UNITED AIRLINES LOFT TRAINING

Captain Dale Cavanagh
Captain Bill Traub

Today we from United would like to describe for you the use we make of line-oriented training and some of the background which has led us where we are today. At the outset let me make it clear that when we speak of LOFT we are in most cases talking of line-oriented training in a broader, generic sense and not as a specific program approved under FAR 121.409 and AC 120-35. I will be describing a LOFT concept which we use in recurrent flight training while Captain Bill Traub will discuss the use of LOFT in transition training.

One of the criticisms most frequently heard concerning airline training and checking has been its lack of line orientation. The maneuvers required under FAR 121, Appendix F, too often bear little resemblance to the normal day-to-day requirements of line flying. The environment in which the checks are conducted because of the need to accomplish the many maneuvers dictated under Appendix F too often bear little resemblance to the cockpit environment on a line trip. In addition, in many cases the composition of the crew has had little resemblance to that found on a line flight. In our view both of those criticisms have been valid.

There has been little which we could do about the manuevers required to be performed during proficiency checks and recurrent training, but in the area of crew composition we have had the latitude to structure the crew to be as close to that found on a line flight as possible. Nearly 20 years ago, United determined that in order to properly evaluate the performance of a Captain, First Officer or Second Officer, it could best be accomplished if he were working with the support of a qualified cockpit crew. Accordingly, a company policy was established which required that all pilot checks and recurrent training must be conducted with a full crew occupying the seats they occupy on the line. In order to maintain this crew concept, it has been necessary for us to schedule First Officers and Second Officers into our DEN training facility twice as often as is required under FAR in order to provide a fully-qualified crew during the Captain's visit to DEN for proficiency checks and recurrent training.

We are not able to provide a regular line crew for FAA type-rating checks, but the ACI's with whom we worked agree that both the safety pilot occupying the right seat and a Flight Operations Instructor occupying the Engineer's station during a rating check should be permitted to provide normal SOP items without specific command.

As a result of the crew concept application during proficiency checks, recurrent training and rating, pilots involved in such checking or training have operated with the support of a full crew, unlike a number of other airlines around the world where performances are sometimes demonstrated in a solo environment.

A number of years ago we were intrigued by the LOFT concept when it was first introduced by Northwest Airlines. We secured an invitation to observe some of their training in Minneapolis. A Flight Manager, a Training Manager and a representative from ALPA all observed Northwest's operation of LOFT and were uniformly impressed--so impressed, in fact, that we immediately investigated the possibility of implementing a similar program in Denver.

The program approved for Northwest included two instructors, one for the Flight Engineer and one for the pilots. In addition, the instructors were line-qualified or at least rated on the aircraft. However, the instructors whom we had used for many years in proficiency training were not qualified in the same manner and consequently could not meet the requirements of the FAA guides which by this time had been laid down. Some of our Flight Simulator Instructors were line pilots who had been medically grounded, others were pilots for other airlines, and a large number were retired military pilots. None of the instructors were line- current and because of medical groundings a number could not be rated on the aircraft. However, we had established a qualification program for the instructors which, in our view, had adequately prepared them for the job they filled. Each Flight Simulator Instructor completed the full transition training required for each pilot in command and upon completion of the training, passed the same qualification check as is administered by the FAA for type rating.

In addition, each Flight Simulator Instructor is given additional training to qualify them as a flight engineer on the aircraft so that they have a familiarity and an acquaintance with the operating duties and procedures of the pilots and flight engineer. Recurrent proficiency training is required on a monthly basis and line observation trips are also required on a monthly basis. Annual proficiency checks are also required.

With that as a training background and with the benefit of the years of experience they had had in administering proficiency training programs for United, we felt they were fully qualified to provide the required instruction as envisioned with LOFT and were also qualified to do this with a single instructor. Consequently, for reasons of instructor qualification and the additional expense which would be imposed with furnishing two instructors during LOFT training, United

elected not to pursue LOFT under the earlier exemption nor subsequently under the FAR when it was promulgated and published. However, we continued to look longingly at LOFT, wondering how, under our system, we might adopt at least some part of the concept.

In the early summer of 1978 we approached our FAA Principal Operations Inspector with a proposal to restructure the four hours we used in recurrent proficiency training. For many years, roughly 2-1/2 hours of the four had been used to accomplish the Appendix F maneuvers for both the Captain and First Officer participating in recurrent training and the remaining 1-1/2 hours were used for review of emergency and abnormal procedures. We proposed to our POI that we use that 1-1/2 hour for a LOFT flight. He was agreeable to our suggestion. Consequently, in September of 1978 we launched a LOFT portion in recurrent proficiency training.

