity switch, paragraph 3-32.

3-18.   Output/dBm Control. This is the output R.F. level attenua-
        tor for the internal signal generator. The level is cali-
        brated in -dBm normally used in transponder and DME work,
        and the calibration is accurate only from -30 dBm to
        -110 dBm. An attenuator correction curve is provided for
        each serial number test set for the non-linear region from
        -30 dBm to 0 dBm, or the low attenuation stop.

3-19.   Slew In/Out Switch. The Slew switch rapidly moves the DME reply pulses to any range from 0 to 300 N.M., slewing inbound or outbound, when operating in velocity mode. As soon as the switch is released, the velocity switch takes over moving the reply pulses at the programmed velocity setting. Slewing from 0 to 300 miles takes approximately 6 seconds.

3-20.   Dist. In/Out Switch. When in velocity operating mode, the Dist. In/Out switch controls whether the reply pulses will move toward 0 N.M.-inbound, or toward 300 N.M.-outbound. The rate will be determined by the velocity switch. It should be noted that when operating near either limit, when the range actually reaches the limit it will at once jump to the opposite limit and continue its original course in or out.

3-21.   Squitter On/Off Switch. This switch turns the squitter pulses on or off. The average squitter rate is determined by the Interr./Squitter Rate control. See paragraph 3-6.

3-22.   Ident Off/1350 cycle/Ident On Switch. The three position Ident switch a) turns off all ident signals or tones - far left position, b) turns on a steady 1350 cycle tone - center position, and c) turns on an Ident signal in code at approximately 7WPM of the characters IFR - far right position. The signal is repeated every 30 sec. Since when ident is on either continuously or in code it overrides and eliminates all reply and squitter pulses, a warning indicator is lighted continuously in center switch position and in coded form every 30 seconds in right switch position. See paragraph 3-44.

3-23.   PRF Switch 0-30/0-300. The PRF range switch controls the meter full-scale sensitivity when reading DME interrogation PRF rates. The 0-300 N.M. meter scale and its calibrations are used. The 0-30 PRF range is normally used for DME track PRF's; the 0-300 PRF range is used for DME search PRF's. Input to the PRF measurement system is internal and requires no external, additional connections.

3-24.   Sync Selector Switch. The Sync switch selects the source of sync signal to be presented to the neg. sync. output connector (paragraph 3-35) to permit viewing various signals concerning test operations. See the Technical Specifications for TO and TD positions in both transponder (page 2-2) and DME (page 2-3) modes. Note also that in DME mode, TD position, a rear panel switch determines actual output sync. See paragraph 3-48.

3-25.   Cal 1.0/1.45us Switch. This selects the calibrate pulse
        output signal between 1.0us and 1.45us intervals. Both
        pulse trains are used only in transponder mode, or during
        DME calibration procedures of the ATC-1200Y3 itself. The
        1.0us is used to monitor spacing of Xpdr interrogation
        pulses and the 1.45us is used to monitor spacing of reply
        pulses. See also paragraph 3-26 and 3-36.

3-26.   Cal Phase (∅) Control. This control varies the phase
        between the interrogate and CAL pulses, or the reply and
        CAL pulses. Total phase variance is approximately 3.5us.
        The control is used to accurately align the CAL pulses
        with the leading edge of the interrogation or reply pulses.
        (See also paragraph 3-46).

3-27.   DME % Reply Control. The % Reply Control controls the
        percent of return of reply pulses of the ATC-1200Y3 to
        an interrogating DME. The % reply can be varied from
        20 to 100 percent. The reply pulse drop-out is at a com-
        pletely random rate determined by an internal noise gen-
        erator, and so simulates actual ground-to-air propagation
        path conditions.

3-28.   VAR or FREQ Switch. The VAR or FREQ switch determines the
        signal generator mode of operation between a) phase-locked-
        frequency controlled by the Frequency Switch in FREQ
        position, see paragraph 3-16, or b) continuously variable
        frequency operation controlled by the variable frequency
        sweep controls in VAR position, see paragraph 3-29. In
        VAR position the generator frequency must be monitored by
        an external counter.

3-29.   Variable Frequency Sweep Controls. Two controls are used
        to vary the signal generator frequency when in VAR mode.
        (Paragraph 3-28) A coarse control - the large, outer
        knob - will sweep the output frequency from 950 to 1225
        MHz. The fine adjust control - the small, outer knob -
        will sweep the frequency approximately 1.5 to 2.5 MHz
        over its full range.

3-30.   -1 Mile Switch. When turned on the -1 mile switch will
        subtract an exact one mile from whatever range the test
        set is replying at, whether in range or velocity mode.
        If the range switches are at 0 miles the output range will
        be -1 mile, enabling the operator to test steps on drum
        DME readouts, etc.

3-31. CW Switch. The CW switch disables both the ON-Off and Shaping modulators and applies CW R.F. energy to the XMTR/REC jack at the level set by the Output -dBm control. Frequency of output may be determined any one of three ways: a) phase-locked direct frequency readout, b) phase-locked VOR paired channel readout, or c) variable frequency control over the band from 950 to 1225 MHz. See paragraph 3-16 and paragraph 3-28 and 3-29.

3-32. Range/Velocity Switch. This switch selects between the two modes of DME Test operation of the ATC-1200Y3. Range mode gives a stationary, accurate range selected by the Distance switch. Velocity mode gives a range changing at a precision rate selected by the Velocity -KTS switch. See also paragraph 3-15 and paragraph 3-17.

3-33. Line Switch. Applies AC power to test set.

3-34. Test Input Connector. The Test Input is the input to the decoder, and is designed to be used as a twin-pulse generator test and alignment input. If the test generator is synced with the ATC-1200Y3 via an internal test point, the lus CAL pulse train will be stationary with respect to the interrogate and reply pulses and enable test set alignment to be easily accomplished.

3-35. Negative Sync Output Connector. The Negative Sync Pulse generated by the test set is presented at this connector to keep an oscilloscope in time with the various input and output signals. See also paragraph 3-24 and the Technical Summary under transponder and DME sync outputs.

3-36. CAL us Output Connector. The 1.0us or 1.45us pulse trains are presented at this connector for timing measurement of various signals. The connecting coax should be terminated in 50 ohm at the oscilloscope end.

3-37. Modulation Output Connector. DME shaped pulses closely coincident with the R.F. reply pulses are presented for use in modulating an I.F. generator or applying directly to a DME's ranging circuits. They are positive in amplitude (0 to 10.5 V P-P) and D.C. restored at the top of the pulses to zero volts. See Technical Summary.

3-38. Counter Output Connector. The output pulses direct from the counter block are presented here for determining the signal generator frequency in variable frequency mode

and to be observed on an oscilloscope periodically for
pulse stability in the counter chain. To determine the
output R.F. frequency, add 9 MHz to the counter reading
and multiply the sum by 100.

3-39. Generator Monitor Connector. The R.F. pulses generated by
the ATC-1200Y3 are detected, amplified and presented at
this monitor connector to enable viewing the interrogation
to a transponder or reply and squitter to a DME. Generally
the output R.F. level should be relatively great to view
these pulses. The connecting coax should be terminated
in 50 ohm at the oscilloscope end.

3-40. Power Monitor Connector. This connector will present all
pulses coming into the ATC-1200Y3. All power and fre-
quency measurements are performed by observing these
pulses. The connecting coax should be terminated in
50 ohm at the oscilloscope end.

3-41. XMTR/REC Connector. All RF pulses coming into or going
out of the test set pass through this connector. The
output -dBm control is calibrated at this connector into
a 50 ohm load.

3-42. Signal Generator Phase Lock Indicator. Whenever the
signal generator is placed in phase-lock mode and the
frequency switch is set between the limits the generator
will phase lock in, this indicator must be lighted. It
indicates the generator is in control of the phase lock
circuitry. When in variable mode, if the generator fre-
quency is manually set at the same frequency the frequen-
cy switch is set at, the indicator may flash on and off.
This is normal operation.

3-43. Echo On Indicator. The Echo On Indicator warns the oper-
ator he has an echo pulse pair present in the output to a
DME under test which could enable him to wrongly adjust
the ranging circuits. See paragraph 3-11. When echo is
on, all output pulses are square instead of Gaussian
shaped. This will cause the normal range to decrease by
approximately 0.1 mile.

3-44. Ident/Self Interrogate Indicator. This indicator warns
the operator that either the Ident tone has been left "on"
(which will override all range pulses) or the R-NAV On/Off
switch is on thus generating many false replies. The in-
dicator will flash the code characters I-F-R when the
ident switch is in the "Ident On" position.

3-45. Meter. The 0 to 300 N.M. scale is used for range readout when in velocity mode. It is also used as 0 to 30 or 0 to 300 PRF ranges when in range mode. The blue area of the left one - third scale is used to read transponder percent return from 0 to 100 percent. Percent return is automatically computed within the test set with a transponder operating into it. See also paragraph 3-18.

3-46. Pre-Pulse On-Off Switch. This toggle switch is used to enable the circuitry which generates the Pre-Pulse. This pulse is similar in amplitude and width to the normal interrogation pulses, P1 and P3. Its relationship in time preceeding P1 may be altered by the CAL Ø us control. (See 3-26)

3-47. R-NAV On/Off Switch. This switch interrogates the ATC-1200Y3 at the rate set by the Interr/Squitter Rate Control (self-interrogate function). This feature enables the test set to operate an R-NAV computer without having a DME operating into it.

3-48. Sync Squitter/Sync Range Switch. When in DME mode, TD sync, this switch selects the output sync between squitter pulses or range reply pulses. The switch is inoperative in TO sync.

3-49. Tacan On/Off Switch. Turns on or off a 60 Hz signal used to amplitude modulate all output DME pulses to simulate TACAN modulation. See paragraph 3-52.

3-50. R-NAV Output Connector. R-NAV computers requiring two pulses for range information may be operated by the ATC-1200Y3 through this connector. One pulse is at time of interrogation, the other at time of reply. See also paragraph 3-47.

3-51. Suppressor Output Connector. Suppressor output pulses for both transponder and DME are presented here. Transponder pulses are coincident with each interrogation pulse, and DME pulses are at a steady rate set into the Interr/Squitter Rate control.

3-52. Tacan Level Control. When Tacan modulation is turned on (simulation only), the Level Control varies the percent of modulation from 0 to more than 50 percent. This must be adjusted by observing the video pulses in a DME with a linear video output.

3-53. Fuse. This fuse is in the transformer primary winding. Its normal value is 1 Amp.

3-54. AC Power Connector. Applies AC power to the test set. Requires a grounding-type cable and plug.

3-55. Internal Controls.

3-56. There are no internal controls useful during operation. Only calibration and alignment adjustments are internal and require very careful attention when being set. See the maintenance section of this manual for details.

SECTION IV

ATC-1200Y3 Operation Procedures

4-1.   INTRODUCTION

4-2.   The ATC-1200Y3 was designed throughout for maximum oper-
ator's convenience and speed, while simultaneously giving
him maximum accuracy of test measurements. The only equip-
ment required external of the test set is a high-quality
oscilloscope and a counter capable of 3.5 MHz. Connections
to these pieces of test equipment are simple and require
minimum changing during different testing operations. All
R.F. signals and proper modulation signals are developed
within the ATC-1200Y3 and are instantly selectable and/or
variable to meet the test conditions at hand for trans-
ponder and DME work.

4-3.   The following procedures provide information necessary to
operate the ATC-1200Y3 in Transponder and DME modes. The
set-ups are given to familiarize the operator with the
test set versatility and typical measurement procedures.
Refer to Section Three for detailed control functions.

4-4.   TRANSPONDER OPERATION

4-5.   Equipment Set-up. The ATC-1200Y3 is connected to the
oscilloscope and the transponder under test as shown in
Figure 4-1. All connecting cables are RG-58 50 ohm coax
except the R.F. cable which is recommended to be RG-8
foam coax of shortest practical length.

4-6.   To obtain accurate pulse wave shape determination the
cables used for the monitor and CAL pulse outputs should
be terminated in 50 ohms at the oscilloscope end. Commonly
used is a BNC Tee connector with a 51 ohm resistor in the
open end of the Tee, or solder a 51 ohm resistor inside a
UG-88 BNC male connector to plug on the Tee.

4-7.   Some operators have found they can, in some operations,
leave the CAL pulse cable unterminated. This produces
sharp overshoots on the pulse leading edges and gives a
very definite point to time from. It does in no way de-
grade the accuracy of the signal.
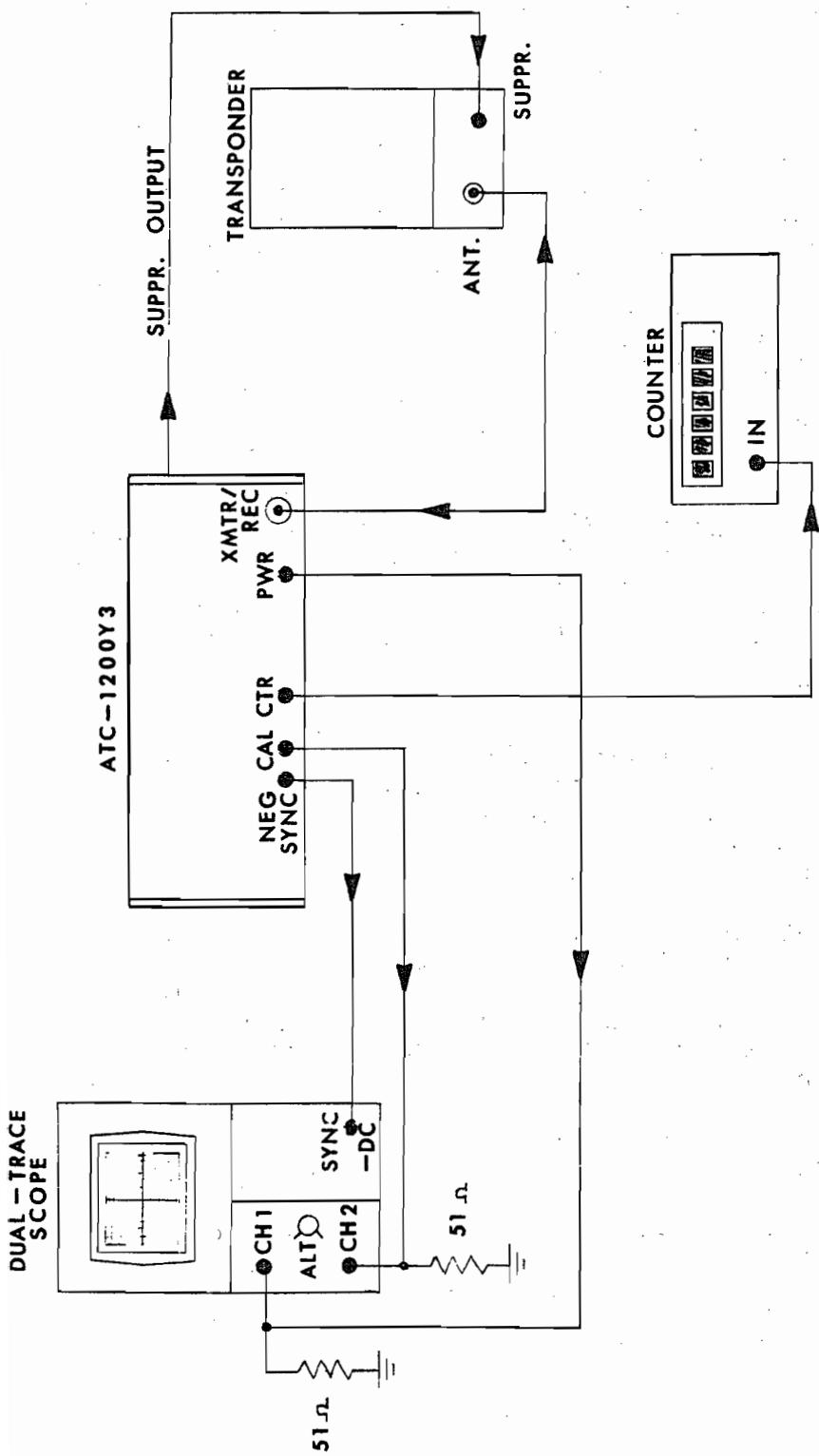
Figure 4—1

Equipment Interconnections
for Transponder Testing

4-8.   ATC-1200Y3 Initial Control Settings

      a.   MODE SWITCH to A
      b.   FREQUENCY SWITCH to 1030 Gz
      c.   OUTPUT - dBm control to -50 dBm
      d.   INTERR/SQUITTER RATE control to 50
      e.   X1/X10 SWITCH to X10
      f.   Both P2 and P3 DEV us controls to 0.0
      g.   XPDR PULSE WIDTH us control to 0.8us
      h.   SLS/ECHO LEVEL -dB control to OFF
      i.   POWER KW control full CCW
      j.   TO/TD switch to TD
      k.   CAL us switch to 1.45us
      l.   VAR or FREQ switch to FREQ
      m.   CW switch OFF
      n.   LINE switch ON (red pilot lamps on)
      o.   Connect cables as shown in Figure 4-1

4-9.   Refer to Figure 4-2 and the following control settings
for various transponder tests. Each of the tests outlined
in paragraph 4-12 is a typical test only and is therefore
generalized. Always refer to the calibration and align-
ment manual for the Transponder being tested for the
specific values, settings and tests to be performed.

4-10.   Oscilloscope Control Settings

      a.   Both vertical gain controls to .05 V/cm
      b.   Horiz. sweep to 2 us/cm
      c.   Trigger input to EXT, NEG, DC
      d.   Intensity as desired for 500 PRF interrogation rate
      e.   VERT MODE to alternate.

