A Q Specification of ICAO Flight Plan Instructions

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%include startup.s

%include icaofpdefs.s

BEGIN_Q

{Aircraft Identification is correct} is true iff
{all of {

  I7A.
  if {{The radiotelephony call sign to be used by the aircraft will
  consist of {
    any of {
      the registration marking of the aircraft,

      the registration marking of the aircraft preceeded by the ICAO
      telephony designator for the aircraft operating agency}}}
    or {not {The aircraft is equipped with radio}}} then
  {insert {Item 7} - {the registration marking of the aircraft}},

  I7B.
  {id} is {the ICAO telephony designator for the operating agency followed by
  the flight identification} in {
  if {The radiotelephony call sign to be used by the aircraft will consist of
  {id}} then {insert {Item 7} - {id}}}
}}.


{FlightRules and Type of Flight is correct} is true iff
{all of {

  I8FR.
  all of {
  if {IFR rules} then {insert {Item 8 Flight Rules} - {I}},
  if {VFR rules} then {insert {Item 8 Flight Rules} - {V}},
  if {IFR first} then {insert {Item 8 Flight Rules} - {Y}},
  if {VFR first} then {insert {Item 8 Flight Rules} - {Z}}},

  I8FT.
  if {Scheduled Air Service} then {insert {Item 8 Type of Flight} - {S}}
  else {if {Non-scheduled Air Transport Operation} then {insert {Item 8 Type of Flight} - {N}}
  else {if {General Aviation} then {insert {Item 8 Type of Flight} - {G}}
  else {if {Military} then {insert {Item 8 Type of Flight} - {M}}
  else {insert {Item 8 Type of Flight} - {X}}}}}
}}.
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{Number and Type of Aircraft and Wake Turbulence Category is correct}
is true iff
{all of{

  I9N.
  if {There is more than one aircraft} then
  {insert {Item 9 Number of Aircraft} - {the number of aircraft}},

  I9T.
  if {{not {There is an appropriate ICAO type designator}}
    or {This is a formation flight with more than one type}}
  then {{insert {Item 9 Type of Aircraft} - {ZZZZ}} and {insert {Item 18} - {TYP/
    Types of aircraft preceded by numbers of aircraft}}}
  else {insert {Item 9 Type of Aircraft} - {the appropriate ICAO type
    designator}},

  I9W.
  all of {
  if {The maximum certified take-off mass is {136000} kg or more} then
  {insert {Item 9 Wake Turnulence} - {/H}},
  if {The maximum certified take-off mass is less than {136000} kg but more
  than {7000} kg} then {insert {Item 9 Wake Turnulence} - {/M}},
  if {The maximum certified take-off mass is {7000} kg or less} then
  {insert {Item 9 Wake Turnulence} - {/L}}
  }
}}.


{Equipment [Part E] is correct} is true iff
{all of{

  I10SE.
  all of {
  if {not {SSR equipment is present}} then {insert {Item 10 SE} - {N}},
  if {SSR transponder mode A} then {insert {Item 10 SE} - {A}},
  if {SSR transponder mode A and mode C} then {insert {Item 10 SE} - {C}},
  if {SSR transponder mode S only} then {insert {Item 10 SE} - {X}},
  if {SSR transponder mode S including pressure-altitude trasmission} then
    {insert {Item 10 SE} - {P}},
  if {SSR transponder mode S including aircraft identification trasmission} then
    {insert {Item 10 SE} - {I}},
  if {SSR transponder mode S including pressure-altitude and aicraft identification trasmission} then
    {insert {Item 10 SE} - {S}},

  if {ADS capability} then {insert {Item 10 SE} - {D}}}
}}.

{Equipment [Part 1] is correct} is true iff
{all of {
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    if {COM/NAV/approach aid equipment is {LORAN C}} then
    {insert {Item 10 CNA} - {C}},

    if {COM/NAV/approach aid equipment is {DME}} then
    {insert {Item 10 CNA} - {D}},

    if {COM/NAV/approach aid equipment is {ADF}} then
    {insert {Item 10 CNA} - {F_}},

    if {COM/NAV/approach aid equipment is {GNSS}} then
    {insert {Item 10 CNA} - {G}},

    if {COM/NAV/approach aid equipment is {HF RTF}} then
    {insert {Item 10 CNA} - {H}},

    if {COM/NAV/approach aid equipment is {Inertial Navigation}} then
    {insert {Item 10 CNA} - {I}},

    if {COM/NAV/approach aid equipment is {Data Link}} then
    {{insert {Item 10 CNA} - {J}} and {insert {Item 18} - {DAT/}}},

    if {COM/NAV/approach aid equipment is {MLS}} then
    {insert {Item 10 CNA} - {K}},

    if {COM/NAV/approach aid equipment is {ILS}} then
    {insert {Item 10 CNA} - {L}}
}}.