That first year the flight originated in SEA and was planned to terminate at SFO; however, because SEA-SFO would require more than the time available, the scenario was structured in order to provide a diversion into PDX. When the crew reported for training during the briefing, they were provided with a flight plan, a weight manifest and a weather briefing message which approximated the material they would have in hand prior to departure on a similar line flight. The instructor was directed to provide all the normal ground communication contacts such as clearance for engine start, pushback, taxi clearance, ATIS, clearance delivery, and the after-takeoff departure control, center, etc. The instructor was also told to make no instructional comments during the flight, to provide only the assistance by radio that would be normally available to a crew, but to keep notes so that in subsequent debriefing unanswered questions, suggestions, comments and the like could be reviewed with the crew.

The number of emergencies and abnormal procedures which could be undertaken with some degree of realism had to be carefully considered. While we originally left the selection of problems, their timing, and the numbers to be given to the discretion of the instructors, we did have to step in after several weeks and suggest a more standardized approach. Eventually, as a general guide, we suggested that somewhere between 6 to 1Ø problems of varying magnitude as being a normal number. Obviously on a typical line flight one doesn't expect that number of problems. However, crews recognizing this as a training exercise, would be less than happy with a great deal of time spent in climb, cruise and descent with everything operating normally.

To digress for a moment, we have had various comments in these areas. Probably one of the most repeated criticisms has

been the aspect of too much time being spent in a training situation with nothing going on. I was very comfortable with the pacing and number of problems we had in our scenarios until John Lauber and Clay Foushee visited last November. In talking about their observations afterward, I asked about the number of problems which were introduced. I think it was Clay who said that one instructor he had seen had only introduced one problem, and I sucked my breath in involuntarily, thinking I had a problem. But, he went on to say that the problem this instructor had introduced was one which occupied the crew for the balance of the flight. They could not retract their landing gear after takeoff. They could not return to the point of origin because of the weather, and they were forced to go to Los Angeles with the gear down and with all the things that went with that particular problem--hydraulics, etc. The more I thought about it, I began to feel that that is a good approach to follow.

The LOFT concept has been well received by virtually all the pilots and managers who have been exposed to it and it has been accepted as a regular way to doing business on recurrent proficiency training.

After about 12 months, during which period most line crews had been exposed to the SEA-SFO route with a landing at PDX, we changed the route and for the following year picked up LAX to SFO.

We also introduced an occasional incapacitation as one of the problems which might confront the crew. Shortly thereafter we elected to include incapacitation as a standard part of each PT for the following 12 months. The incapacitation was not intended or designed to be subtle, though there would certainly be nothing wrong with that approach. However, by including it on each PT, all crews were soon aware that an incapacitation would occur so it was hardly a surprise. There was an element of uncertainty, though, because the crew didn't know which crew member would be taken out of the loop, nor did they know when during the flight the incapacitation would occur.

We feel this incapacitation has been a worthwhile educational exercise. It is certainly the first opportunity many crews have had to operate shorthanded. We have received a number of interesting comments and made a number of interesting observations. For instance, we have found that the Flight Engineer is generally considered to be the most difficult crew member to replace on the wide-bodies. More difficulty is experienced by the Captain and First Officer when they are operating without the Flight Engineer on a DC-10 or 747. Conversely, we have found that the Captain is more difficult to replace when incapacitated on either a DC-8 or 727.

Last summer we directed a request to our POI, asking for his approval to expand our application of LOFT to the entire four hours of recurrent training. Our justification for proposing a plan which did not fully comply with AC was the wording in it which says the AC describes one method of operation which can be approved by FAA, the implication being that there could be other methods. In November our request was rejected, though a loophole was provided which suggested that FAA might consider one instructor if we used a simulator capable of automatically managing the entire scenario, including all malfunctions, thus relieving the instructor from any manual input. At this point we have not made a decision as to any future action along the lines suggested, though we know that our simulator capabilities would preclude automatic management of the scenario in all except the very latest equipment.

I have given you a brief description of the application of LOFT in our recurrent pilot training over the past 2-1/2 years. I would now like to introduce, Captain Bill Traub, who is Flight Operations Manager for Boeing aircraft training, and who will take over as Director of Flight Operations Training on February 1.

Bill Traub

Dale has covered our use of LOFT in the recurrent training program at United Airlines. We, at United, enthusiastically endorse the LOFT concept and accordingly have expanded its use into several other facets of training and checking. We have chosen to continue using the acronym LOFT, even though this added use is considerably different than LOFT as described in the original Advisory Circular. I will cover:

- First, why we have expanded on the LOFT concept,
- then, how we are now using the LOFT concept in our simulator syllabus development under Appendix E training.
- I'll also explain our use of "pure" LOFT periods in training;
- and, finally our use of the LOFT concept on type-rating checks for Captains.