4-11.   Transponder Control Settings

      a.   MODE SWITCH to A or A/C
      b.   FUNCTION switch to ON (may be same as mode switch)
      c.   CODE to 0000

4-12.   TYPICAL TRANSPONDER TESTS

4-13.   With the controls of the ATC-1200Y3, oscilloscope, and
transponder set according to paragraphs 4-8, 4-9, and
4-10, an oscilloscope display should be observed of the
transponder reply pulses. Varying the POWER KW control
will change the amplitude of the reply pulses, and vary-

INTERROGATION RATE

PULSE SPACING AND WIDTH

MODE

SLS

POWER

%
RETURN

0 6 0 0

1 0 8 0 0

0 5 0 0 0

RF OUTPUT

SYNC

CAL MARKS

COUNTER OUTPUT

VARIABLE FREQUENCY

MONITORS

PRE PULSE ON/OFF
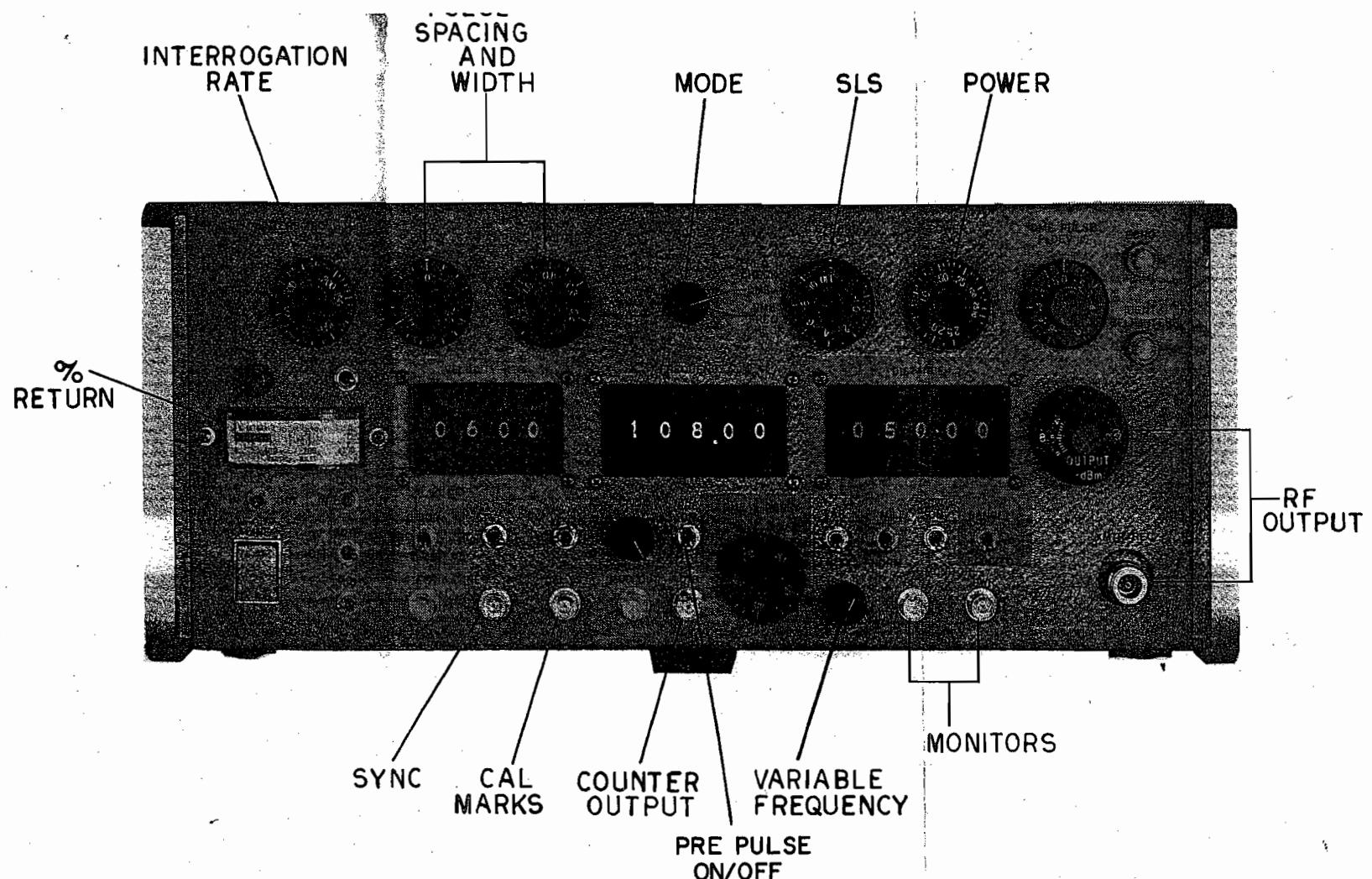
ATC-1200Y3 TRANSPONDER CONTROLS

Fig 4-2

4-4

ing the CAL Ø control will change the relative phasing of
the CAL pulses to the reply pulses. These two simple tests
indicate proper interconnection of equipment.

A.   Sensitivity - Minimum Trigger Level. Interrogate
     the Transponder at a rate that achieves a solid
     100% return with the Output -dBm set to -50 dBm.
     (This may be other than the 500 PRF as set by para-
     graph 4-8d and 4-8e). Then reduce the R.F. Output
     level to achieve 90% return (or per manufacturer's
     manual) and read MTL reading on the Output -dBm
     control.

     NOTE: The Transponder Percent Return is auto-
            matically displayed whenever a transponder
            is actively operating into the ATC-1200Y3.

B.   Decoder Limits. Vary the P3 DEV us control to deter-
     mine receiver decoding limits as per manufacturer
     specs.

C.   SLS Calibration. Turn SLS/ECHO LEVEL -dB control
     clockwise to ON and set to -10dB. Increase amplitude
     of SLS pulse (P2) until transponder stops replying
     to interrogations. This is normally about -6dB -
     return to manufacturer specs.

D.   SLS (P2) Decoder Limits. With the SLS LEVEL control
     set to no reply from transponder, vary the P2 DEV us
     control until reply resumes. These + and - deviations
     are the SLS pulse gate limits.

E.   Transmitter Power. Turn SLS LEVEL control to OFF.
     Turn POWER KW control clockwise until reply pulses
     just do disappear into the base line of the scope
     display. Read power in KW directly from POWER KW
     control scale.

     NOTE: Any point on the reply pulse waveform may
            be measured for power by placing that point
            on the display base line. Always read power
            from POWER KW control scale.

F.   Transmitter Frequency Check. See Figure 4-3.
     Rotate the POWER KW control until approximately 3 cm
     of reply pulse amplitude is displayed. Next set the
     ATC-1200Y3 mode switch to FREQ. CHECK. Interrogation

Adjust amplitude with Power - KW Control
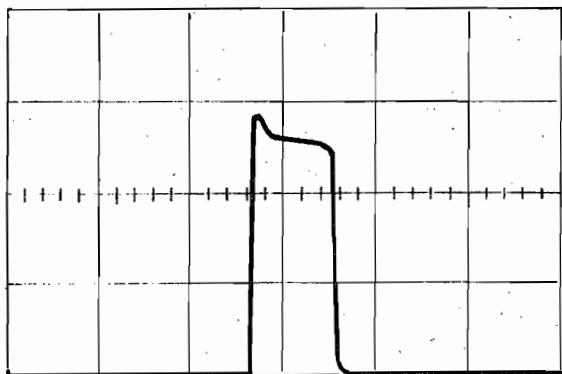
Normal
Waveform.

On-Frequency
Presentation

Vert: .05 V/cm
Horiz: .5 us/cm
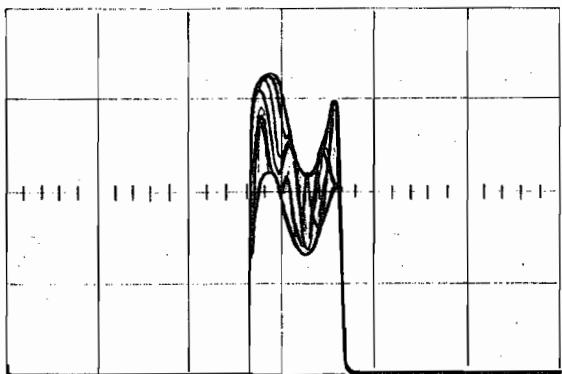
Off frequency
approximately
1 Mhz (high or
low).

Vert: .05 V/cm
Horiz: .5 us/cm
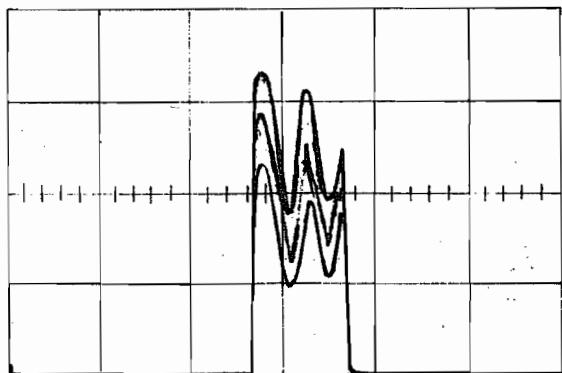
Off frequency
approximately
2 Mhz (high or
low).

Vert: .05 V.cm
Horiz: .5 us/cm

Figure 4-3

Transponder Frequency Check Waveforms

mode will automatically be on mode A. Select 1090 Gz on the FREQUENCY switch. Observe a beat pattern on the reply pulse display. This beat pattern is the result of heterodyning the ATC-1200Y3 signal generator and the transponder transmitter frequencies. Place the VAR or FREQ switch to VAR. Connect a counter to the CTR jack. Using the counter to determine the signal generator frequency sweep the frequency to 1090 MHz. A beat pattern very similar to that obtained in phase-locked operation should be displayed. Use the phase-locked mode to determine transmitter frequency to 1.0 MHz and the VAR mode to determine frequency to 500 kHz or closer, depending on operator experience and skill.

G. Reply Pulse Spacing. Set CAL us switch to 1.45 then using the CAL ∅ control align the leading edge of any calibrate pulse with the leading edge of P1 of reply. P2 of reply must then occur on the fifteenth CAL mark. Any code set into the transponder must have all pulses of that code occur exactly on the cal mark for that pulse's position. Ident pulse would occur on the eighteenth cal mark after P1. In addition to checking pulse spacing, the width of the 1.45us pulses is trimmed at the factory for approximately 0.45us the width of the reply pulses.

H. A/C Mode Interlace. Set Mode switch to A/C. Observe reply pulse on oscilloscope. (Do not use alternate or chopped position). You should see reply pulses at positions A and C with a duty cycle of 50% each.

I. Suppressor. Operate the ATC-1200Y3 and a transponder as outlined in paragraphs 4-8 through 4-12, observing the reply pulses on the oscilloscope. Next connect a cable between the test set suppressor output and the transponder. All reply pulses should cease while the suppressor pulse is applied to the transponder.

J. Other Tests. Each manufacturer of ATC Transponder Equipment will have other tests for his specifice requirements. Always utilize the manufacturer's manual and specifications when testing equipment, using the ATC-1200Y3 to provide the test parameters accurately and quickly.
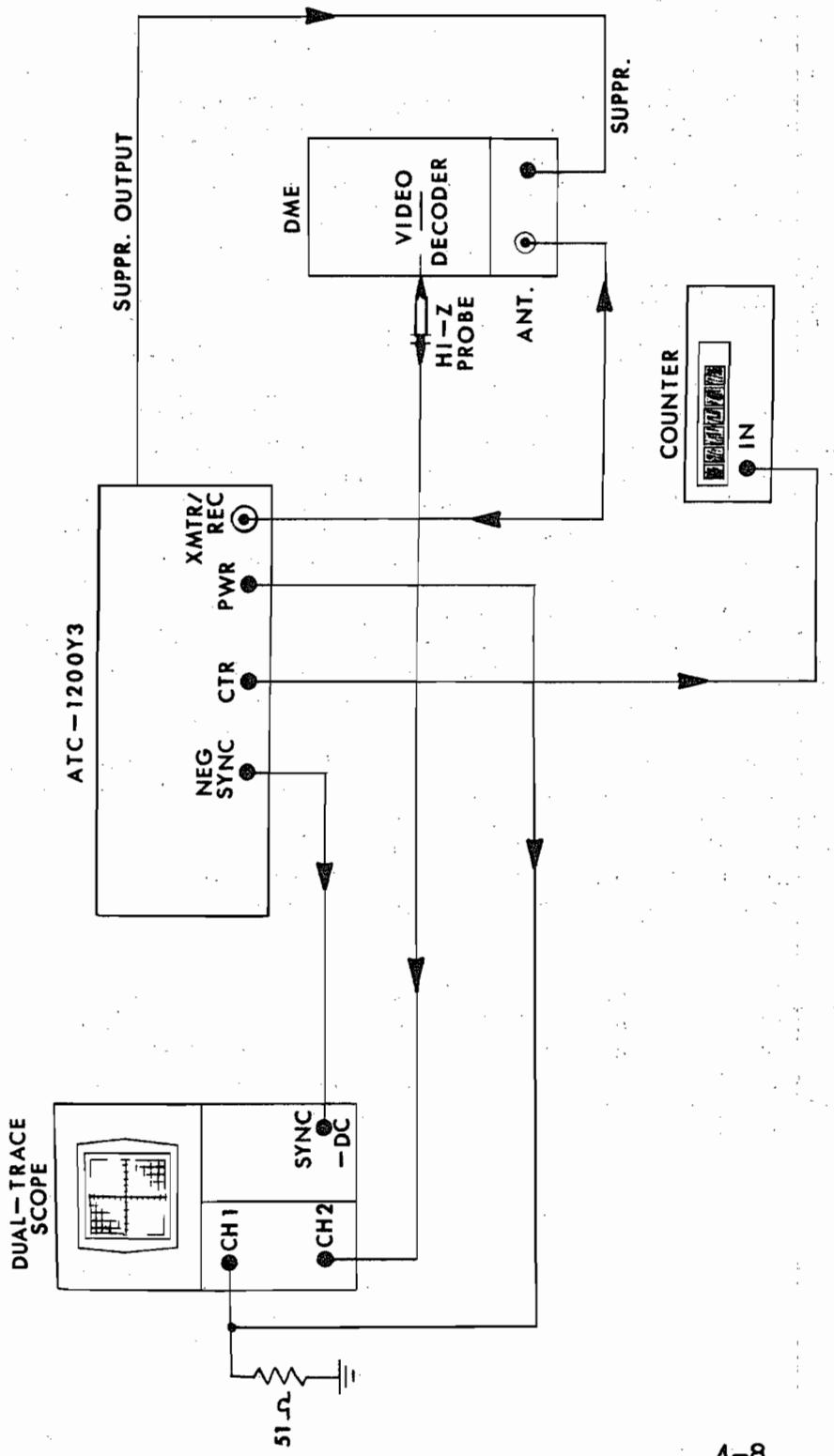
Figure 4-4

Equipment Interconnections for DME Testing

DME PULSE CHARACTERISTICS
AND MODE SPACING

AIRBORNE
INTERROGATION

GROUND STATION
REPLY

50µS

12µS

12µS

1µS CAL
MARKS

P1 TO P1 RANGING

P1   P2   P1   P2

P1   P2   P1   P2

P2 TO P2 RANGING

12µS

12µS

50µS

X CHANNEL

56 µS

30 µS

36 µS

P1 TO P1
RANGING

1µS CAL MARKS

P1   P2   P1   P2

P1   P2   P1   P2

P2 TO P2
RANGING

36µS

30µS

50µS
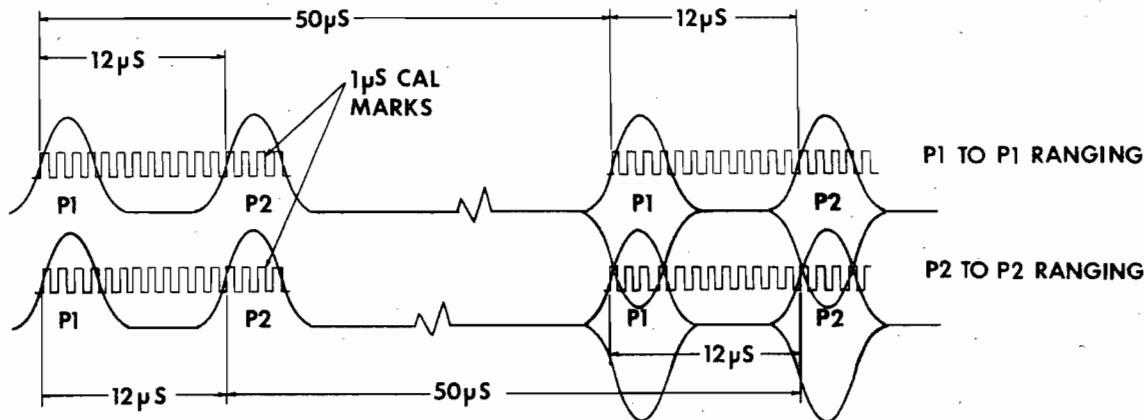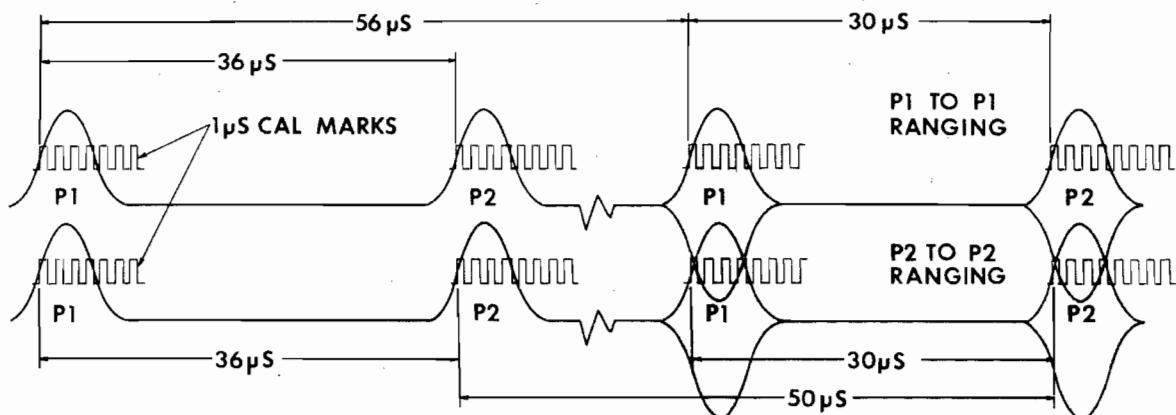
ALL TIMING MEASUREMENTS ARE
GIVEN AT 0.5A.

Y CHANNEL

RISE
TIME
2.5µS
0.5µS

DECAY TIME
2.5µS ± 0.5µS

DURATION
3.5µS ±0.5µS

0.9A
0.5A
0.1A
A
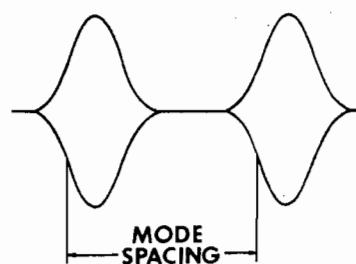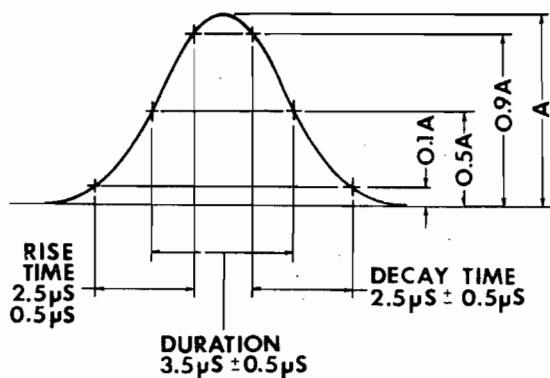
MODE
SPACING

	AIRBORNE INTERR.	GROUND STATION REPLY
MODE X	12µS ±0.5µS	12µS ±0.5µS
MODE Y	36µS ±0.5µS	30µS ±0.5µS

FIG.4-4.1

4-8.1

4-14.   DME OPERATION

4-15.   Equipment Set-Up. The ATC-1200Y3 is connected to the oscilloscope and the DME under test as shown in Figure 4-4. All connecting cables are RG-58 50 ohm coax except the R.F. cable which is recommended to be RG-8 foam coax of short-est practical length.

4-16.   To obtain accurate pulse wave shape determination the cable used for the monitor output should be terminated in 50 ohms.

4-17.   Refer to Figure 4-5 and the following control settings for various DME tests. Each of the tests outlined in para-graph 4-21 is a typical test only and is therefore gener-alized. Always refer to the calibration and alignment manual for the DME being tested for the specific values, settings and tests to be performed.