{Equipment [Part 2] is correct} is true iff
{all of {

    if {COM/NAV/approach aid equipment is {Omega}} then
    {insert {Item 10 CNA} - {M}},

    if {COM/NAV/approach aid equipment is {VOR}} then
    {insert {Item 10 CNA} - {O}},

    if {COM/NAV/approach aid equipment is {RNP type certification}} then
    {insert {Item 10 CNA} - {R}},

    if {COM/NAV/approach aid equipment is {TACAN}} then
    {insert {Item 10 CNA} - {T_}},

    if {COM/NAV/approach aid equipment is {UHF RTF}} then
    {insert {Item 10 CNA} - {U}},

    if {COM/NAV/approach aid equipment is {VHF RTF}} then
    {insert {Item 10 CNA} - {V}},
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    if {COM/NAV/approach aid equipment is {other}} then
    {{insert {Item 10 CNA} - {Z}} and {insert {Item 18} - {COM/ or NAV/}}},

    {letter} is {each of {W, X, Y}} in
    {if {{letter} is prescribed by ATS} then {insert {Item 10 CNA} - {letter}}}
}}.

{Equipment is correct} is true iff
{all of {

  I10.
  if {Standard COM/NAV/approach aid equipment for the route to be flown is
  carried and is serviceable} then
  {all of {

    insert {Item 10 CNA} - {S},

    Equipment [Part 1] is correct,

    Equipment [Part 2] is correct}},

  Equipment [Part E] is correct
}}.


{Departure Aerodrome and time are correct} is true iff
{I13.all of{

  if {The flight plan is received from an aircraft in flight} then {
    {insert {Item 13 A} - {AFIL}} and {insert {Item 18} - {DEP/ the four-letter
    location indicator of the location of the ATS unit from which supplementary
    flight data can be obtained}}}
  else {if {not {Location indicator has been assigned}} then
    {{insert {Item 13 A} - {ZZZZZ}} and {insert {Item 13} - {DEP/ aerodrome name}}}
  else
    {insert {Item 13 A} - {the ICAO four-letter location indicator of the
    departure aerodrome}}},

  if {The flight plan was submitted before departure} then
    {insert {Item 13 B} - {the estimated off-block time}}
  else
    {insert {Item 13 B} - {{any of {the actual time, the estimated time}} over
    the first point of the route to which the flight plan applies}}
}}.


{Route is correct} is true iff
{all of {

  I15A.
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if {Mach number is prescribed by the appropriate ATS authority} then
  {insert {Item 15 A} - {the true airspeed for the first or the whole cruising
  portion of the flight expressed as {M followed by 3 digits of Mach
  hundredths}}}
else {insert {Item 15 A} - {the true airspeed for the first or the whole
  cruising portion of the flight expressed as {any of {
    K followed by 4 digits of kilometres per hour,
    N followed by 4 digits of knots
  }}}},

I15B.
if {Flight is uncontrolled VFR} then {insert {Item 15 B} - {VFR}}
else {insert {Item 15 B} - {the planned cruising level for the first or the
  whole portion of the route to be flown as {any of {
    F followed by 3 digits of Flight level,
    S followed by 4 digits of Standard Metric Level in tens of metres,
    A followed by 3 digits of Altitude in tens of metres
  }}}},

I15C.
if {The flight is along a designated ATS route} then
  {all of {

  if {The departure aerodrome is {any of {located on, connected to}} the
    ATS route} then
    {insert {Item 15 C} - {the designator of the first ATS route}}
  else {insert {Item 15 C} - {the letters DCT followed by the point of
    joining the first ATS route followed by the designator of the ATS route}},

  for any {point} {
  if {A change of {any of {speed, level, ATS route other than same
      direction lower/upper, flight rules}} is planned at {point}} then
    {if {{The flight to the {next {point}} will be outside a designated route}
      and {not {{each of {point, next {point}}} is
      defined by geological co-ordinates}}} then
      {insert {Item 15 C} - {{point} followed by DCT}}
    else {insert {Item 15 C} - {{point} followed by the designator of the
      next ATS route segment}}}}}}