Why have we have expanded the LOFT concept to Appendix E training programs? It's our desire at United Airlines to be as operationally oriented as possible in training, so that each task the trainee accomplishes has a real meaning in complementing his line skills, in addition to fulfilling the obligations of FAR 121 training regulations. In the past we probably concentrated too much on individual maneuvers in order

of relative difficulty. This approach also led to a conditioned environment that was considerably different than line operations and did not explore the airplane gross weight and performance capabilities to the extent used in line operations. Along with this, our syllabuses listed the maneuvers to be accomplished, important briefing items that needed emphasis and irregular and emergency procedures randomly selected to fulfill training requirements. Our instructors then had to try to put some realism into their briefings and simulator training. By using the LOFT concept we can structure every period like a typical line flight and still accomplish our training objectives.

Now let me explain how we are using LOFT in our simulator syllabus development in Appendix E training. In order to develop good planning skills our pilots need to have a syllabus that logically and sequentially outlines what they are going to accomplish in that training session. Therefore, every simulator period is structured first like a line flight. In simulator training we provide our pilot trainees with actual line documents for each simulator period: they have a flight plan forecast, a weather briefing message covering enroute weather and NOTAMS, and a weight manifest with airplane type and weight operating data. These are the same papers that are automatically generated on the line and so they are provided in the same format for each simulator session. By providing line documents for training, we are familiarizing our pilot trainees with the essential information in the correct format for safely and accurately conducting their flights.

Ground operations receive high priorities in a LOFT concept syllabus. Weather parameters are included to develop the flight crew's awareness that they must integrate weather contingencies into their normal procedures, including such items as slush on taxiways, freezing rain, and tailwind takeoffs. Communication details are included, starting with the closing of all cabin and cargo compartment doors, discussion with ground crews, salute, ATC clearance, and VHF comm switching for taxi, takeoff, enroute, through gate arrival at termination. Simulator positioning can be on a parallel taxiway when the visual is turned on so realistic taxiing and sequencing of checklists can be experienced.

Real-time orientation is a key in LOFT. When a training mission is formulated, it is assumed that flight progress will be in the same time frame as a line-operated flight. Fast slewing the simulator to another geographical fix or cutting short an irregular procedure can become confusing and can dilute training effectiveness. Realism, in our opinion, is a critical factor in allowing our crewmembers the opportunity they need to formulate plans and exercise judgment.

Maneuver-sequencing realism is another byproduct of a well-planned LOFT sortie. If we truly concentrate on a line environment, we shouldn't get a wheel well fire on final approach after an hour of training.

Another key element in our LOFT training syllabus is the development of the crew concept. One of our primary objectives in simulator and airplane operations is the interrelationship of each flight crewmember to fully realize the synergistic aspects of a well-run team. Individual crew training, such as a second officer working on an unrelated irregularity, to fulfill his training while the pilots are shooting a CAT II approach, does not foster crew coordination. On the other hand, a hydraulic irregularity with the full crew involved, does enhance performance by establishing duty assignments, aircraft control responsibility, coordination, and the time planning necessary to arrive at the landing airport safely.

A well-planned simulator syllabus under LOFT will acquaint the flight crew with varying parameters of environment and configuration. We are all aware of airplane performance variations as we fly from a cold winter takeoff at DEN to a balmy LAX landing. This is really only a start as we vary gross weights for takeoff and landing, vary flap settings for takeoff and landing, employ the reduced EPR program, encounter turbulence, and a variety of headwinds, tailwinds, and crosswinds. A rejected takeoff at V1 with maximum weight for the runway, is an excellent training manuever in developing the Captain's confidence that the performance charts really work or in detecting that his braking technique is faulty.

The actual conduct of the LOFT syllabus involves less coaching and interruption in crew training by the instructor. Effective exercise of judgment and command ability are keys in Captain training. It is difficult for Captains to assume and maintain control, or to develop the skills, if he is constantly interrupted or the training session is put together in pieces and offered to him one at a time by the instructor.

We coordinate irregular and emergency procedures required for pilot or Second Officer training to involve the whole flight crew as much as possible and in a realistic sequence. As an example, a leading-edge flap problem after takeoff can involve the whole crew, and should as they cope with aircraft control, navigation, communications, and crew coordination to correct or deal with the irregularity.