4-18.   ATC-1200Y3 Initial Control Settings

    a.   MODE switch to DME
    b.   FREQUENCY SWITCH to 108.00
    c.   OUTPUT -dBm control to -50 dBm
    d.   INTERR/SQUITTER RATE control to 270
    e.   X1/X10 switch to X10
    f.   SLS/ECHO LEVEL -dB to OFF
    g.   POWER KW control full CCW
    h.   DME PULSE P2 DEV us to 0.0
    i.   VELOCITY-KTS switch to 0100 KTS
    j.   DISTANCE switch to 020.00 N.M.
    k.   PRF switch to 0-300 position.
    l.   SQTR switch to ON
    m.   IDENT switch to OFF
    n.   SYNC switch to TO
    o.   DME % REPLY to 100%
    p.   VAR/FREQ switch to FREQ
    q.   CW switch to OFF
    r.   RANGE/VELOCITY switch to RANGE
    s.   Rear Panel sync switch to SYNC SQUITTER
    t.   R-NAV switch to OFF
    u.   TACAN SIMULATION switch to OFF
    v.   LINE switch ON (red pilot lamps on)
    w.   Connect cables as shown in Figure 4-4

SQUITTER/SELF INTERROGATION RATE

ECHO   POWER   PULSE DEVIATION

WARNING LAMPS

VELOCITY RANGE/DME PRF

0 6 0 0   1 0 8 0 0   0 5 0 · 0 0

RF OUTPUT

VELOCITY RANGE CONTROLS

DME PRF   TEST GENERATOR INPUT   SYNC   SHAPED MOD   COUNTER OUTPUT   VARIABLE FREQUENCY   MONITORS   DME MODE

% REPLY
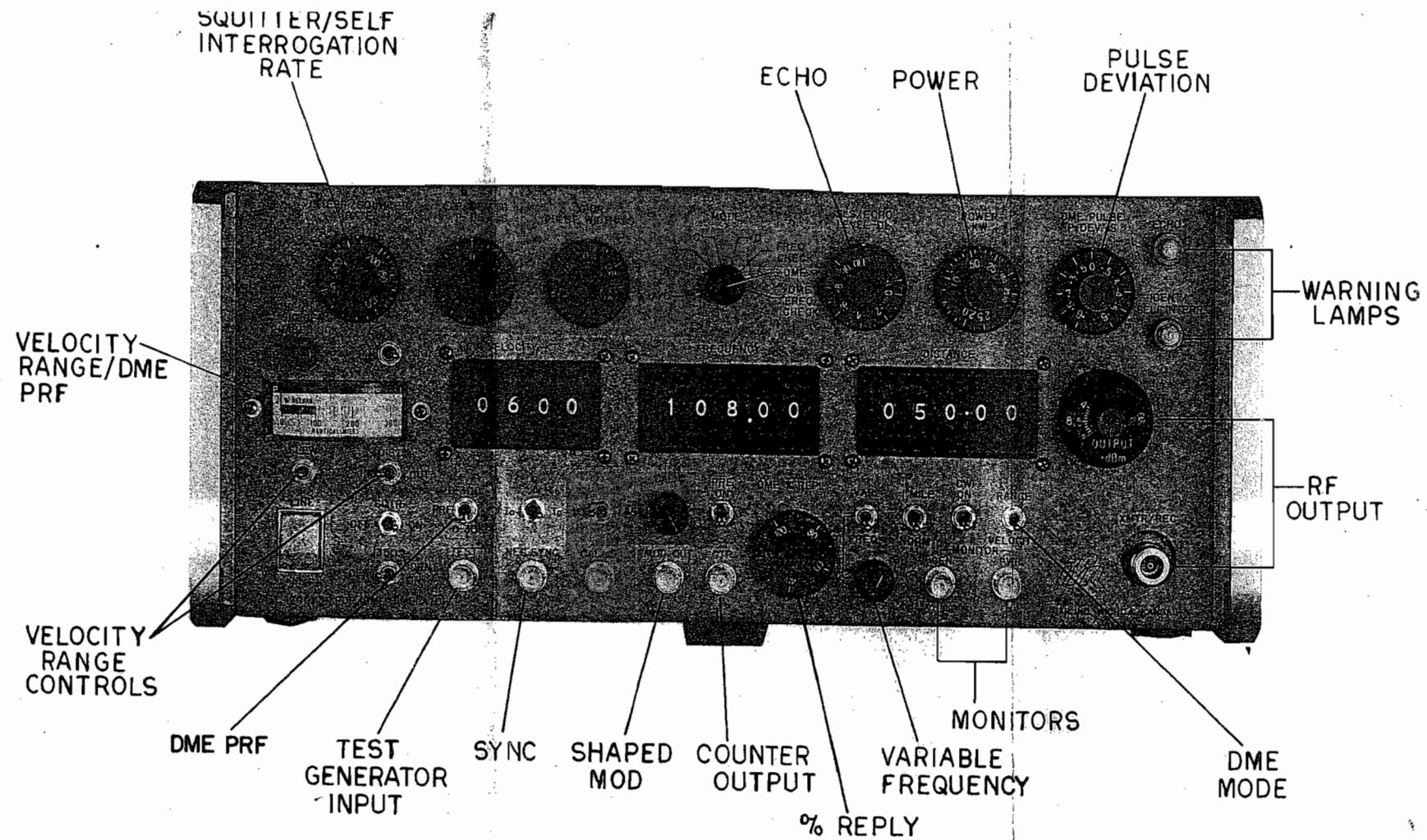
ATC-1200Y3 DME CONTROLS

4-10

Fig 4-5

4-19.   Oscilloscope Control Settings

      a.   Vertical gain control to .05 V/cm
      b.   Horiz. sweep to 2 us/cm
      c.   Trigger input to EXT, NEG, DC
      d.   Vertical mode to CHAN. A
      e.   Intensity as desired for approximately a 25 PRF
           trigger rate

4-20.   DME Control Settings.

      a.   MODE switch to OPERATE (or activate the DME for
           normal service)
      b.   FREQUENCY switch to 108.0
      c.   FUNCTION switch to 0-30 N.M. range or distance
           readout.

4-21.   Typical DME Tests.

4-22.   With all controls and cables set according to paragraphs
4-17 through 4-19, the DME should be interrogating the
ATC-1200Y3 and receiving squitter at a 2700 average PRF
rate and fixed range replies at 20.0 N.M. Sync to the
oscilloscope will coincide with each interrogation pulse
from the DME, allowing observation of the transmitter
waveform. The DME should "lock on" and hold at 20.0 NM
with 0 KTS velocity. Clockwise rotation of the POWER -
KW control will reduce the displayed amplitude of the
transmitter pulses to zero (into the base line).

    A.   Transmitter Power Output. Observe the transmitter
        interrogation pulses to the ATC-1200Y3 as in para-
        graph 4-21. Slowly rotate the POWER KW control
        clockwise until the peak of the pulses just disap-
        pears into the display's base line. Read the peak
        power in KW directly from the POWER KW control
        scale.

    B.   Transmitter Pulse Spacing. Select the frequency
        specified by the manufacturer of your DME equipment
        for this test. Set the selected frequency on both
        the DME control head and the test set FREQUENCY
        switch. Adjust the POWER KW control for an oscil-
        loscope display of pulses 4 to 6 cm in amplitude.
        Center the display vertically on the scope center
        graticule. The spacing from leading edge to lead-
        ing edge as read on the center graticule should be
        12.0us or 36.0us as shown in Figure 4-4.1.

Adjust Amplitude with Power - KW Control
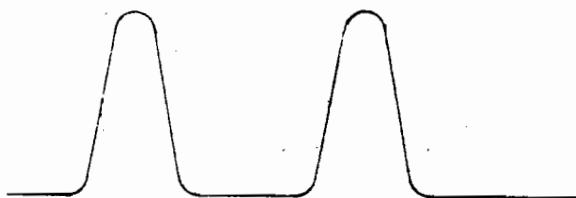
Normal DME
Interrogation
Pulses - X Ch.

Vert: .05 V/cm
Horiz: 5 us/cm
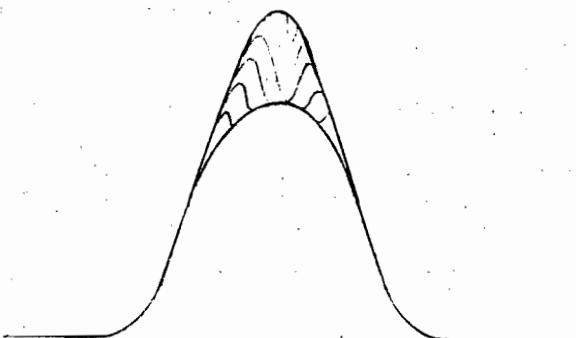
Approximately 1
Mhz (high or low)
from center channel
frequency.

Vert: .05 V/cm
Horiz: 2 us/cm
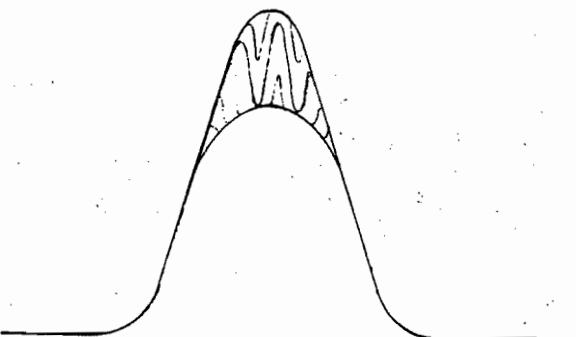
Approximately 2
Mhz (high or low)
from center channel
frequency.

Vert: .05 V/cm
Horiz: 2 us/cm

Figure 4-6

DME Frequency Check Waveforms

C. Transmitter Frequency. The DME frequency check
    function is to give rapid verification that the DME
    is on the proper XMTR channel to within ±1 MHz. Most
    DME sets must have an automatic standby circuit de-
    signed to allow the DME to search without receiving
    squitter. Refer to Figure 4-7 for the transmitter
    air to ground frequency for any given DME paired VOR
    frequency. Set the VOR frequency into the DME and
    select the Gz mode and the transmitter frequency on
    the FREQUENCY switch of the test set. Select DME
    FREQ CHECK on the mode switch and observe a beat
    pattern on the scope display. See Figures 4-6. The
    frequency switch may be paired in 1 MHz steps to
    verify channel center frequency, or operated in
    variable mode (using a counter to read out generator
    frequency).

D. Receiver Sensitivity. One method is to adjust the
    Output -dBm control for a very low R.F. output of
    -115 dBm. The DME should be in standby. Slowly in-
    crease the output level until the DME locks on. Be
    sure squitter is ON at a PRF of 2700 and IDENT switch
    is OFF. Another method is to set the Output -dBm
    control to a value the DME should lock on at, and
    change frequency throughout the band. After each new
    frequency is selected the DME must lock on within a
    short time (perhaps 2 to 5 sec). Some manufacturers
    also specify a reduced % reply of 70 to 80%. Adjust
    the DME % REPLY control for desired reply efficiency.

E. Receiver Selectivity. Set Output -dBm control to a
    solid lock on value (-60 to -70 dBm), and turn IDENT
    switch to 1350 cycle. Set VAR/FREQ switch to VAR
    and monitor generator frequency with an external
    counter. Manually vary the generator frequency
    above and below the channel the DME is set to.
    Refer to Figure 4-7. At the high and low selectiv-
    ity limits, the ident tone should stop.

F. Decoder Selectivity. With the DME operating normally
    into the ATC-1200Y3, turn IDENT switch to 1350 cycle.
    Vary the DME PULSE P2 DEV us control plus and minus
    0.5us, 3, 4, 5, and 6us. At the decoder limits
    called for by the manufacturer, the tone should stop.

G. Suppressor Pulse Output. Operate the DME into the ATC-1200Y3 in RANGE mode. Sync the scope by placing the sync switch in TD, rear panel switch in SYNC SQUITTER, and observe the DECODER OUTPUT from the DME receiver. Connect a cable from suppressor output (on rear of test set) to suppr. input of DME. During the time the cable is connected approximately 30% of the squitter pulses will be dropped by the decoder.

H. Suppressor Pulse from DME. Operate the DME in the ATC-1200Y3 in RANGE mode, and select TO sync on test set. Observe the interrogation pulses on the scope. (See paragraph 4-22a). Next observe the suppr. output from the DME on channel B of scope using ALT vertical mode. A pulse must be present with each transmitted pulse. For amplitude and width refer to maintenance manual.

I. Pulse Repetition Frequency. Place the PRF switch in 0-300 range. Cause the DME to search by any convenient means. While in search mode, read the interrogation PRF directly from the meter. Allow the DME to lock on. Place the PRF switch in 0-30 range and again read interrogation PRF directly from the meter. Note: ATC-1200Y3 must always be in RANGE mode to use the meter to measure PRF.

J. Auto Standby. Place SQUITTER switch to OFF. Select a frequency for the DME different from the frequency set into the test set. The DME should go into standby mode. Next change the frequency of the test set to agree with the DME frequency. The DME should still be in standby with no squitter applied. Turning on squitter should start the DME searching. Note: some lower cost DME sets will search without squitter and have no standby circuits. Consult manufacturer's manual.

K. Range Accuracy. Operate DME into ATC-1200Y3 in RANGE mode. Set squitter to on and IDENT off. Any range set into the DISTANCE switch should be read out by the DME indicator. Check with DME specifications for values to use for calibration.

L. Velocity Accuracy. Operate DME into ATC-1200Y3 in VELOCITY mode. Set squitter to on and IDENT off. Press SLEW switch to the right until meter indicates

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desired range. Set IN/OUT switch to track inbound or outbound. Any value set into velocity switch must be duplicated by DME. Check with DME specifications for values to use for velocity calibration.

M.   Memory Time. Allow DME to lock on to test set in either VELOCITY or RANGE mode. Squitter on and IDENT off. After DME has locked on for a short time (at least 20-30 sec.) turn IDENT switch to 1350 cycle which removes the reply to the DME. After the proper memory time has elapsed the DME should lose distance readout and begin searching.

N.   Echo Detection. For the relatively newer DME's that feature echo rejection, lock the DME on to the ATC-1200Y3 in RANGE mode at a distance of approximately 40 N.M. After a solid lock on has occurred, rotate the SLS/ECHO LEVEL -dB control clockwise to ON, then slowly increase the amplitude of the ECHO pulses until the DME unlocks from its original range and locks on immediately at 30 N.M. (the fixed ECHO distance). When this occurs stop rotating the control and read in dB the relative amplitude of the echo to regular reply pulses required for the DME to sense a new reply pulse.

O.   Audio Output. Placing the IDENT switch in 1350 cycle position at any time causes a solid tone to be heard in the receiver. Audio power output, IDENT filters, etc. may be checked in this manner.

P.   Other Tests

  1.   Mod. Output. The shaped DME reply pulses (and IDENT and SQUITTER) are available to modulate an I.F. signal generator or other purposes as needed.

  2.   Tacan Simulation. There are cases where a DME presents ranging or tracking problems when tuned to a TACAN (VORTAC) station, but no problems when tuned to a VOR-DME station only. The ATC-1200Y3 simulates TACAN modulation, variable from 0 to 50%, to help in spotting these difficulties.

3.   R-NAV. Area navigation computers which accept a two pulse input from the DME for range information can be directly tested from the ATC-1200Y3. The R-NAV two-pulse output is always available whenever the set is replying to valid interrogations. Those interrogations may come from the test set itself without a DME working into it by placing the R-NAV switch to ON position.

4.   -1 Mile Switch. Some models of DME equipment utilize a drum distance readout which should have a lower limit of less than 0.0 N.M. The -1 mile function allows this setting to be checked. It also subtracts one mile from any other range set into the test set as well.

4-23. USE OF ATC-1200Y3 AS A GENERAL PURPOSE GENERATOR

4-24. From time to time it may be necessary or convenient to have an L-Band, crystal-controlled signal generator around the shop. By placing the CW switch ON the ATC-1200Y3 becomes such a generator. Of course it may also be used in continuously variable frequency mode, using an external counter to determine frequency. Either way, the R.F. output is leveled, pure, and selectively attenuated for any use.