else {all of {

  if {ATS flight track points are required by the appropriate ATS authority}
  then
    {all of {
    Use ATS style track points,
    for any {point A} {
    for any {point B} {
      if {{point A} and {point B} are successive points} then
        {{point def} is {each of {
          goegraphical co-ordinates,
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        bearing and distance}} in
      {if {{each of {point A, point B}} is defined by {point def}} then
        {insert {Item 15 C} - {DCT between {point A} and {point B}}}
      else
        {insert {Item 15 C} - {{point A} followed by {point B}}}}}}}
  }}
else
  {for any {point} {
  {insert {Item 15 C} - {{point} details}} if and only if
    {{not {{point} and {next {point}} are normally more than
    {each of {30 minutes flying time, 370km}} apart}} and
    {A change of {any of {speed, level, track, flight rules}}
    is planned at {point}}}}},

for any {point} {if {{point} is listed in Item 15 C} then
{all of {

I15C1.
the code designator assigned to {any of {route, route segment}} including
  where appropriate the coded designator assigned to the standard
  {any of {departure, arrival}} route is associated with {point},

I15C2.
if {not{A significant point code designator has been assigned to {point}}} then
  {any of {

  2 figures describing latitude in degrees followed
  by {any of {N, S}} followed by 3 figures describing longitude in degrees
  followed by {any of {E, W}} is associated with {point},

  4 figures describing latitude in degrees and
  tens of units of minutes followed by {any of {N, S}} followed by 5
  figures describing longitude in degrees and tens of units of minutes
  followed by {any of {E, W}} is associated with {point},

  the 2 or 3 character identification of the
  navigation aid followed by the 3 figure bearing from the aid in degrees
  magnetic followed by the distance from the aid in 3 figures expressing
  nautical miles is associated with {point}
  }}
else
  {the 2 to 5 characters of the assigned coded
  designator is associated with {point}},

I15C3.
{change} is
{each of {speed - 5pc TAS or more, speed - 0.01 Mach or more, level}} in {
if {A change of {change} is planned at {point}} then {

  an oblique stroke and both the cruising speed
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      and the cruising level is associated with {point}}},

    I15C4.
    if {A change of {flight rules} is planned at {point}} then {
      if {IFR to VFR} then
        {the letters VFR are associated with {point}}
      else {if {VFR to IFR} then
        {the letters IFR are associated with {point}}}},

    I15C5.
    if {A change of {level - climb} is planned at {point}} then {
      an oblique stroke followed by the speed to be maintained during
      cruise climb followed by {any of {
        the two levels defining the layer to be occupied during cruide climb,
        the level above which cruise climb is planned followed by PLUS}} is
        associated with {point}}
    }}
    }}}
}}.


END_Q

/* NOTE - Item 15 C, outside ATS routes:

The scope of the instructions 1 - 5 is not clear, i.e., are these
        conventions applied:

1. to each point in Item 15 C,
2. only when outside ATS routes, or
3. only when required by an ATS authority.

(2) is assumed in the above spec.
*/


Subsm ["insert * - * " "Item 10 CNA" V; "insert * - * " "Item 10 CNA" S];
Subsm ["insert * - * " "Item 10 CNA" "F_"; "insert * - * " "Item 10 CNA" S];
Subsm ["insert * - * " "Item 10 CNA" O; "insert * - * " "Item 10 CNA" S];
Subsm ["insert * - * " "Item 10 CNA" L; "insert * - * " "Item 10 CNA" S];


BEGIN_Q


{Destination Aerodrome and Total Estimated Elapsed Time is correct} is true iff
{all of {

  I16-1.
  if {not {Location indicator has been assigned}} then
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    {{insert {Item 16 Dest} - {ZZZZ followed by the total estimated elapsed time}}
    and {insert {Item 18} - {DEST/ the name of the aerodrome}}}
  else
    {insert {Item 16 Dest} - {the ICAO four letter location indicator of the
    destination aerodrome followed by the total estimated elapsed time}},

  I16-2.
  if {not {Location indicator has been assigned to the alternate aerodrome}} then
    {{insert {Item 16 Alt} - {ZZZZ}}
    and {insert {Item 18} - {ALTN/ the name of the alternate aerodrome}}}
}}.