Fig 4-7

DME Frequency--VOR Frequency Pairing

VOR FREQ (MHz)	DME RCVR (GRD TO AIR)	DME XMTR (AIR TO GND)	TACAN CH (SPACING)	VOR FREQ (MHz)	DME RCVR (GRD TO AIR)	DME XMTR (AIR TO GND)	TACAN CH (SPACING)	VOR FREQ (MHz)	DME RCVR (GRD TO AIR)	DME XMTR (AIR TO GND)	TACAN CH (SPACING)
108.00	978	1041	17X	112.20	1020	1083	59X	116.40	1198	1135	111X
108.05	1104	1041	17Y	112.25	1146	1083	59Y	116.45	1072	1135	111Y
108.10	979	1042	18X	112.30	1157	1094	70X	116.50	1199	1136	112X
108.15	1105	1042	18Y	112.35	1051	1094	70Y	116.55	1073	1136	112Y
108.20	980	1043	19X	112.40	1158	1095	71X	116.60	1200	1137	113X
108.25	1106	1043	19Y	112.45	1032	1095	71Y	116.65	1074	1137	113Y
108.30	981	1044	20X	112.50	1159	1096	72X	116.70	1201	1138	114X
108.35	1107	1044	20Y	112.55	1033	1096	72Y	116.75	1075	1138	114Y
108.40	982	1045	21X	112.60	1160	1097	73X	116.80	1202	1139	115X
108.45	1108	1045	21Y	112.65	1034	1097	73Y	116.85	1076	1139	115Y
108.50	983	1046	22X	112.70	1161	1098	74X	116.90	1203	1140	116X
108.55	1109	1046	22Y	112.75	1035	1098	74Y	116.95	1077	1140	116Y
108.60	984	1047	23X	112.80	1162	1099	75X	117.00	1204	1141	117X
108.65	1110	1047	23Y	112.85	1036	1099	75Y	117.05	1078	1141	117Y
108.70	985	1048	24X	112.90	1163	1100	76X	117.10	1205	1142	118X
108.75	1111	1048	24Y	112.95	1037	1100	76Y	117.15	1079	1142	118Y
108.80	986	1049	25X	113.00	1164	1101	77X	117.20	1206	1143	119X
108.85	1112	1049	25Y	113.05	1038	1101	77Y	117.25	1080	1143	119Y
108.90	987	1050	26X	113.10	1165	1102	78X	117.30	1207	1144	120X
108.95	1113	1050	26Y	113.15	1039	1102	78Y	117.35	1081	1144	120Y
109.00	988	1051	27X	113.20	1166	1103	79X	117.40	1208	1145	121X
109.05	1114	1051	27Y	113.25	1040	1103	79Y	117.45	1082	1145	121Y
109.10	989	1052	28X	113.30	1167	1104	80X	117.50	1209	1146	122X
109.15	1115	1052	28Y	113.35	1041	1104	80Y	117.55	1083	1146	122Y
109.20	990	1053	29X	113.40	1168	1105	81X	117.60	1210	1147	123X
109.25	1116	1053	29Y	113.45	1042	1105	81Y	117.65	1084	1147	123Y
109.30	991	1054	30X	113.50	1169	1106	82X	117.70	1211	1148	124X
109.35	1117	1054	30Y	113.55	1043	1106	82Y	117.75	1085	1148	124Y
109.40	992	1055	31X	113.60	1170	1107	83X	117.80	1212	1149	125X
109.45	1118	1055	31Y	113.65	1044	1107	83Y	117.85	1086	1149	125Y
109.50	993	1056	32X	113.70	1171	1108	84X	117.90	1213	1150	126X
109.55	1119	1056	32Y	113.75	1045	1108	84Y	117.95	1087	1150	126Y
109.60	994	1057	33X	113.80	1172	1109	85X	133.30	1021	1084	60X
109.65	1120	1057	33Y	113.85	1046	1109	85Y	133.35	1147	1084	60Y
109.70	995	1058	34X	113.90	1173	1110	86X	133.40	1022	1085	61X
109.75	1121	1058	34Y	113.95	1047	1110	86Y	133.45	1148	1085	61Y
109.80	996	1059	35X	114.00	1174	1111	87X	133.50	1023	1086	62X
109.85	1122	1059	35Y	114.05	1048	1111	87Y	133.55	1149	1086	62Y
109.90	997	1060	36X	114.10	1175	1112	88X	133.60	1024	1087	63X
109.95	1123	1060	36Y	114.15	1049	1112	88Y	133.65	1150	1087	63Y
110.00	998	1061	37X	114.20	1176	1113	89X	133.70	1151	1088	64X
110.05	1124	1061	37Y	114.25	1050	1113	89Y	133.75	1025	1088	64Y
110.10	999	1062	38X	114.30	1177	1114	90X	133.80	1152	1089	65X
110.15	1125	1062	38Y	114.35	1051	1114	90Y	133.85	1026	1089	65Y
110.20	1000	1063	39X	114.40	1178	1115	91X	133.90	1153	1090	66X
110.25	1126	1063	39Y	114.45	1052	1115	91Y	133.95	1027	1090	66Y
110.30	1001	1064	40X	114.50	1179	1116	92X	134.00	1154	1091	67X
110.35	1127	1064	40Y	114.55	1053	1116	92Y	134.05	1028	1091	67Y
110.40	1002	1065	41X	114.60	1180	1117	93X	134.10	1155	1092	68X
110.45	1128	1065	41Y	114.65	1054	1117	93Y	134.15	1029	1092	68Y
110.50	1003	1066	42X	114.70	1181	1118	94X	134.20	1156	1093	69X
110.55	1129	1066	42Y	114.75	1055	1118	94Y	134.25	1030	1093	69Y
110.60	1004	1067	43X	114.80	1182	1119	95X	134.40	962	1025	1X
110.65	1130	1067	43Y	114.85	1056	1119	95Y	134.45	1088	1025	1Y
110.70	1005	1068	44X	114.90	1183	1120	96X	134.50	963	1026	2X
110.75	1131	1068	44Y	114.95	1057	1120	96Y	134.55	1089	1026	2Y
110.80	1006	1069	45X	115.00	1184	1121	97X	134.60	964	1027	3X
110.85	1132	1069	45Y	115.05	1058	1121	97Y	134.65	1090	1027	3Y
110.90	1007	1070	46X	115.10	1185	1122	98X	134.70	965	1028	4X
110.95	1133	1070	46Y	115.15	1059	1122	98Y	134.75	1091	1028	4Y
111.00	1008	1071	47X	115.20	1186	1123	99X	134.80	966	1029	5X
111.05	1134	1071	47Y	115.25	1060	1123	99Y	134.85	1092	1029	5Y
111.10	1009	1072	48X	115.30	1187	1124	100X	134.90	967	1030	6X
111.15	1135	1072	48Y	115.35	1061	1124	100Y	134.95	1093	1030	6Y
111.20	1010	1073	49X	115.40	1188	1125	101X	135.00	968	1031	7X
111.25	1136	1073	49Y	115.45	1062	1125	101Y	135.05	1094	1031	7Y
111.30	1011	1074	50X	115.50	1189	1126	102X	135.10	969	1032	8X
111.35	1137	1074	50Y	115.55	1063	1126	102Y	135.15	1095	1032	8Y
111.40	1012	1075	51X	115.60	1190	1127	103X	135.20	970	1033	9X
111.45	1138	1075	51Y	115.65	1064	1127	103Y	135.25	1096	1033	9Y
111.50	1013	1076	52X	115.70	1191	1128	104X	135.30	971	1034	10X
111.55	1139	1076	52Y	115.75	1065	1128	104Y	135.35	1097	1034	10Y
111.60	1014	1077	53X	115.80	1192	1129	105X	135.40	972	1035	11X
111.65	1140	1077	53Y	115.85	1066	1129	105Y	135.45	1098	1035	11Y
111.70	1015	1078	54X	115.90	1193	1130	106X	135.50	973	1036	12X
111.75	1141	1078	54Y	115.95	1067	1130	106Y	135.55	1099	1036	12Y
111.80	1016	1079	55X	116.00	1194	1131	107X	135.60	974	1037	13X
111.85	1142	1079	55Y	116.05	1068	1131	107Y	135.65	1100	1037	13Y
111.90	1017	1080	56X	116.10	1195	1132	108X	135.70	975	1038	14X
111.95	1143	1080	56Y	116.15	1069	1132	108Y	135.75	1101	1038	14Y
112.00	1018	1081	57X	116.20	1196	1133	109X	135.80	976	1039	15X
112.05	1144	1081	57Y	116.25	1070	1133	109Y	135.85	1102	1039	15Y
112.10	1019	1082	58X	116.30	1197	1134	110X	135.90	977	1040	16X
112.15	1145	1082	58Y	116.35	1071	1134	110Y	135.95	1103	1040	16Y
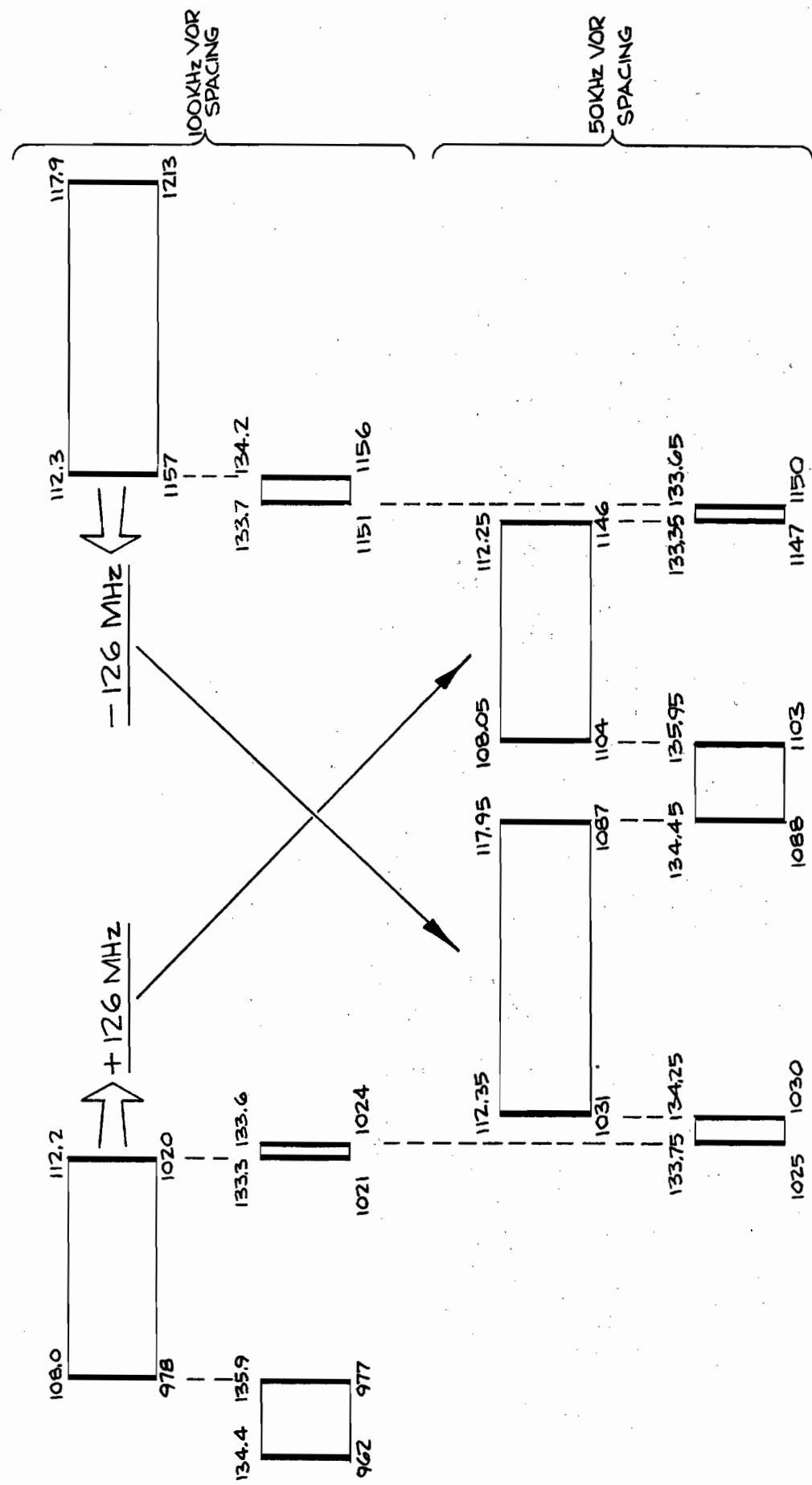
FIGURE 4-8.

DME GROUND TO AIR FREQUENCY CHANNELING

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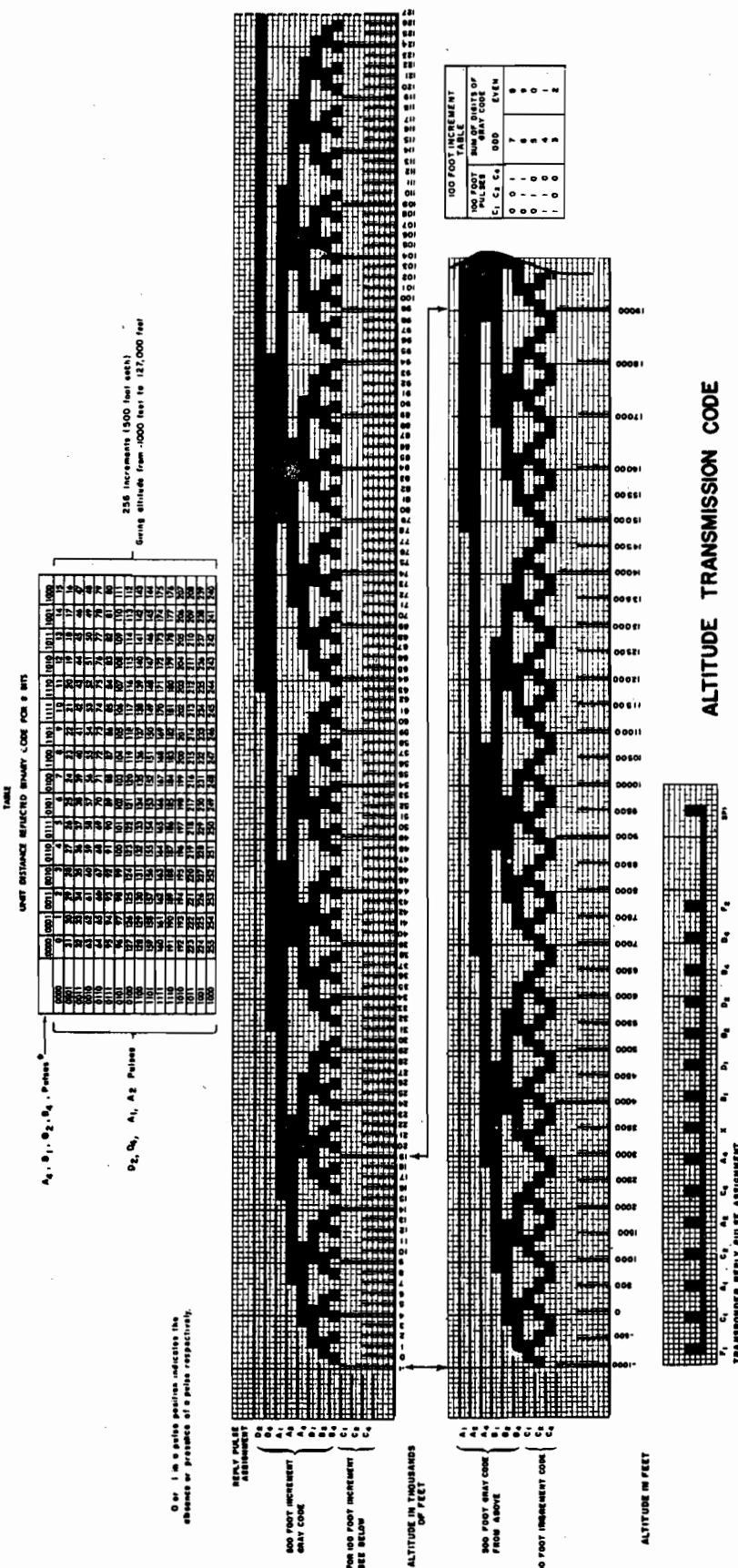
Figure 4-9

Altitude Code for Mode C Reporting

ALTITUDE TRANSMISSION CODE CHART

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
-1.0	0	0	0	0	0	0	0	0	0	1	0
-0.9	0	0	0	0	0	0	0	0	1	1	0
-0.8	0	0	0	0	0	0	0	0	1	0	0
-0.7	0	0	0	0	0	0	0	1	1	0	0
-0.6	0	0	0	0	0	0	0	1	1	1	0
-0.5	0	0	0	0	0	0	0	1	0	1	0
-0.4	0	0	0	0	0	0	0	1	0	1	1
-0.3	0	0	0	0	0	0	0	1	0	0	1
-0.2	0	0	0	0	0	0	1	1	0	0	1
-0.1	0	0	0	0	0	0	1	1	0	1	1
0.0	0	0	0	0	0	0	1	1	0	1	0
0.1	0	0	0	0	0	0	1	1	1	1	0
0.2	0	0	0	0	0	0	1	1	1	0	0
0.3	0	0	0	0	0	0	1	0	1	0	0
0.4	0	0	0	0	0	0	1	0	1	1	0
0.5	0	0	0	0	0	0	1	0	0	1	0
0.6	0	0	0	0	0	0	1	0	0	1	1
0.7	0	0	0	0	0	0	1	0	0	0	1
0.8	0	0	0	0	0	1	1	0	0	0	1
0.9	0	0	0	0	0	1	1	0	0	1	1
1.0	0	0	0	0	0	1	1	0	0	1	0
1.1	0	0	0	0	0	1	1	0	1	1	0
1.2	0	0	0	0	0	1	1	0	1	0	0
1.3	0	0	0	0	0	1	1	1	1	0	0
1.4	0	0	0	0	0	1	1	1	1	1	0
1.5	0	0	0	0	0	1	1	1	0	1	0
1.6	0	0	0	0	0	1	1	1	0	1	1
1.7	0	0	0	0	0	1	1	1	0	0	1

Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
RANGE	PULSE POSITION										

Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
1.8	0	0	0	0	0	1	0	1	0	0	1
1.9	0	0	0	0	0	1	0	1	0	1	1
2.0	0	0	0	0	0	1	0	1	0	1	0
2.1	0	0	0	0	0	1	0	1	1	1	0
2.2	0	0	0	0	0	1	0	1	1	0	0
2.3	0	0	0	0	0	1	0	0	1	0	0
2.4	0	0	0	0	0	1	0	0	1	1	0
2.5	0	0	0	0	0	1	0	0	0	1	0
2.6	0	0	0	0	0	1	0	0	0	1	1
2.7	0	0	0	0	0	1	0	0	0	0	1
2.8	0	0	0	0	1	1	0	0	0	0	1
2.9	0	0	0	0	1	1	0	0	0	1	1
3.0	0	0	0	0	1	1	0	0	0	1	0
3.1	0	0	0	0	1	1	0	0	1	1	0
3.2	0	0	0	0	1	1	0	0	1	0	0
3.3	0	0	0	0	1	1	0	1	1	0	0
3.4	0	0	0	0	1	1	0	1	1	1	0
3.5	0	0	0	0	1	1	0	1	0	1	0
3.6	0	0	0	0	1	1	0	1	0	1	1
3.7	0	0	0	0	1	1	0	1	0	0	1
3.8	0	0	0	0	1	1	1	1	0	0	1
3.9	0	0	0	0	1	1	1	1	0	1	1
4.0	0	0	0	0	1	1	1	1	0	1	0
4.1	0	0	0	0	1	1	1	1	1	1	0
4.2	0	0	0	0	1	1	1	1	1	0	0
4.3	0	0	0	0	1	1	1	0	1	0	0
4.4	0	0	0	0	1	1	1	0	1	1	0
4.5	0	0	0	0	1	1	1	0	0	1	0
4.6	0	0	0	0	1	1	1	0	0	1	1
4.7	0	0	0	0	1	1	1	0	0	0	1
4.8	0	0	0	0	1	0	1	0	0	0	1
4.9	0	0	0	0	1	0	1	0	0	1	1
5.0	0	0	0	0	1	0	1	0	0	1	0
5.1	0	0	0	0	1	0	1	0	1	1	0
5.2	0	0	0	0	1	0	1	0	1	0	0

Altitude in Thousands	D$_2$	D$_4$ and SPI	A$_1$	A$_2$	A$_4$	B$_1$	B$_2$	B$_4$	C$_1$	C$_2$	C$_4$
RANGE	PULSE POSITION										
5.3	0	0	0	0	1	0	1	1	1	0	0
5.4	0	0	0	0	1	0	1	1	1	1	0
5.5	0	0	0	0	1	0	1	1	0	1	0
5.6	0	0	0	0	1	0	1	1	0	1	1
5.7	0	0	0	0	1	0	1	1	0	0	1
5.8	0	0	0	0	1	0	0	1	0	0	1
5.9	0	0	0	0	1	0	0	1	0	1	1
6.0	0	0	0	0	1	0	0	1	0	1	0
6.1	0	0	0	0	1	0	0	1	1	1	0
6.2	0	0	0	0	1	0	0	1	1	0	0
6.3	0	0	0	0	1	0	0	0	1	0	0
6.4	0	0	0	0	1	0	0	0	1	1	0
6.5	0	0	0	0	1	0	0	0	0	1	0
6.6	0	0	0	0	1	0	0	0	0	1	1
6.7	0	0	0	0	1	0	0	0	0	0	1
6.8	0	0	0	1	1	0	0	0	0	0	1
6.9	0	0	0	1	1	0	0	0	0	1	1
7.0	0	0	0	1	1	0	0	0	0	1	0
7.1	0	0	0	1	1	0	0	0	1	1	0
7.2	0	0	0	1	1	0	0	0	1	0	0
7.3	0	0	0	1	1	0	0	1	1	0	0
7.4	0	0	0	1	1	0	0	1	1	1	0
7.5	0	0	0	1	1	0	0	1	0	1	0
7.6	0	0	0	1	1	0	0	1	0	1	1
7.7	0	0	0	1	1	0	0	1	0	0	1
7.8	0	0	0	1	1	0	1	1	0	0	1
7.9	0	0	0	1	1	0	1	1	0	1	1
8.0	0	0	0	1	1	0	1	1	0	1	0
8.1	0	0	0	1	1	0	1	1	1	1	0
8.2	0	0	0	1	1	0	1	1	1	0	0

Altitude in Thousands	D	D and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
								PULSE POSITION			
8.3	0	0	0	1	1	0	1	0	1	0	0
8.4	0	0	0	1	1	0	1	0	1	1	0
8.5	0	0	0	1	1	0	1	0	0	1	0
8.6	0	0	0	1	1	0	1	0	0	1	1
8.7	0	0	0	1	1	0	1	0	0	0	1
8.8	0	0	0	1	1	1	1	0	0	0	1
8.9	0	0	0	1	1	1	1	0	0	1	1
9.0	0	0	0	1	1	1	1	0	0	1	0
9.1	0	0	0	1	1	1	1	0	1	1	0
9.2	0	0	0	1	1	1	1	0	1	0	0
9.3	0	0	0	1	1	1	1	1	1	0	0
9.4	0	0	0	1	1	1	1	1	1	1	0
9.5	0	0	0	1	1	1	1	1	0	1	0
9.6	0	0	0	1	1	1	1	1	0	1	1
9.7	0	0	0	1	1	1	1	1	0	0	1
9.8	0	0	0	1	1	1	0	1	0	0	1
9.9	0	0	0	1	1	1	0	1	0	1	1
10.0	0	0	0	1	1	1	0	1	0	1	0
10.1	0	0	0	1	1	1	0	1	1	1	0
10.2	0	0	0	1	1	1	0	1	1	0	0
10.3	0	0	0	1	1	1	0	0	1	0	0
10.4	0	0	0	1	1	1	0	0	1	1	0
10.5	0	0	0	1	1	1	0	0	0	1	0
10.6	0	0	0	1	1	1	0	0	0	1	1
10.7	0	0	0	1	1	1	0	0	0	0	1
10.8	0	0	0	1	0	1	0	0	0	0	1
10.9	0	0	0	1	0	1	0	0	0	1	1
11.0	0	0	0	1	0	1	0	0	0	1	0
11.1	0	0	0	1	0	1	0	0	1	1	0
11.2	0	0	0	1	0	1	0	0	1	0	0

| RANGE | PULSE POSITION | | | | | | | | | | |
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
11.3	0	0	0	1	0	1	0	1	1	0	0
11.4	0	0	0	1	0	1	0	1	1	1	0
11.5	0	0	0	1	0	1	0	1	0	1	0
11.6	0	0	0	1	0	1	0	1	0	1	1
11.7	0	0	0	1	0	1	0	1	0	0	1
11.8	0	0	0	1	0	1	1	1	0	0	1
11.9	0	0	0	1	0	1	1	1	0	1	1
12.0	0	0	0	1	0	1	1	1	0	1	0
12.1	0	0	0	1	0	1	1	1	1	1	0
12.2	0	0	0	1	0	1	1	1	1	0	0
12.3	0	0	0	1	0	1	1	0	1	0	0
12.4	0	0	0	1	0	1	1	0	1	1	0
12.5	0	0	0	1	0	1	1	0	0	1	0
12.6	0	0	0	1	0	1	1	0	0	1	1
12.7	0	0	0	1	0	1	1	0	0	0	1
12.8	0	0	0	1	0	0	1	0	0	0	1
12.9	0	0	0	1	0	0	1	0	0	1	1
13.0	0	0	0	1	0	0	1	0	0	1	0
13.1	0	0	0	1	0	0	1	0	1	1	0
13.2	0	0	0	1	0	0	1	0	1	0	0
13.3	0	0	0	1	0	0	1	1	1	0	0
13.4	0	0	0	1	0	0	1	1	1	1	0
13.5	0	0	0	1	0	0	1	1	0	1	0
13.6	0	0	0	1	0	0	1	1	0	1	1
13.7	0	0	0	1	0	0	1	1	0	0	1
13.8	0	0	0	1	0	0	0	1	0	0	1
13.9	0	0	0	1	0	0	0	1	0	1	1
14.0	0	0	0	1	0	0	0	1	0	1	0
14.1	0	0	0	1	0	0	0	1	1	1	0
14.2	0	0	0	1	0	0	0	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
14.3	0	0	0	1	0	0	0	0	1	0	0
14.4	0	0	0	1	0	0	0	0	1	1	0
14.5	0	0	0	1	0	0	0	0	0	1	0
14.6	0	0	0	1	0	0	0	0	0	1	1
14.7	0	0	0	1	0	0	0	0	0	0	1
14.8	0	0	1	1	0	0	0	0	0	0	1
14.9	0	0	1	1	0	0	0	0	0	1	1
15.0	0	0	1	1	0	0	0	0	0	1	0
15.1	0	0	1	1	0	0	0	0	1	1	0
15.2	0	0	1	1	0	0	0	0	1	0	0
15.3	0	0	1	1	0	0	0	1	1	0	0
15.4	0	0	1	1	0	0	0	1	1	1	0
15.5	0	0	1	1	0	0	0	1	0	1	0
15.6	0	0	1	1	0	0	0	1	0	1	1
15.7	0	0	1	1	0	0	0	1	0	0	1
15.8	0	0	1	1	0	0	1	1	0	0	1
15.9	0	0	1	1	0	0	1	1	0	1	1
16.0	0	0	1	1	0	0	1	1	0	1	0
16.1	0	0	1	1	0	0	1	1	1	1	0
16.2	0	0	1	1	0	0	1	1	1	0	0
16.3	0	0	1	1	0	0	1	0	1	0	0
16.4	0	0	1	1	0	0	1	0	1	1	0
16.5	0	0	1	1	0	0	1	0	0	1	0
16.6	0	0	1	1	0	0	1	0	0	1	1
16.7	0	0	1	1	0	0	1	0	0	0	1
16.8	0	0	1	1	0	1	1	0	0	0	1
16.9	0	0	1	1	0	1	1	0	0	1	1
17.0	0	0	1	1	0	1	1	0	0	1	0
17.1	0	0	1	1	0	1	1	0	1	1	0
17.2	0	0	1	1	0	1	1	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
17.3	0	0	1	1	0	1	1	1	1	0	0
17.4	0	0	1	1	0	1	1	1	1	1	0
17.5	0	0	1	1	0	1	1	1	0	1	0
17.6	0	0	1	1	0	1	1	1	0	1	1
17.7	0	0	1	1	0	1	1	1	0	0	1
17.8	0	0	1	1	0	1	0	1	0	0	1
17.9	0	0	1	1	0	1	0	1	0	1	1
18.0	0	0	1	1	0	1	0	1	0	1	0
18.1	0	0	1	1	0	1	0	1	1	1	0
18.2	0	0	1	1	0	1	0	1	1	0	0
18.3	0	0	1	1	0	1	0	0	1	0	0
18.4	0	0	1	1	0	1	0	0	1	1	0
18.5	0	0	1	1	0	1	0	0	0	1	0
18.6	0	0	1	1	0	1	0	0	0	1	1
18.7	0	0	1	1	0	1	0	0	0	0	1
18.8	0	0	1	1	1	1	0	0	0	0	1
18.9	0	0	1	1	1	1	0	0	0	1	1
19.0	0	0	1	1	1	1	0	0	0	1	0
19.1	0	0	1	1	1	1	0	0	1	1	0
19.2	0	0	1	1	1	1	0	0	1	0	0
19.3	0	0	1	1	1	1	0	1	1	0	0
19.4	0	0	1	1	1	1	0	1	1	1	0
19.5	0	0	1	1	1	1	0	1	0	1	0
19.6	0	0	1	1	1	1	0	1	0	1	1
19.7	0	0	1	1	1	1	0	1	0	0	1
19.8	0	0	1	1	1	1	1	1	0	0	1
19.9	0	0	1	1	1	1	1	1	0	1	1
20.0	0	0	1	1	1	1	1	1	0	1	0
20.1	0	0	1	1	1	1	1	1	1	1	0
20.2	0	0	1	1	1	1	1	1	1	0	0