{Other Information is correct} is true iff
{all of {

  I18-1.
  for any {point} {
  if {{point} is a {any of {significant point, FIR boundary}} prescribed
    {any of {
      on the basis of regional air navigation agreements,
      by the approapriate ATS authority}}} then {
    insert {Item 18} - {EET/ {point}}}},

  I18-2.
  if {The route is revised} then {
    insert {Item 18} - {RIF/route details to the revised destination
    aerodrome followed by the ICAO four letter location indicator of the
    aerodrome}},

  I18-3.
  if {The registration markings of the aircraft are different from the
    aircraft identification in Item 7} then {
    insert {Item 18} - {REG/registration markings of the aircraft}},

  I18-4.
  if {A SELCAL Code is prescribed by the appropriate ATS authority} then {
    insert {Item 18} - {SEL/SELCAL Code}},

  I18-5.
  if {not {The name of the operator is obvious from the aircraft identification
    in Item 7}} then {
    insert {Item 18} - {OPR/operator name}},

  I18-6.
  if {There is a reason for special handling} then {
    insert {Item 18} - {STS/reason for special handling}},

  I18-7.
  if {Aircraft performance data is prescribed by the appropriate ATS
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    authority} then {
    insert {Item 18} - {PER/Aircraft performance data}},

  I18-8.
  for any {aerodrome} {
  if {{aerodrome} is an en-route alternate aerodrome} then {
    insert {Item 18} - {RALT/ {aerodrome}}}},

  I18-9.
  if {Any other plain lanugage remarks are necessary} then {
    insert {Item 18} - {RMK/any other remarks}}
}}.


{Supplementary Information [Part 1] is correct} is true iff
{all of {

  I19E.
  insert {Item 19 E} - {the four digit fuel endurance in hours and minutes},

  I19P.
  if {Number of persons is required by the ATS authority} then {
      if {not {The total number of persons is known}} then {
        insert {Item 19 P} - {TBN}}
      else {
        insert {Item 19 P} - {the total number of persons [passengers and crew]
            on board}}},

  I19ES1.
  all of {
    if {not {UHF on frequency 243.0 MHz is available}} then {
      cross out {Item 19 R} - {U}},

    if {not {VHF on frequency 121.5 MHz is available}} then {
      cross out {Item 19 R} - {V}},

    if {not {Emergency location beacon is available}} then {
      cross out {Item 19 R} - {E}}
    },

  I19ES2.
  all of {
    if {not {Polar equipment is carried}} then {
      cross out {Item 19 S} - {P}},

    if {not {Desert equipment is carried}} then {
      cross out {Item 19 S} - {D}},

    if {not {Maritime equipment is carried}} then {
      cross out {Item 19 S} - {M}},
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    if {not {Jungle equipment is carried}} then {
      cross out {Item 19 S} - {J}}
    },

  I19ES3.
  if {not {Life jackets are carried}} then {
    cross out {Item 19 J} - {each of {L, F_, U, V}}}
  else {all of {
    if {not {Life jackets are equipped with lights}} then {
      cross out {Item 19 J} - {L}},

    if {not {Life jackets are equipped with fluorescein}} then {
      cross out {Item 19 J} - {F_}},

    {cross out {Item 19 J} - {U}} exactly when {cross out {Item 19 R} - {U}},

    {cross out {Item 19 J} - {V}} exactly when {cross out {Item 19 R} - {V}}
    }}
}}.

{Supplementary Information [Part 2] is correct} is true iff
{all of {

  I19ES4.
  if {not {Dinghies are carried}} then {
    cross out {Item 19 D} - {each of {D, C}}}
  else {all of {
    insert {Item 19 D} - {number of dinghies carried},

    insert {Item 19 D} - {total capacity in persons of all dinghies carried},

    if {not {Dinghies are covered}} then {
      cross out {Item 19 D} - {C}},

    insert {Item 19 D} - {colour of dinghies}
    }},

  I19ES5.
  insert {Item 19 A} - {colour of aircraft and significant markings},

  I19ES6.
  if {not{There are remarks}} then {
    cross out {Item 19 N} - {N}}
  else {
    indicate {Item 19 N} - {any other survival equipment carried and any other
        remarks regarding survival equipment}},

  I19ES7.
  insert {Item 19 C} - {name of pilot in command}
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}}.

{Supplementary Information is correct} is true iff
{all of {
  Supplementary Information [Part 1] is correct,
  Supplementary Information [Part 2] is correct
}}.


{Correct Form} is true iff
{all of {
  Aircraft Identification is correct,
  FlightRules and Type of Flight is correct,
  Number and Type of Aircraft and Wake Turbulence Category is correct,
  Equipment is correct,
  Departure Aerodrome and time are correct,
  Route is correct,
  Destination Aerodrome and Total Estimated Elapsed Time is correct,
  Other Information is correct,
  Supplementary Information is correct
}}.


{Flag Errors} is true iff
{if {not {Correct Form}} then {report error}}.


END_Q
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