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Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
RANGE	PULSE POSITION										
20.3	0	0	1	1	1	1	1	0	1	0	0
20.4	0	0	1	1	1	1	1	0	1	1	0
20.5	0	0	1	1	1	1	1	0	0	1	0
20.6	0	0	1	1	1	1	1	0	0	1	1
20.7	0	0	1	1	1	1	1	0	0	0	1
20.8	0	0	1	1	1	0	1	0	0	0	1
20.9	0	0	1	1	1	0	1	0	0	1	1
21.0	0	0	1	1	1	0	1	0	0	1	0
21.1	0	0	1	1	1	0	1	0	1	1	0
21.2	0	0	1	1	1	0	1	0	1	0	0
21.3	0	0	1	1	1	0	1	1	1	0	0
21.4	0	0	1	1	1	0	1	1	1	1	0
21.5	0	0	1	1	1	0	1	1	0	1	0
21.6	0	0	1	1	1	0	1	1	0	1	1
21.7	0	0	1	1	1	0	1	1	0	0	1
21.8	0	0	1	1	1	0	0	1	0	0	1
21.9	0	0	1	1	1	0	0	1	0	1	1
22.0	0	0	1	1	1	0	0	1	0	1	0
22.1	0	0	1	1	1	0	0	1	1	1	0
22.2	0	0	1	1	1	0	0	1	1	0	0
22.3	0	0	1	1	1	0	0	0	1	0	0
22.4	0	0	1	1	1	0	0	0	1	1	0
22.5	0	0	1	1	1	0	0	0	0	1	0
22.6	0	0	1	1	1	0	0	0	0	1	1
22.7	0	0	1	1	1	0	0	0	0	0	1
22.8	0	0	1	0	1	0	0	0	0	0	1
22.9	0	0	1	0	1	0	0	0	0	1	1
23.0	0	0	1	0	1	0	0	0	0	1	0
23.1	0	0	1	0	1	0	0	0	1	1	0
23.2	0	0	1	0	1	0	0	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
23.3	0	0	1	0	1	0	0	1	1	0	0
23.4	0	0	1	0	1	0	0	1	1	1	0
23.5	0	0	1	0	1	0	0	1	0	1	0
23.6	0	0	1	0	1	0	0	1	0	1	1
23.7	0	0	1	0	1	0	0	1	0	0	1
23.8	0	0	1	0	1	0	1	1	0	0	1
23.9	0	0	1	0	1	0	1	1	0	1	1
24.0	0	0	1	0	1	0	1	1	0	1	0
24.1	0	0	1	0	1	0	1	1	1	1	0
24.2	0	0	1	0	1	0	1	1	1	0	0
24.3	0	0	1	0	1	0	1	0	1	0	0
24.4	0	0	1	0	1	0	1	0	1	1	0
24.5	0	0	1	0	1	0	1	0	0	1	0
24.6	0	0	1	0	1	0	1	0	0	1	1
24.7	0	0	1	0	1	0	1	0	0	0	1
24.8	0	0	1	0	1	1	1	0	0	0	1
24.9	0	0	1	0	1	1	1	0	0	1	1
25.0	0	0	1	0	1	1	1	0	0	1	0
25.1	0	0	1	0	1	1	1	0	1	1	0
25.2	0	0	1	0	1	1	1	0	1	0	0
25.3	0	0	1	0	1	1	1	1	1	0	0
25.4	0	0	1	0	1	1	1	1	1	1	0
25.5	0	0	1	0	1	1	1	1	0	1	0
25.6	0	0	1	0	1	1	1	1	0	1	1
25.7	0	0	1	0	1	1	1	1	0	0	1
25.8	0	0	1	0	1	1	0	1	0	0	1
25.9	0	0	1	0	1	1	0	1	0	1	1
26.0	0	0	1	0	1	1	0	1	0	1	0
26.1	0	0	1	0	1	1	0	1	1	1	0
26.2	0	0	1	0	1	1	0	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
26.3	0	0	1	0	1	1	0	0	1	0	0
26.4	0	0	1	0	1	1	0	0	1	1	0
26.5	0	0	1	0	1	1	0	0	0	1	0
26.6	0	0	1	0	1	1	0	0	0	1	1
26.7	0	0	1	0	1	1	0	0	0	0	1
26.8	0	0	1	0	0	1	0	0	0	0	1
26.9	0	0	1	0	0	1	0	0	0	1	1
27.0	0	0	1	0	0	1	0	0	0	1	0
27.1	0	0	1	0	0	1	0	0	1	1	0
27.2	0	0	1	0	0	1	0	0	1	0	0
27.3	0	0	1	0	0	1	0	1	1	0	0
27.4	0	0	1	0	0	1	0	1	1	1	0
27.5	0	0	1	0	0	1	0	1	0	1	0
27.6	0	0	1	0	0	1	0	1	0	1	1
27.7	0	0	1	0	0	1	0	1	0	0	1
27.8	0	0	1	0	0	1	1	1	0	0	1
27.9	0	0	1	0	0	1	1	1	0	1	1
28.0	0	0	1	0	0	1	1	1	0	1	0
28.1	0	0	1	0	0	1	1	1	1	1	0
28.2	0	0	1	0	0	1	1	1	1	0	0
28.3	0	0	1	0	0	1	1	0	1	0	0
28.4	0	0	1	0	0	1	1	0	1	1	0
28.5	0	0	1	0	0	1	1	0	0	1	0
28.6	0	0	1	0	0	1	1	0	0	1	1
28.7	0	0	1	0	0	1	1	0	0	0	1
28.8	0	0	1	0	0	0	1	0	0	0	1
28.9	0	0	1	0	0	0	1	0	0	1	1
29.0	0	0	1	0	0	0	1	0	0	1	0
29.1	0	0	1	0	0	0	1	0	1	1	0
29.2	0	0	1	0	0	0	1	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
29.3	0	0	1	0	0	0	1	1	1	0	0
29.4	0	0	1	0	0	0	1	1	1	1	0
29.5	0	0	1	0	0	0	1	1	0	1	0
29.6	0	0	1	0	0	0	1	1	0	1	1
29.7	0	0	1	0	0	0	1	1	0	0	1
29.8	0	0	1	0	0	0	0	1	0	0	1
29.9	0	0	1	0	0	0	0	1	0	1	1
30.0	0	0	1	0	0	0	0	1	0	1	0
30.1	0	0	1	0	0	0	0	1	1	1	0
30.2	0	0	1	0	0	0	0	1	1	0	0
30.3	0	0	1	0	0	0	0	0	1	0	0
30.4	0	0	1	0	0	0	0	0	1	1	0
30.5	0	0	1	0	0	0	0	0	0	1	0
30.6	0	0	1	0	0	0	0	0	0	1	1
30.7	0	0	1	0	0	0	0	0	0	0	1
30.8	0	1	1	0	0	0	0	0	0	0	1
30.9	0	1	1	0	0	0	0	0	0	1	1
31.0	0	1	1	0	0	0	0	0	0	1	0
31.1	0	1	1	0	0	0	0	0	1	1	0
31.2	0	1	1	0	0	0	0	0	1	0	0
31.3	0	1	1	0	0	0	0	1	1	0	0
31.4	0	1	1	0	0	0	0	1	1	1	0
31.5	0	1	1	0	0	0	0	1	0	1	0
31.6	0	1	1	0	0	0	0	1	0	1	1
31.7	0	1	1	0	0	0	0	1	0	0	1
31.8	0	1	1	0	0	0	1	1	0	0	1
31.9	0	1	1	0	0	0	1	1	0	1	1
32.0	0	1	1	0	0	0	1	1	0	1	0
32.1	0	1	1	0	0	0	1	1	1	1	0
32.2	0	1	1	0	0	0	1	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
32.3	0	1	1	0	0	0	1	0	1	0	0
32.4	0	1	1	0	0	0	1	0	1	1	0
32.5	0	1	1	0	0	0	1	0	0	1	0
32.6	0	1	1	0	0	0	1	0	0	1	1
32.7	0	1	1	0	0	0	1	0	0	0	1
32.8	0	1	1	0	0	1	1	0	0	0	1
32.9	0	1	1	0	0	1	1	0	0	1	1
33.0	0	1	1	0	0	1	1	0	0	1	0
33.1	0	1	1	0	0	1	1	0	1	1	0
33.2	0	1	1	0	0	1	1	0	1	0	0
33.3	0	1	1	0	0	1	1	1	1	0	0
33.4	0	1	1	0	0	1	1	1	1	1	0
33.5	0	1	1	0	0	1	1	1	0	1	0
33.6	0	1	1	0	0	1	1	1	0	1	1
33.7	0	1	1	0	0	1	1	1	0	0	1
33.8	0	1	1	0	0	1	0	1	0	0	1
33.9	0	1	1	0	0	1	0	1	0	1	1
34.0	0	1	1	0	0	1	0	1	0	1	0
34.1	0	1	1	0	0	1	0	1	1	1	0
34.2	0	1	1	0	0	1	0	1	1	0	0
34.3	0	1	1	0	0	1	0	0	1	0	0
34.4	0	1	1	0	0	1	0	0	1	1	0
34.5	0	1	1	0	0	1	0	0	0	1	0
34.6	0	1	1	0	0	1	0	0	0	1	1
34.7	0	1	1	0	0	1	0	0	0	0	1
34.8	0	1	1	0	1	1	0	0	0	0	1
34.9	0	1	1	0	1	1	0	0	0	1	1
35.0	0	1	1	0	1	1	0	0	0	1	0
35.1	0	1	1	0	1	1	0	0	1	1	0
35.2	0	1	1	0	1	1	0	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
35.3	0	1	1	0	1	1	0	1	1	0	0
35.4	0	1	1	0	1	1	0	1	1	1	0
35.5	0	1	1	0	1	1	0	1	0	1	0
35.6	0	1	1	0	1	1	0	1	0	1	1
35.7	0	1	1	0	1	1	0	1	0	0	1
35.8	0	1	1	0	1	1	1	1	0	0	1
35.9	0	1	1	0	1	1	1	1	0	1	1
36.0	0	1	1	0	1	1	1	1	0	1	0
36.1	0	1	1	0	1	1	1	1	1	1	0
36.2	0	1	1	0	1	1	1	1	1	0	0
36.3	0	1	1	0	1	1	1	0	1	0	0
36.4	0	1	1	0	1	1	1	0	1	1	0
36.5	0	1	1	0	1	1	1	0	0	1	0
36.6	0	1	1	0	1	1	1	0	0	1	1
36.7	0	1	1	0	1	1	1	0	0	0	1
36.8	0	1	1	0	1	0	1	0	0	0	1
36.9	0	1	1	0	1	0	1	0	0	1	1
37.0	0	1	1	0	1	0	1	0	0	1	0
37.1	0	1	1	0	1	0	1	0	1	1	0
37.2	0	1	1	0	1	0	1	0	1	0	0
37.3	0	1	1	0	1	0	1	1	1	0	0
37.4	0	1	1	0	1	0	1	1	1	1	0
37.5	0	1	1	0	1	0	1	1	0	1	0
37.6	0	1	1	0	1	0	1	1	0	1	1
37.7	0	1	1	0	1	0	1	1	0	0	1
37.8	0	1	1	0	1	0	0	1	0	0	1
37.9	0	1	1	0	1	0	0	1	0	1	1
38.0	0	1	1	0	1	0	0	1	0	1	0
38.1	0	1	1	0	1	0	0	1	1	1	0
38.2	0	1	1	0	1	0	0	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
38.3	0	1	1	0	1	0	0	0	1	0	0
38.4	0	1	1	0	1	0	0	0	1	1	0
38.5	0	1	1	0	1	0	0	0	0	1	0
38.6	0	1	1	0	1	0	0	0	0	1	1
38.7	0	1	1	0	1	0	0	0	0	0	1
38.8	0	1	1	1	1	0	0	0	0	0	1
38.9	0	1	1	1	1	0	0	0	0	1	1
39.0	0	1	1	1	1	0	0	0	0	1	0
39.1	0	1	1	1	1	0	0	0	1	1	0
39.2	0	1	1	1	1	0	0	0	1	0	0
39.3	0	1	1	1	1	0	0	1	1	0	0
39.4	0	1	1	1	1	0	0	1	1	1	0
39.5	0	1	1	1	1	0	0	1	0	1	0
39.6	0	1	1	1	1	0	0	1	0	1	1
39.7	0	1	1	1	1	0	0	1	0	0	1
39.8	0	1	1	1	1	0	1	1	0	0	1
39.9	0	1	1	1	1	0	1	1	0	1	1
40.0	0	1	1	1	1	0	1	1	0	1	0
40.1	0	1	1	1	1	0	1	1	1	1	0
40.2	0	1	1	1	1	0	1	1	1	0	0
40.3	0	1	1	1	1	0	1	0	1	0	0
40.4	0	1	1	1	1	0	1	0	1	1	0
40.5	0	1	1	1	1	0	1	0	0	1	0
40.6	0	1	1	1	1	0	1	0	0	1	1
40.7	0	1	1	1	1	0	1	0	0	0	1
40.8	0	1	1	1	1	1	1	0	0	0	1
40.9	0	1	1	1	1	1	1	0	0	1	1
41.0	0	1	1	1	1	1	1	0	0	1	0
41.1	0	1	1	1	1	1	1	0	1	1	0
41.2	0	1	1	1	1	1	1	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
41.3	0	1	1	1	1	1	1	1	1	0	0
41.4	0	1	1	1	1	1	1	1	1	1	0
41.5	0	1	1	1	1	1	1	1	0	1	0
41.6	0	1	1	1	1	1	1	1	0	1	1
41.7	0	1	1	1	1	1	1	1	0	0	1
41.8	0	1	1	1	1	1	0	1	0	0	1
41.9	0	1	1	1	1	1	0	1	0	1	1
42.0	0	1	1	1	1	1	0	1	0	1	0
42.1	0	1	1	1	1	1	0	1	1	1	0
42.2	0	1	1	1	1	1	0	1	1	0	0
42.3	0	1	1	1	1	1	0	0	1	0	0
42.4	0	1	1	1	1	1	0	0	1	1	0
42.5	0	1	1	1	1	1	0	0	0	1	0
42.6	0	1	1	1	1	1	0	0	0	1	1
42.7	0	1	1	1	1	1	0	0	0	0	1
42.8	0	1	1	1	0	1	0	0	0	0	1
42.9	0	1	1	1	0	1	0	0	0	1	1
43.0	0	1	1	1	0	1	0	0	0	1	0
43.1	0	1	1	1	0	1	0	0	1	1	0
43.2	0	1	1	1	0	1	0	0	1	0	0
43.3	0	1	1	1	0	1	0	1	1	0	0
43.4	0	1	1	1	0	1	0	1	1	1	0
43.5	0	1	1	1	0	1	0	1	0	1	0
43.6	0	1	1	1	0	1	0	1	0	1	1
43.7	0	1	1	1	0	1	0	1	0	0	1
43.8	0	1	1	1	0	1	1	1	0	0	1
43.9	0	1	1	1	0	1	1	1	0	1	1
44.0	0	1	1	1	0	1	1	1	0	1	0
44.1	0	1	1	1	0	1	1	1	1	1	0
44.2	0	1	1	1	0	1	1	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
44.3	0	1	1	1	0	1	1	0	1	0	0
44.4	0	1	1	1	0	1	1	0	1	1	0
44.5	0	1	1	1	0	1	1	0	0	1	0
44.6	0	1	1	1	0	1	1	0	0	1	1
44.7	0	1	1	1	0	1	1	0	0	0	1
44.8	0	1	1	1	0	0	1	0	0	0	1
44.9	0	1	1	1	0	0	1	0	0	1	1
45.0	0	1	1	1	0	0	1	0	0	1	0
45.1	0	1	1	1	0	0	1	0	1	1	0
45.2	0	1	1	1	0	0	1	0	1	0	0
45.3	0	1	1	1	0	0	1	1	1	0	0
45.4	0	1	1	1	0	0	1	1	1	1	0
45.5	0	1	1	1	0	0	1	1	0	1	0
45.6	0	1	1	1	0	0	1	1	0	1	1
45.7	0	1	1	1	0	0	1	1	0	0	1
45.8	0	1	1	1	0	0	0	1	0	0	1
45.9	0	1	1	1	0	0	0	1	0	1	1
46.0	0	1	1	1	0	0	0	1	0	1	0
46.1	0	1	1	1	0	0	0	1	1	1	0
46.2	0	1	1	1	0	0	0	1	1	0	0
46.3	0	1	1	1	0	0	0	0	1	0	0
46.4	0	1	1	1	0	0	0	0	1	1	0
46.5	0	1	1	1	0	0	0	0	0	1	0
46.6	0	1	1	1	0	0	0	0	0	1	1
46.7	0	1	1	1	0	0	0	0	0	0	1
46.8	0	1	0	1	0	0	0	0	0	0	1
46.9	0	1	0	1	0	0	0	0	0	1	1
47.0	0	1	0	1	0	0	0	0	0	1	0
47.1	0	1	0	1	0	0	0	0	1	1	0
47.2	0	1	0	1	0	0	0	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
47.3	0	1	0	1	0	0	0	1	1	0	0
47.4	0	1	0	1	0	0	0	1	1	1	0
47.5	0	1	0	1	0	0	0	1	0	1	0
47.6	0	1	0	1	0	0	0	1	0	1	1
47.7	0	1	0	1	0	0	0	1	0	0	1
47.8	0	1	0	1	0	0	1	1	0	0	1
47.9	0	1	0	1	0	0	1	1	0	1	1
48.0	0	1	0	1	0	0	1	1	0	1	0
48.1	0	1	0	1	0	0	1	1	1	1	0
48.2	0	1	0	1	0	0	1	1	1	0	0
48.3	0	1	0	1	0	0	1	0	1	0	0
48.4	0	1	0	1	0	0	1	0	1	1	0
48.5	0	1	0	1	0	0	1	0	0	1	0
48.6	0	1	0	1	0	0	1	0	0	1	1
48.7	0	1	0	1	0	0	1	0	0	0	1
48.8	0	1	0	1	0	1	1	0	0	0	1
48.9	0	1	0	1	0	1	1	0	0	1	1
49.0	0	1	0	1	0	1	1	0	0	1	0
49.1	0	1	0	1	0	1	1	0	1	1	0
49.2	0	1	0	1	0	1	1	0	1	0	0
49.3	0	1	0	1	0	1	1	1	1	0	0
49.4	0	1	0	1	0	1	1	1	1	1	0
49.5	0	1	0	1	0	1	1	1	0	1	0
49.6	0	1	0	1	0	1	1	1	0	1	1
49.7	0	1	0	1	0	1	1	1	0	0	1
49.8	0	1	0	1	0	1	0	1	0	0	1
49.9	0	1	0	1	0	1	0	1	0	1	1
50.0	0	1	0	1	0	1	0	1	0	1	0
50.1	0	1	0	1	0	1	0	1	1	1	0
50.2	0	1	0	1	0	1	0	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
50.3	0	1	0	1	0	1	0	0	1	0	0
50.4	0	1	0	1	0	1	0	0	1	1	0
50.5	0	1	0	1	0	1	0	0	0	1	0
50.6	0	1	0	1	0	1	0	0	0	1	1
50.7	0	1	0	1	0	1	0	0	0	0	1
50.8	0	1	0	1	1	1	0	0	0	0	1
50.9	0	1	0	1	1	1	0	0	0	1	1
51.0	0	1	0	1	1	1	0	0	0	1	0
51.1	0	1	0	1	1	1	0	0	1	1	0
51.2	0	1	0	1	1	1	0	0	1	0	0
51.3	0	1	0	1	1	1	0	1	1	0	0
51.4	0	1	0	1	1	1	0	1	1	1	0
51.5	0	1	0	1	1	1	0	1	0	1	0
51.6	0	1	0	1	1	1	0	1	0	1	1
51.7	0	1	0	1	1	1	0	1	0	0	1
51.8	0	1	0	1	1	1	1	1	0	0	1
51.9	0	1	0	1	1	1	1	1	0	1	1
52.0	0	1	0	1	1	1	1	1	0	1	0
52.1	0	1	0	1	1	1	1	1	1	1	0
52.2	0	1	0	1	1	1	1	1	1	0	0
52.3	0	1	0	1	1	1	1	0	1	0	0
52.4	0	1	0	1	1	1	1	0	1	1	0
52.5	0	1	0	1	1	1	1	0	0	1	0
52.6	0	1	0	1	1	1	1	0	0	1	1
52.7	0	1	0	1	1	1	1	0	0	0	1
52.8	0	1	0	1	1	0	1	0	0	0	1
52.9	0	1	0	1	1	0	1	0	0	1	1
53.0	0	1	0	1	1	0	1	0	0	1	0
53.1	0	1	0	1	1	0	1	0	1	1	0
53.2	0	1	0	1	1	0	1	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
53.3	0	1	0	1	1	0	1	1	1	0	0
53.4	0	1	0	1	1	0	1	1	1	1	0
53.5	0	1	0	1	1	0	1	1	0	1	0
53.6	0	1	0	1	1	0	1	1	0	1	1
53.7	0	1	0	1	1	0	1	1	0	0	1
53.8	0	1	0	1	1	0	0	1	0	0	1
53.9	0	1	0	1	1	0	0	1	0	1	1
54.0	0	1	0	1	1	0	0	1	0	1	0
54.1	0	1	0	1	1	0	0	1	1	1	0
54.2	0	1	0	1	1	0	0	1	1	0	0
54.3	0	1	0	1	1	0	0	0	1	0	0
54.4	0	1	0	1	1	0	0	0	1	1	0
54.5	0	1	0	1	1	0	0	0	0	1	0
54.6	0	1	0	1	1	0	0	0	0	1	1
54.7	0	1	0	1	1	0	0	0	0	0	1
54.8	0	1	0	0	1	0	0	0	0	0	1
54.9	0	1	0	0	1	0	0	0	0	1	1
55.0	0	1	0	0	1	0	0	0	0	1	0
55.1	0	1	0	0	1	0	0	0	1	1	0
55.2	0	1	0	0	1	0	0	0	1	0	0
55.3	0	1	0	0	1	0	0	1	1	0	0
55.4	0	1	0	0	1	0	0	1	1	1	0
55.5	0	1	0	0	1	0	0	1	0	1	0
55.6	0	1	0	0	1	0	0	1	0	1	1
55.7	0	1	0	0	1	0	0	1	0	0	1
55.8	0	1	0	0	1	0	1	1	0	0	1
55.9	0	1	0	0	1	0	1	1	0	1	1
56.0	0	1	0	0	1	0	1	1	0	1	0
56.1	0	1	0	0	1	0	1	1	1	1	0
56.2	0	1	0	0	1	0	1	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
56.3	0	1	0	0	1	0	1	0	1	0	0
56.4	0	1	0	0	1	0	1	0	1	1	0
56.5	0	1	0	0	1	0	1	0	0	1	0
56.6	0	1	0	0	1	0	1	0	0	1	1
56.7	0	1	0	0	1	0	1	0	0	0	1
56.8	0	1	0	0	1	1	1	0	0	0	1
56.9	0	1	0	0	1	1	1	0	0	1	1
57.0	0	1	0	0	1	1	1	0	0	1	0
57.1	0	1	0	0	1	1	1	0	1	1	0
57.2	0	1	0	0	1	1	1	0	1	0	0
57.3	0	1	0	0	1	1	1	1	1	0	0
57.4	0	1	0	0	1	1	1	1	1	1	0
57.5	0	1	0	0	1	1	1	1	0	1	0
57.6	0	1	0	0	1	1	1	1	0	1	1
57.7	0	1	0	0	1	1	1	1	0	0	1
57.8	0	1	0	0	1	1	0	1	0	0	1
57.9	0	1	0	0	1	1	0	1	0	1	1
58.0	0	1	0	0	1	1	0	1	0	1	0
58.1	0	1	0	0	1	1	0	1	1	1	0
58.2	0	1	0	0	1	1	0	1	1	0	0
58.3	0	1	0	0	1	1	0	0	1	0	0
58.4	0	1	0	0	1	1	0	0	1	1	0
58.5	0	1	0	0	1	1	0	0	0	1	0
58.6	0	1	0	0	1	1	0	0	0	1	1
58.7	0	1	0	0	1	1	0	0	0	0	1
58.8	0	1	0	0	0	1	0	0	0	0	1
58.9	0	1	0	0	0	1	0	0	0	1	1
59.0	0	1	0	0	0	1	0	0	0	1	0
59.1	0	1	0	0	0	1	0	0	1	1	0
59.2	0	1	0	0	0	1	0	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
59.3	0	1	0	0	0	1	0	1	1	0	0
59.4	0	1	0	0	0	1	0	1	1	1	0
59.5	0	1	0	0	0	1	0	1	0	1	0
59.6	0	1	0	0	0	1	0	1	0	1	1
59.7	0	1	0	0	0	1	0	1	0	0	1
59.8	0	1	0	0	0	1	1	1	0	0	1
59.9	0	1	0	0	0	1	1	1	0	1	1
60.0	0	1	0	0	0	1	1	1	0	1	0
60.1	0	1	0	0	0	1	1	1	1	1	0
60.2	0	1	0	0	0	1	1	1	1	0	0
60.3	0	1	0	0	0	1	1	0	1	0	0
60.4	0	1	0	0	0	1	1	0	1	1	0
60.5	0	1	0	0	0	1	1	0	0	1	0
60.6	0	1	0	0	0	1	1	0	0	1	1
60.7	0	1	0	0	0	1	1	0	0	0	1
60.8	0	1	0	0	0	0	1	0	0	0	1
60.9	0	1	0	0	0	0	1	0	0	1	1
61.0	0	1	0	0	0	0	1	0	0	1	0
61.1	0	1	0	0	0	0	1	0	1	1	0
61.2	0	1	0	0	0	0	1	0	1	0	0
61.3	0	1	0	0	0	0	1	1	1	0	0
61.4	0	1	0	0	0	0	1	1	1	1	0
61.5	0	1	0	0	0	0	1	1	0	1	0
61.6	0	1	0	0	0	0	1	1	0	1	1
61.7	0	1	0	0	0	0	1	1	0	0	1
61.8	0	1	0	0	0	0	0	1	0	0	1
61.9	0	1	0	0	0	0	0	1	0	1	1
62.0	0	1	0	0	0	0	0	1	0	1	0
62.1	0	1	0	0	0	0	0	1	1	1	0
62.2	0	1	0	0	0	0	0	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
62.3	0	1	0	0	0	0	0	0	1	0	0
62.4	0	1	0	0	0	0	0	0	1	1	0
62.5	0	1	0	0	0	0	0	0	0	1	0
62.6	0	1	0	0	0	0	0	0	0	1	1
62.7	0	1	0	0	0	0	0	0	0	0	1
62.8	1	1	0	0	0	0	0	0	0	0	1
62.9	1	1	0	0	0	0	0	0	0	1	1
63.0	1	1	0	0	0	0	0	0	0	1	0
63.1	1	1	0	0	0	0	0	0	1	1	0
63.2	1	1	0	0	0	0	0	0	1	0	0
63.3	1	1	0	0	0	0	0	1	1	0	0
63.4	1	1	0	0	0	0	0	1	1	1	0
63.5	1	1	0	0	0	0	0	1	0	1	0
63.6	1	1	0	0	0	0	0	1	0	1	1
63.7	1	1	0	0	0	0	0	1	0	0	1
63.8	1	1	0	0	0	0	1	1	0	0	1
63.9	1	1	0	0	0	0	1	1	0	1	1
64.0	1	1	0	0	0	0	1	1	0	1	0
64.1	1	1	0	0	0	0	1	1	1	1	0
64.2	1	1	0	0	0	0	1	1	1	0	0
64.3	1	1	0	0	0	0	1	0	1	0	0
64.4	1	1	0	0	0	0	1	0	1	1	0
64.5	1	1	0	0	0	0	1	0	0	1	0
64.6	1	1	0	0	0	0	1	0	0	1	1
64.7	1	1	0	0	0	0	1	0	0	0	1
64.8	1	1	0	0	0	1	1	0	0	0	1
64.9	1	1	0	0	0	1	1	0	0	1	1
65.0	1	1	0	0	0	1	1	0	0	1	0
65.1	1	1	0	0	0	1	1	0	1	1	0
65.2	1	1	0	0	0	1	1	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
65.3	1	1	0	0	0	1	1	1	1	0	0
65.4	1	1	0	0	0	1	1	1	1	1	0
65.5	1	1	0	0	0	1	1	1	0	1	0
65.6	1	1	0	0	0	1	1	1	0	1	1
65.7	1	1	0	0	0	1	1	1	0	0	1
65.8	1	1	0	0	0	1	0	1	0	0	1
65.9	1	1	0	0	0	1	0	1	0	1	1
66.0	1	1	0	0	0	1	0	1	0	1	0
66.1	1	1	0	0	0	1	0	1	1	1	0
66.2	1	1	0	0	0	1	0	1	1	0	0
66.3	1	1	0	0	0	1	0	0	1	0	0
66.4	1	1	0	0	0	1	0	0	1	1	0
66.5	1	1	0	0	0	1	0	0	0	1	0
66.6	1	1	0	0	0	1	0	0	0	1	1
66.7	1	1	0	0	0	1	0	0	0	0	1
66.8	1	1	0	0	1	1	0	0	0	0	1
66.9	1	1	0	0	1	1	0	0	0	1	1
67.0	1	1	0	0	1	1	0	0	0	1	0
67.1	1	1	0	0	1	1	0	0	1	1	0
67.2	1	1	0	0	1	1	0	0	1	0	0
67.3	1	1	0	0	1	1	0	1	1	0	0
67.4	1	1	0	0	1	1	0	1	1	1	0
67.5	1	1	0	0	1	1	0	1	0	1	0
67.6	1	1	0	0	1	1	0	1	0	1	1
67.7	1	1	0	0	1	1	0	1	0	0	1
67.8	1	1	0	0	1	1	1	1	0	0	1
67.9	1	1	0	0	1	1	1	1	0	1	1
68.0	1	1	0	0	1	1	1	1	0	1	0
68.1	1	1	0	0	1	1	1	1	1	1	0
68.2	1	1	0	0	1	1	1	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
68.3	1	1	0	0	1	1	1	0	1	0	0
68.4	1	1	0	0	1	1	1	0	1	1	0
68.5	1	1	0	0	1	1	1	0	0	1	0
68.6	1	1	0	0	1	1	1	0	0	1	1
68.7	1	1	0	0	1	1	1	0	0	0	1
68.8	1	1	0	0	1	0	1	0	0	0	1
68.9	1	1	0	0	1	0	1	0	0	1	1
69.0	1	1	0	0	1	0	1	0	0	1	0
69.1	1	1	0	0	1	0	1	0	1	1	0
69.2	1	1	0	0	1	0	1	0	1	0	0
69.3	1	1	0	0	1	0	1	1	1	0	0
69.4	1	1	0	0	1	0	1	1	1	1	0
69.5	1	1	0	0	1	0	1	1	0	1	0
69.6	1	1	0	0	1	0	1	1	0	1	1
69.7	1	1	0	0	1	0	1	1	0	0	1
69.8	1	1	0	0	1	0	0	1	0	0	1
69.9	1	1	0	0	1	0	0	1	0	1	1
70.0	1	1	0	0	1	0	0	1	0	1	0
70.1	1	1	0	0	1	0	0	1	1	1	0
70.2	1	1	0	0	1	0	0	1	1	0	0
70.3	1	1	0	0	1	0	0	0	1	0	0
70.4	1	1	0	0	1	0	0	0	1	1	0
70.5	1	1	0	0	1	0	0	0	0	1	0
70.6	1	1	0	0	1	0	0	0	0	1	1
70.7	1	1	0	0	1	0	0	0	0	0	1
70.8	1	1	0	1	1	0	0	0	0	0	1
70.9	1	1	0	1	1	0	0	0	0	1	1
71.0	1	1	0	1	1	0	0	0	0	1	0
71.1	1	1	0	1	1	0	0	0	1	1	0
71.2	1	1	0	1	1	0	0	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
71.3	1	1	0	1	1	0	0	1	1	0	0
71.4	1	1	0	1	1	0	0	1	1	1	0
71.5	1	1	0	1	1	0	0	1	0	1	0
71.6	1	1	0	1	1	0	0	1	0	1	1
71.7	1	1	0	1	1	0	0	1	0	0	1
71.8	1	1	0	1	1	0	1	1	0	0	1
71.9	1	1	0	1	1	0	1	1	0	1	1
72.0	1	1	0	1	1	0	1	1	0	1	0
72.1	1	1	0	1	1	0	1	1	1	1	0
72.2	1	1	0	1	1	0	1	1	1	0	0
72.3	1	1	0	1	1	0	1	0	1	0	0
72.4	1	1	0	1	1	0	1	0	1	1	0
72.5	1	1	0	1	1	0	1	0	0	1	0
72.6	1	1	0	1	1	0	1	0	0	1	1
72.7	1	1	0	1	1	0	1	0	0	0	1
72.8	1	1	0	1	1	1	1	0	0	0	1
72.9	1	1	0	1	1	1	1	0	0	1	1
73.0	1	1	0	1	1	1	1	0	0	1	0
73.1	1	1	0	1	1	1	1	0	1	1	0
73.2	1	1	0	1	1	1	1	0	1	0	0
73.3	1	1	0	1	1	1	1	1	1	0	0
73.4	1	1	0	1	1	1	1	1	1	1	0
73.5	1	1	0	1	1	1	1	1	0	1	0
73.6	1	1	0	1	1	1	1	1	0	1	1
73.7	1	1	0	1	1	1	1	1	0	0	1
73.8	1	1	0	1	1	1	0	1	0	0	1
73.9	1	1	0	1	1	1	0	1	0	1	1
74.0	1	1	0	1	1	1	0	1	0	1	0
74.1	1	1	0	1	1	1	0	1	1	1	0
74.2	1	1	0	1	1	1	0	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
74.3	1	1	0	1	1	1	0	0	1	0	0
74.4	1	1	0	1	1	1	0	0	1	1	0
74.5	1	1	0	1	1	1	0	0	0	1	0
74.6	1	1	0	1	1	1	0	0	0	1	1
74.7	1	1	0	1	1	1	0	0	0	0	1
74.8	1	1	0	1	0	1	0	0	0	0	1
74.9	1	1	0	1	0	1	0	0	0	1	1
75.0	1	1	0	1	0	1	0	0	0	1	0
75.1	1	1	0	1	0	1	0	0	1	1	0
75.2	1	1	0	1	0	1	0	0	1	0	0
75.3	1	1	0	1	0	1	0	1	1	0	0
75.4	1	1	0	1	0	1	0	1	1	1	0
75.5	1	1	0	1	0	1	0	1	0	1	0
75.6	1	1	0	1	0	1	0	1	0	1	1
75.7	1	1	0	1	0	1	0	1	0	0	1
75.8	1	1	0	1	0	1	1	1	0	0	1
75.9	1	1	0	1	0	1	1	1	0	1	1
76.0	1	1	0	1	0	1	1	1	0	1	0
76.1	1	1	0	1	0	1	1	1	1	1	0
76.2	1	1	0	1	0	1	1	1	1	0	0
76.3	1	1	0	1	0	1	1	0	1	0	0
76.4	1	1	0	1	0	1	1	0	1	1	0
76.5	1	1	0	1	0	1	1	0	0	1	0
76.6	1	1	0	1	0	1	1	0	0	1	1
76.7	1	1	0	1	0	1	1	0	0	0	1
76.8	1	1	0	1	0	0	1	0	0	0	1
76.9	1	1	0	1	0	0	1	0	0	1	1
77.0	1	1	0	1	0	0	1	0	0	1	0
77.1	1	1	0	1	0	0	1	0	1	1	0
77.2	1	1	0	1	0	0	1	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
77.3	1	1	0	1	0	0	1	1	1	0	0
77.4	1	1	0	1	0	0	1	1	1	1	0
77.5	1	1	0	1	0	0	1	1	0	1	0
77.6	1	1	0	1	0	0	1	1	0	1	1
77.7	1	1	0	1	0	0	1	1	0	0	1
77.8	1	1	0	1	0	0	0	1	0	0	1
77.9	1	1	0	1	0	0	0	1	0	1	1
78.0	1	1	0	1	0	0	0	1	0	1	0
78.1	1	1	0	1	0	0	0	1	1	1	0
78.2	1	1	0	1	0	0	0	1	1	0	0
78.3	1	1	0	1	0	0	0	0	1	0	0
78.4	1	1	0	1	0	0	0	0	1	1	0
78.5	1	1	0	1	0	0	0	0	0	1	0
78.6	1	1	0	1	0	0	0	0	0	1	1
78.7	1	1	0	1	0	0	0	0	0	0	1
78.8	1	1	1	1	0	0	0	0	0	0	1
78.9	1	1	1	1	0	0	0	0	0	1	1
79.0	1	1	1	1	0	0	0	0	0	1	0
79.1	1	1	1	1	0	0	0	0	1	1	0
79.2	1	1	1	1	0	0	0	0	1	0	0
79.3	1	1	1	1	0	0	0	1	1	0	0
79.4	1	1	1	1	0	0	0	1	1	1	0
79.5	1	1	1	1	0	0	0	1	0	1	0
79.6	1	1	1	1	0	0	0	1	0	1	1
79.7	1	1	1	1	0	0	0	1	0	0	1
79.8	1	1	1	1	0	0	1	1	0	0	1
79.9	1	1	1	1	0	0	1	1	0	1	1
80.0	1	1	1	1	0	0	1	1	0	1	0
80.1	1	1	1	1	0	0	1	1	1	1	0
80.2	1	1	1	1	0	0	1	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
80.3	1	1	1	1	0	0	1	0	1	0	0
80.4	1	1	1	1	0	0	1	0	1	1	0
80.5	1	1	1	1	0	0	1	0	0	1	0
80.6	1	1	1	1	0	0	1	0	0	1	1
80.7	1	1	1	1	0	0	1	0	0	0	1
80.8	1	1	1	1	0	1	1	0	0	0	1
80.9	1	1	1	1	0	1	1	0	0	1	1
81.0	1	1	1	1	0	1	1	0	0	1	0
81.1	1	1	1	1	0	1	1	0	1	1	0
81.2	1	1	1	1	0	1	1	0	1	0	0
81.3	1	1	1	1	0	1	1	1	1	0	0
81.4	1	1	1	1	0	1	1	1	1	1	0
81.5	1	1	1	1	0	1	1	1	0	1	0
81.6	1	1	1	1	0	1	1	1	0	1	1
81.7	1	1	1	1	0	1	1	1	0	0	1
81.8	1	1	1	1	0	1	0	1	0	0	1
81.9	1	1	1	1	0	1	0	1	0	1	1
82.0	1	1	1	1	0	1	0	1	0	1	0
82.1	1	1	1	1	0	1	0	1	1	1	0
82.2	1	1	1	1	0	1	0	1	1	0	0
82.3	1	1	1	1	0	1	0	0	1	0	0
82.4	1	1	1	1	0	1	0	0	1	1	0
82.5	1	1	1	1	0	1	0	0	0	1	0
82.6	1	1	1	1	0	1	0	0	0	1	1
82.7	1	1	1	1	0	1	0	0	0	0	1
82.8	1	1	1	1	1	1	0	0	0	0	1
82.9	1	1	1	1	1	1	0	0	0	1	1
83.0	1	1	1	1	1	1	0	0	0	1	0
83.1	1	1	1	1	1	1	0	0	1	1	0
83.2	1	1	1	1	1	1	0	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
83.3	1	1	1	1	1	1	0	1	1	0	0
83.4	1	1	1	1	1	1	0	1	1	1	0
83.5	1	1	1	1	1	1	0	1	0	1	0
83.6	1	1	1	1	1	1	0	1	0	1	1
83.7	1	1	1	1	1	1	0	1	0	0	1
83.8	1	1	1	1	1	1	1	1	0	0	1
83.9	1	1	1	1	1	1	1	1	0	1	1
84.0	1	1	1	1	1	1	1	1	0	1	0
84.1	1	1	1	1	1	1	1	1	1	1	0
84.2	1	1	1	1	1	1	1	1	1	0	0
84.3	1	1	1	1	1	1	1	0	1	0	0
84.4	1	1	1	1	1	1	1	0	1	1	0
84.5	1	1	1	1	1	1	1	0	0	1	0
84.6	1	1	1	1	1	1	1	0	0	1	1
84.7	1	1	1	1	1	1	1	0	0	0	1
84.8	1	1	1	1	1	0	1	0	0	0	1
84.9	1	1	1	1	1	0	1	0	0	1	1
85.0	1	1	1	1	1	0	1	0	0	1	0
85.1	1	1	1	1	1	0	1	0	1	1	0
85.2	1	1	1	1	1	0	1	0	1	0	0
85.3	1	1	1	1	1	0	1	1	1	0	0
85.4	1	1	1	1	1	0	1	1	1	1	0
85.5	1	1	1	1	1	0	1	1	0	1	0
85.6	1	1	1	1	1	0	1	1	0	1	1
85.7	1	1	1	1	1	0	1	1	0	0	1
85.8	1	1	1	1	1	0	0	1	0	0	1
85.9	1	1	1	1	1	0	0	1	0	1	1
86.0	1	1	1	1	1	0	0	1	0	1	0
86.1	1	1	1	1	1	0	0	1	1	1	0
86.2	1	1	1	1	1	0	0	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
86.3	1	1	1	1	1	0	0	0	1	0	0
86.4	1	1	1	1	1	0	0	0	1	1	0
86.5	1	1	1	1	1	0	0	0	0	1	0
86.6	1	1	1	1	1	0	0	0	0	1	1
86.7	1	1	1	1	1	0	0	0	0	0	1
86.8	1	1	1	0	1	0	0	0	0	0	1
86.9	1	1	1	0	1	0	0	0	0	1	1
87.0	1	1	1	0	1	0	0	0	0	1	0
87.1	1	1	1	0	1	0	0	0	1	1	0
87.2	1	1	1	0	1	0	0	0	1	0	0
87.3	1	1	1	0	1	0	0	1	1	0	0
87.4	1	1	1	0	1	0	0	1	1	1	0
87.5	1	1	1	0	1	0	0	1	0	1	0
87.6	1	1	1	0	1	0	0	1	0	1	1
87.7	1	1	1	0	1	0	0	1	0	0	1
87.8	1	1	1	0	1	0	1	1	0	0	1
87.9	1	1	1	0	1	0	1	1	0	1	1
88.0	1	1	1	0	1	0	1	1	0	1	0
88.1	1	1	1	0	1	0	1	1	1	1	0
88.2	1	1	1	0	1	0	1	1	1	0	0
88.3	1	1	1	0	1	0	1	0	1	0	0
88.4	1	1	1	0	1	0	1	0	1	1	0
88.5	1	1	1	0	1	0	1	0	0	1	0
88.6	1	1	1	0	1	0	1	0	0	1	1
88.7	1	1	1	0	1	0	1	0	0	0	1
88.8	1	1	1	0	1	1	1	0	0	0	1
88.9	1	1	1	0	1	1	1	0	0	1	1
89.0	1	1	1	0	1	1	1	0	0	1	0
89.1	1	1	1	0	1	1	1	0	1	1	0
89.2	1	1	1	0	1	1	1	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
89.3	1	1	1	0	1	1	1	1	1	0	0
89.4	1	1	1	0	1	1	1	1	1	1	0
89.5	1	1	1	0	1	1	1	1	0	1	0
89.6	1	1	1	0	1	1	1	1	0	1	1
89.7	1	1	1	0	1	1	1	1	0	0	1
89.8	1	1	1	0	1	1	0	1	0	0	1
89.9	1	1	1	0	1	1	0	1	0	1	1
90.0	1	1	1	0	1	1	0	1	0	1	0
90.1	1	1	1	0	1	1	0	1	1	1	0
90.2	1	1	1	0	1	1	0	1	1	0	0
90.3	1	1	1	0	1	1	0	0	1	0	0
90.4	1	1	1	0	1	1	0	0	1	1	0
90.5	1	1	1	0	1	1	0	0	0	1	0
90.6	1	1	1	0	1	1	0	0	0	1	1
90.7	1	1	1	0	1	1	0	0	0	0	1
90.8	1	1	1	0	0	1	0	0	0	0	1
90.9	1	1	1	0	0	1	0	0	0	1	1
91.0	1	1	1	0	0	1	0	0	0	1	0
91.1	1	1	1	0	0	1	0	0	1	1	0
91.2	1	1	1	0	0	1	0	0	1	0	0
91.3	1	1	1	0	0	1	0	1	1	0	0
91.4	1	1	1	0	0	1	0	1	1	1	0
91.5	1	1	1	0	0	1	0	1	0	1	0
91.6	1	1	1	0	0	1	0	1	0	1	1
91.7	1	1	1	0	0	1	0	1	0	0	1
91.8	1	1	1	0	0	1	1	1	0	0	1
91.9	1	1	1	0	0	1	1	1	0	1	1
92.0	1	1	1	0	0	1	1	1	0	1	0
92.1	1	1	1	0	0	1	1	1	1	1	0
92.2	1	1	1	0	0	1	1	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
92.3	1	1	1	0	0	1	1	0	1	0	0
92.4	1	1	1	0	0	1	1	0	1	1	0
92.5	1	1	1	0	0	1	1	0	0	1	0
92.6	1	1	1	0	0	1	1	0	0	1	1
92.7	1	1	1	0	0	1	1	0	0	0	1
92.8	1	1	1	0	0	0	1	0	0	0	1
92.9	1	1	1	0	0	0	1	0	0	1	1
93.0	1	1	1	0	0	0	1	0	0	1	0
93.1	1	1	1	0	0	0	1	0	1	1	0
93.2	1	1	1	0	0	0	1	0	1	0	0
93.3	1	1	1	0	0	0	1	1	1	0	0
93.4	1	1	1	0	0	0	1	1	1	1	0
93.5	1	1	1	0	0	0	1	1	0	1	0
93.6	1	1	1	0	0	0	1	1	0	1	1
93.7	1	1	1	0	0	0	1	1	0	0	1
93.8	1	1	1	0	0	0	0	1	0	0	1
93.9	1	1	1	0	0	0	0	1	0	1	1
94.0	1	1	1	0	0	0	0	1	0	1	0
94.1	1	1	1	0	0	0	0	1	1	1	0
94.2	1	1	1	0	0	0	0	1	1	0	0
94.3	1	1	1	0	0	0	0	0	1	0	0
94.4	1	1	1	0	0	0	0	0	1	1	0
94.5	1	1	1	0	0	0	0	0	0	1	0
94.6	1	1	1	0	0	0	0	0	0	1	1
94.7	1	1	1	0	0	0	0	0	0	0	1
94.8	1	0	1	0	0	0	0	0	0	0	1
94.9	1	0	1	0	0	0	0	0	0	1	1
95.0	1	0	1	0	0	0	0	0	0	1	0
95.1	1	0	1	0	0	0	0	0	1	1	0
95.2	1	0	1	0	0	0	0	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
95.3	1	0	1	0	0	0	0	1	1	0	0
95.4	1	0	1	0	0	0	0	1	1	1	0
95.5	1	0	1	0	0	0	0	1	0	1	0
95.6	1	0	1	0	0	0	0	1	0	1	1
95.7	1	0	1	0	0	0	0	1	0	0	1
95.8	1	0	1	0	0	0	1	1	0	0	1
95.9	1	0	1	0	0	0	1	1	0	1	1
96.0	1	0	1	0	0	0	1	1	0	1	0
96.1	1	0	1	0	0	0	1	1	1	1	0
96.2	1	0	1	0	0	0	1	1	1	0	0
96.3	1	0	1	0	0	0	1	0	1	0	0
96.4	1	0	1	0	0	0	1	0	1	1	0
96.5	1	0	1	0	0	0	1	0	0	1	0
96.6	1	0	1	0	0	0	1	0	0	1	1
96.7	1	0	1	0	0	0	1	0	0	0	1
96.8	1	0	1	0	0	1	1	0	0	0	1
96.9	1	0	1	0	0	1	1	0	0	1	1
97.0	1	0	1	0	0	1	1	0	0	1	0
97.1	1	0	1	0	0	1	1	0	1	1	0
97.2	1	0	1	0	0	1	1	0	1	0	0
97.3	1	0	1	0	0	1	1	1	1	0	0
97.4	1	0	1	0	0	1	1	1	1	1	0
97.5	1	0	1	0	0	1	1	1	0	1	0
97.6	1	0	1	0	0	1	1	1	0	1	1
97.7	1	0	1	0	0	1	1	1	0	0	1
97.8	1	0	1	0	0	1	0	1	0	0	1
97.9	1	0	1	0	0	1	0	1	0	1	1
98.0	1	0	1	0	0	1	0	1	0	1	0
98.1	1	0	1	0	0	1	0	1	1	1	0
98.2	1	0	1	0	0	1	0	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
98.3	1	0	1	0	0	1	0	0	1	0	0
98.4	1	0	1	0	0	1	0	0	1	1	0
98.5	1	0	1	0	0	1	0	0	0	1	0
98.6	1	0	1	0	0	1	0	0	0	1	1
98.7	1	0	1	0	0	1	0	0	0	0	1
98.8	1	0	1	0	1	1	0	0	0	0	1
98.9	1	0	1	0	1	1	0	0	0	1	1
99.0	1	0	1	0	1	1	0	0	0	1	0
99.1	1	0	1	0	1	1	0	0	1	1	0
99.2	1	0	1	0	1	1	0	0	1	0	0
99.3	1	0	1	0	1	1	0	1	1	0	0
99.4	1	0	1	0	1	1	0	1	1	1	0
99.5	1	0	1	0	1	1	0	1	0	1	0
99.6	1	0	1	0	1	1	0	1	0	1	1
99.7	1	0	1	0	1	1	0	1	0	0	1
99.8	1	0	1	0	1	1	1	1	0	0	1
99.9	1	0	1	0	1	1	1	1	0	1	1
100.0	1	0	1	0	1	1	1	1	0	1	0
100.1	1	0	1	0	1	1	1	1	1	1	0
100.2	1	0	1	0	1	1	1	1	1	0	0
100.3	1	0	1	0	1	1	1	0	1	0	0
100.4	1	0	1	0	1	1	1	0	1	1	0
100.5	1	0	1	0	1	1	1	0	0	1	0
100.6	1	0	1	0	1	1	1	0	0	1	1
100.7	1	0	1	0	1	1	1	0	0	0	1
100.8	1	0	1	0	1	0	1	0	0	0	1
100.9	1	0	1	0	1	0	1	0	0	1	1
101.0	1	0	1	0	1	0	1	0	0	1	0
101.1	1	0	1	0	1	0	1	0	1	1	0
101.2	1	0	1	0	1	0	1	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
101.3	1	0	1	0	1	0	1	1	1	0	0
101.4	1	0	1	0	1	0	1	1	1	1	0
101.5	1	0	1	0	1	0	1	1	0	1	0
101.6	1	0	1	0	1	0	1	1	0	1	1
101.7	1	0	1	0	1	0	1	1	0	0	1
101.8	1	0	1	0	1	0	0	1	0	0	1
101.9	1	0	1	0	1	0	0	1	0	1	1
102.0	1	0	1	0	1	0	0	1	0	1	0
102.1	1	0	1	0	1	0	0	1	1	1	0
102.2	1	0	1	0	1	0	0	1	1	0	0
102.3	1	0	1	0	1	0	0	0	1	0	0
102.4	1	0	1	0	1	0	0	0	1	1	0
102.5	1	0	1	0	1	0	0	0	0	1	0
102.6	1	0	1	0	1	0	0	0	0	1	1
102.7	1	0	1	0	1	0	0	0	0	0	1
102.8	1	0	1	1	1	0	0	0	0	0	1
102.9	1	0	1	1	1	0	0	0	0	1	1
103.0	1	0	1	1	1	0	0	0	0	1	0
103.1	1	0	1	1	1	0	0	0	1	1	0
103.2	1	0	1	1	1	0	0	0	1	0	0
103.3	1	0	1	1	1	0	0	1	1	0	0
103.4	1	0	1	1	1	0	0	1	1	1	0
103.5	1	0	1	1	1	0	0	1	0	1	0
103.6	1	0	1	1	1	0	0	1	0	1	1
103.7	1	0	1	1	1	0	0	1	0	0	1
103.8	1	0	1	1	1	0	1	1	0	0	1
103.9	1	0	1	1	1	0	1	1	0	1	1
104.0	1	0	1	1	1	0	1	1	0	1	0
104.1	1	0	1	1	1	0	1	1	1	1	0
104.2	1	0	1	1	1	0	1	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
104.3	1	0	1	1	1	0	1	0	1	0	0
104.4	1	0	1	1	1	0	1	0	1	1	0
104.5	1	0	1	1	1	0	1	0	0	1	0
104.6	1	0	1	1	1	0	1	0	0	1	1
104.7	1	0	1	1	1	0	1	0	0	0	1
104.8	1	0	1	1	1	1	1	0	0	0	1
104.9	1	0	1	1	1	1	1	0	0	1	1
105.0	1	0	1	1	1	1	1	0	0	1	0
105.1	1	0	1	1	1	1	1	0	1	1	0
105.2	1	0	1	1	1	1	1	0	1	0	0
105.3	1	0	1	1	1	1	1	1	1	0	0
105.4	1	0	1	1	1	1	1	1	1	1	0
105.5	1	0	1	1	1	1	1	1	0	1	0
105.6	1	0	1	1	1	1	1	1	0	1	1
105.7	1	0	1	1	1	1	1	1	0	0	1
105.8	1	0	1	1	1	1	0	1	0	0	1
105.9	1	0	1	1	1	1	0	1	0	1	1
106.0	1	0	1	1	1	1	0	1	0	1	0
106.1	1	0	1	1	1	1	0	1	1	1	0
106.2	1	0	1	1	1	1	0	1	1	0	0
106.3	1	0	1	1	1	1	0	0	1	0	0
106.4	1	0	1	1	1	1	0	0	1	1	0
106.5	1	0	1	1	1	1	0	0	0	1	0
106.6	1	0	1	1	1	1	0	0	0	1	1
106.7	1	0	1	1	1	1	0	0	0	0	1
106.8	1	0	1	1	0	1	0	0	0	0	1
106.9	1	0	1	1	0	1	0	0	0	1	1
107.0	1	0	1	1	0	1	0	0	0	1	0
107.1	1	0	1	1	0	1	0	0	1	1	0
107.2	1	0	1	1	0	1	0	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
107.3	1	0	1	1	0	1	0	1	1	0	0
107.4	1	0	1	1	0	1	0	1	1	1	0
107.5	1	0	1	1	0	1	0	1	0	1	0
107.6	1	0	1	1	0	1	0	1	0	1	1
107.7	1	0	1	1	0	1	0	1	0	0	1
107.8	1	0	1	1	0	1	1	1	0	0	1
107.9	1	0	1	1	0	1	1	1	0	1	1
108.0	1	0	1	1	0	1	1	1	0	1	0
108.1	1	0	1	1	0	1	1	1	1	1	0
108.2	1	0	1	1	0	1	1	1	1	0	0
108.3	1	0	1	1	0	1	1	0	1	0	0
108.4	1	0	1	1	0	1	1	0	1	1	0
108.5	1	0	1	1	0	1	1	0	0	1	0
108.6	1	0	1	1	0	1	1	0	0	1	1
108.7	1	0	1	1	0	1	1	0	0	0	1
108.8	1	0	1	1	0	0	1	0	0	0	1
108.9	1	0	1	1	0	0	1	0	0	1	1
109.0	1	0	1	1	0	0	1	0	0	1	0
109.1	1	0	1	1	0	0	1	0	1	1	0
109.2	1	0	1	1	0	0	1	0	1	0	0
109.3	1	0	1	1	0	0	1	1	1	0	0
109.4	1	0	1	1	0	0	1	1	1	1	0
109.5	1	0	1	1	0	0	1	1	0	1	0
109.6	1	0	1	1	0	0	1	1	0	1	1
109.7	1	0	1	1	0	0	1	1	0	0	1
109.8	1	0	1	1	0	0	0	1	0	0	1
109.9	1	0	1	1	0	0	0	1	0	1	1
110.0	1	0	1	1	0	0	0	1	0	1	0
110.1	1	0	1	1	0	0	0	1	1	1	0
110.2	1	0	1	1	0	0	0	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
110.3	1	0	1	1	0	0	0	0	1	0	0
110.4	1	0	1	1	0	0	0	0	1	1	0
110.5	1	0	1	1	0	0	0	0	0	1	0
110.6	1	0	1	1	0	0	0	0	0	1	1
110.7	1	0	1	1	0	0	0	0	0	0	1
110.8	1	0	0	1	0	0	0	0	0	0	1
110.9	1	0	0	1	0	0	0	0	0	1	1
111.0	1	0	0	1	0	0	0	0	0	1	0
111.1	1	0	0	1	0	0	0	0	1	1	0
111.2	1	0	0	1	0	0	0	0	1	0	0
111.3	1	0	0	1	0	0	0	1	1	0	0
111.4	1	0	0	1	0	0	0	1	1	1	0
111.5	1	0	0	1	0	0	0	1	0	1	0
111.6	1	0	0	1	0	0	0	1	0	1	1
111.7	1	0	0	1	0	0	0	1	0	0	1
111.8	1	0	0	1	0	0	1	1	0	0	1
111.9	1	0	0	1	0	0	1	1	0	1	1
112.0	1	0	0	1	0	0	1	1	0	1	0
112.1	1	0	0	1	0	0	1	1	1	1	0
112.2	1	0	0	1	0	0	1	1	1	0	0
112.3	1	0	0	1	0	0	1	0	1	0	0
112.4	1	0	0	1	0	0	1	0	1	1	0
112.5	1	0	0	1	0	0	1	0	0	1	0
112.6	1	0	0	1	0	0	1	0	0	1	1
112.7	1	0	0	1	0	0	1	0	0	0	1
112.8	1	0	0	1	0	1	1	0	0	0	1
112.9	1	0	0	1	0	1	1	0	0	1	1
113.0	1	0	0	1	0	1	1	0	0	1	0
113.1	1	0	0	1	0	1	1	0	1	1	0
113.2	1	0	0	1	0	1	1	0	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
113.3	1	0	0	1	0	1	1	1	1	0	0
113.4	1	0	0	1	0	1	1	1	1	1	0
113.5	1	0	0	1	0	1	1	1	0	1	0
113.6	1	0	0	1	0	1	1	1	0	1	1
113.7	1	0	0	1	0	1	1	1	0	0	1
113.8	1	0	0	1	0	1	0	1	0	0	1
113.9	1	0	0	1	0	1	0	1	0	1	1
114.0	1	0	0	1	0	1	0	1	0	1	0
114.1	1	0	0	1	0	1	0	1	1	1	0
114.2	1	0	0	1	0	1	0	1	1	0	0
114.3	1	0	0	1	0	1	0	0	1	0	0
114.4	1	0	0	1	0	1	0	0	1	1	0
114.5	1	0	0	1	0	1	0	0	0	1	0
114.6	1	0	0	1	0	1	0	0	0	1	1
114.7	1	0	0	1	0	1	0	0	0	0	1
114.8	1	0	0	1	1	1	0	0	0	0	1
114.9	1	0	0	1	1	1	0	0	0	1	1
115.0	1	0	0	1	1	1	0	0	0	1	0
115.1	1	0	0	1	1	1	0	0	1	1	0
115.2	1	0	0	1	1	1	0	0	1	0	0
115.3	1	0	0	1	1	1	0	1	1	0	0
115.4	1	0	0	1	1	1	0	1	1	1	0
115.5	1	0	0	1	1	1	0	1	0	1	0
115.6	1	0	0	1	1	1	0	1	0	1	1
115.7	1	0	0	1	1	1	0	1	0	0	1
115.8	1	0	0	1	1	1	1	1	0	0	1
115.9	1	0	0	1	1	1	1	1	0	1	1
116.0	1	0	0	1	1	1	1	1	0	1	0
116.1	1	0	0	1	1	1	1	1	1	1	0
116.2	1	0	0	1	1	1	1	1	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
116.3	1	0	0	1	1	1	1	0	1	0	0
116.4	1	0	0	1	1	1	1	0	1	1	0
116.5	1	0	0	1	1	1	1	0	0	1	0
116.6	1	0	0	1	1	1	1	0	0	1	1
116.7	1	0	0	1	1	1	1	0	0	0	1
116.8	1	0	0	1	1	0	1	0	0	0	1
116.9	1	0	0	1	1	0	1	0	0	1	1
117.0	1	0	0	1	1	0	1	0	0	1	0
117.1	1	0	0	1	1	0	1	0	1	1	0
117.2	1	0	0	1	1	0	1	0	1	0	0
117.3	1	0	0	1	1	0	1	1	1	0	0
117.4	1	0	0	1	1	0	1	1	1	1	0
117.5	1	0	0	1	1	0	1	1	0	1	0
117.6	1	0	0	1	1	0	1	1	0	1	1
117.7	1	0	0	1	1	0	1	1	0	0	1
117.8	1	0	0	1	1	0	0	1	0	0	1
117.9	1	0	0	1	1	0	0	1	0	1	1
118.0	1	0	0	1	1	0	0	1	0	1	0
118.1	1	0	0	1	1	0	0	1	1	1	0
118.2	1	0	0	1	1	0	0	1	1	0	0
118.3	1	0	0	1	1	0	0	0	1	0	0
118.4	1	0	0	1	1	0	0	0	1	1	0
118.5	1	0	0	1	1	0	0	0	0	1	0
118.6	1	0	0	1	1	0	0	0	0	1	1
118.7	1	0	0	1	1	0	0	0	0	0	1
118.8	1	0	0	0	1	0	0	0	0	0	1
118.9	1	0	0	0	1	0	0	0	0	1	1
119.0	1	0	0	0	1	0	0	0	0	1	0
119.1	1	0	0	0	1	0	0	0	1	1	0
119.2	1	0	0	0	1	0	0	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
119.3	1	0	0	0	1	0	0	1	1	0	0
119.4	1	0	0	0	1	0	0	1	1	1	0
119.5	1	0	0	0	1	0	0	1	0	1	0
119.6	1	0	0	0	1	0	0	1	0	1	1
119.7	1	0	0	0	1	0	0	1	0	0	1
119.8	1	0	0	0	1	0	1	1	0	0	1
119.9	1	0	0	0	1	0	1	1	0	1	1
120.0	1	0	0	0	1	0	1	1	0	1	0
120.1	1	0	0	0	1	0	1	1	1	1	0
120.2	1	0	0	0	1	0	1	1	1	0	0
120.3	1	0	0	0	1	0	1	0	1	0	0
120.4	1	0	0	0	1	0	1	0	1	1	0
120.5	1	0	0	0	1	0	1	0	0	1	0
120.6	1	0	0	0	1	0	1	0	0	1	1
120.7	1	0	0	0	1	0	1	0	0	0	1
120.8	1	0	0	0	1	1	1	0	0	0	1
120.9	1	0	0	0	1	1	1	0	0	1	1
121.0	1	0	0	0	1	1	1	0	0	1	0
121.1	1	0	0	0	1	1	1	0	1	1	0
121.2	1	0	0	0	1	1	1	0	1	0	0
121.3	1	0	0	0	1	1	1	1	1	0	0
121.4	1	0	0	0	1	1	1	1	1	1	0
121.5	1	0	0	0	1	1	1	1	0	1	0
121.6	1	0	0	0	1	1	1	1	0	1	1
121.7	1	0	0	0	1	1	1	1	0	0	1
121.8	1	0	0	0	1	1	0	1	0	0	1
121.9	1	0	0	0	1	1	0	1	0	1	1
122.0	1	0	0	0	1	1	0	1	0	1	0
122.1	1	0	0	0	1	1	0	1	1	1	0
122.2	1	0	0	0	1	1	0	1	1	0	0

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RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
122.3	1	0	0	0	1	1	0	0	1	0	0
122.4	1	0	0	0	1	1	0	0	1	1	0
122.5	1	0	0	0	1	1	0	0	0	1	0
122.6	1	0	0	0	1	1	0	0	0	1	1
122.7	1	0	0	0	1	1	0	0	0	0	1
122.8	1	0	0	0	0	1	0	0	0	0	1
122.9	1	0	0	0	0	1	0	0	0	1	1
123.0	1	0	0	0	0	1	0	0	0	1	0
123.1	1	0	0	0	0	1	0	0	1	1	0
123.2	1	0	0	0	0	1	0	0	1	0	0
123.3	1	0	0	0	0	1	0	1	1	0	0
123.4	1	0	0	0	0	1	0	1	1	1	0
123.5	1	0	0	0	0	1	0	1	0	1	0
123.6	1	0	0	0	0	1	0	1	0	1	1
123.7	1	0	0	0	0	1	0	1	0	0	1
123.8	1	0	0	0	0	1	1	1	0	0	1
123.9	1	0	0	0	0	1	1	1	0	1	1
124.0	1	0	0	0	0	1	1	1	0	1	0
124.1	1	0	0	0	0	1	1	1	1	1	0
124.2	1	0	0	0	0	1	1	1	1	0	0
124.3	1	0	0	0	0	1	1	0	1	0	0
124.4	1	0	0	0	0	1	1	0	1	1	0
124.5	1	0	0	0	0	1	1	0	0	1	0
124.6	1	0	0	0	0	1	1	0	0	1	1
124.7	1	0	0	0	0	1	1	0	0	0	1
124.8	1	0	0	0	0	0	1	0	0	0	1
124.9	1	0	0	0	0	0	1	0	0	1	1
125.0	1	0	0	0	0	0	1	0	0	1	0
125.1	1	0	0	0	0	0	1	0	1	1	0
125.2	1	0	0	0	0	0	1	0	1	0	0

RANGE	PULSE POSITION										
Altitude in Thousands	D_2	D_4 and SPI	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
125.3	1	0	0	0	0	0	1	1	1	0	0
125.4	1	0	0	0	0	0	1	1	1	1	0
125.5	1	0	0	0	0	0	1	1	0	1	0
125.6	1	0	0	0	0	0	1	1	0	1	1
125.7	1	0	0	0	0	0	1	1	0	0	1
125.8	1	0	0	0	0	0	0	1	0	0	1
125.9	1	0	0	0	0	0	0	1	0	1	1
126.0	1	0	0	0	0	0	0	1	0	1	0
126.1	1	0	0	0	0	0	0	1	1	1	0
126.2	1	0	0	0	0	0	0	1	1	0	0
126.3	1	0	0	0	0	0	0	0	1	0	0
126.4	1	0	0	0	0	0	0	0	1	1	0
126.5	1	0	0	0	0	0	0	0	0	1	0
126.6	1	0	0	0	0	0	0	0	0	1	1
126.7	1	0	0	0	0	0	0	0	0	0	1

ATCRBS INTERROGATION MODES

MODE APPLICATION

3/A   COMMON   (ATC)

B   CIVIL (ATC)   (NOT REQUIRED FOR U.S. OPERATION)

C   CIVIL (ALTITUDE)

D   CIVIL (UNASSIGNED)

CHARACTERISTIC

8 µS

17 µS

21 µS

25 µS

2 µS

P₁ P₂   P₃

P_1 P_2 P_3
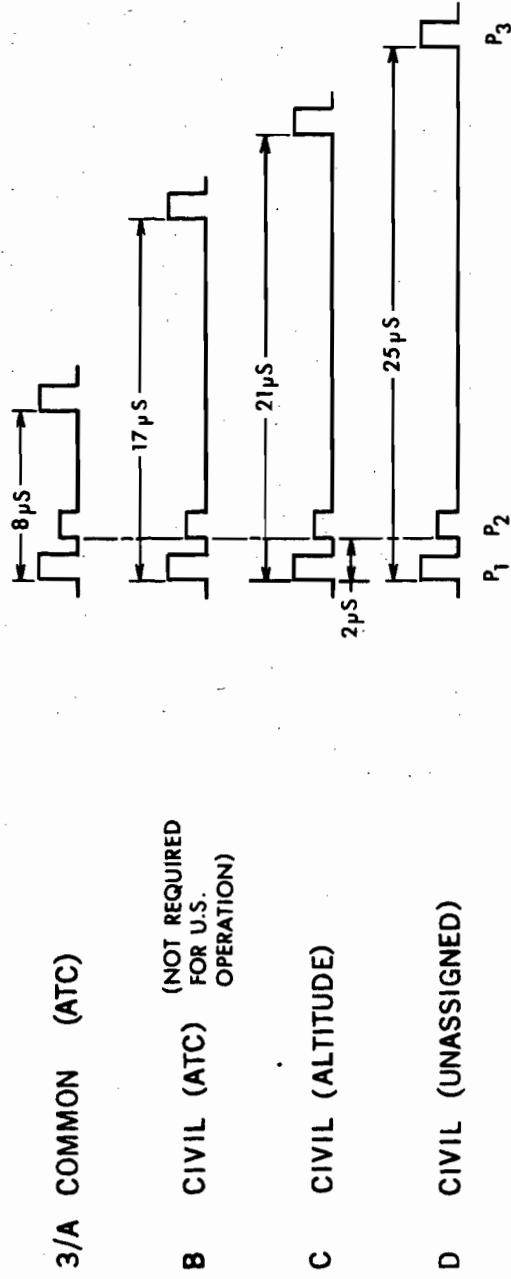
TRANSPONDER REPLY CODES

MODE 3/A																
(4096)																

| SPACING (µS) LEADING EDGE TO LEADING EDGE | 0 | 1.45 | 2.9 | 4.35 | 5.8 | 7.25 | 8.7 | 10.15 | 11.6 | 13.05 | 14.5 | 15.95 | 17.4 | 18.85 | 20.3 |

| PULSE NOMENCLATURE | F_1 | C_1 | A_1 | C_2 | A_2 | C_4 | A_4 | X | B_1 | D_1 | B_2 | D_2 | B_4 | D_4 | F_2 |

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