Each period of the simulator syllabus is arranged to require as much interaction between the pilots and Second Officer as possible. This fosters our crew concept and keeps each crewmember's attention focused on the total airplane environment. An example, combining some higher altitude

problems such as a loss of all generators where each crewmember has inputs, then encounter associated dutch roll problems with the loss of electrical yaw dampers. This involves checklist completion concurrent with maintaining aircraft control and possibly descent to a lower altitude. You can see that this type of sequence requires crewmember coordination and each member's input.

When we finally put this syllabus together into a period-by-period mission profile plan, we must keep all the factors previously mentioned in mind to compel each trainee to exert himself to his greatest capability. We can continue to challenge him by changing performance parameters, weather environmental factors and compounding of abnormals. In the latter stages of training we can introduce the Minimum Equipment List (MEL) items. This allows us to operate with some components inoperative, with certain attendant associated restrictions which the crew must observe throughout the flight.

I have a complete B-727 transition training syllabus available for your inspection with every period structured as a typical line flight following a LOFT type concept. Some periods follow the LOFT concept only through the initial departure. In the latter stages of the syllabus we have a complete LOFT scenario for the entire period.

Use of "Pure" LOFT Periods in Training.

In each of our transition training programs we have introduced "pure" LOFT scenarios. What I mean by a "pure" scenario is a training session that is operated from start to completion as a typical line flight. In several of the training programs we conduct one of these "pure" LOFT scenarios prior to the check flight and one after the check. In the B-747 and DC-1Ø where we are (or soon will be) conducting Appendix H type training, we conduct pure LOFT after the simulator rating check in compliance with the Appendix.

Use of the LOFT Concept on Type-Rating Checks.

At United we have had some difficulty with some ACI's conducting very poorly-planned and very unrealistic type-rating checks. In an effort to correct this problem, we proposed using the LOFT concept to develop a scenario in real time that would accomplish the type-rating. Our POI and ACI's agreed with this plan. In this case we did change the acronym a little bit, we called this a Line-Oriented Check. This concept has enhanced the checking continuity for trainees and gains all the advanced planning benefits associated with training LOFT sorties. It has introduced a more realistic profile to accomplish the majority of the rating requirements. Rating items like stalls, steep turns and no flap landings are then accomplished at the end of

the LOFT or LOC to fulfill the remaining FAR requirements. Rating candidates receive all planning items and the route they will fly about 24 hours in advance of their check. This allows them adequate time to review the route, SID's, STAR's, and profile descents where published. Along with the route they receive a weather briefing message, flight plan forecast, dispatch relase message, and a planned weight manifest so they can be mentally prepared for the conditions that could confront them on the check. Since it is conducted in the real-time environment, they do not feel as rushed. The enroute cruise time gives them added time to collect their thoughts in preparation for the descent, approach and landing.

Summary

Our experience with the LOFT concept in training and checking has been very positive with wide acceptance by trainees, instructors, Flight Standards, and FAA Air Carrier Inspectors. The FAA personnel who work with United Airlines have been excited about the LOFT concept syllabus that starts early in training and reaches its peak on a line-oriented check.

New programs always have a few problems that must be solved. LOFT has a few that need to be refined in our opinion. Some instructors feel that there is too much non-productive time in cruise that could be corrected with a 300K tailwind. We wish to protect the real-time aspects and will approve of a 100K tailwind. The diversity of operating areas, approach aids and terminal aids connected with line-type scenarios has added many more approach plates for trainees to become familiar with. However, operation in real time seems to allow well-disciplined and organized folks the time needed to review and brief for each approach.

I am excited, as our company is, about the LOFT concept in training. I have covered some highlights of the programs we are now using, or are in the process of developing, and in each case, the only limitations are priorities for simulator time and our own vision.

We know that by concentrating on line orientation that our flight crewmembers are better prepared for line operations because they have operated more closely as a crew under real-time line conditions in the appropriate environment. Their planning strengths are enhanced by more documentation before mission execution, thereby allowing Captains to develop their command and judgment earlier in the training process. Certainly, the bottom line in this whole process is each graduate's confidence that they can proficiently function in their new status. We believe we have done this by exposing them to wide, yet realistic variations in their flight environment and broader use of the airplane's envelope.

CAPTAIN BEACH: On the initial aircraft checkout--your LOFT format for initial checkout--you mentioned that you have all the flight type paperwork available for every training period. Do you have dispatch release, the routes they are to fly and all that?

CAPTAIN TRAUB: Yes.

CAPTAIN BEACH: For each trip? How many trips do you have for your pilots?

CAPTAIN TRAUB: It varies between aircraft types.

CAPTAIN BEACH: Say, the 727?

CAPTAIN TRAUB: In the 727, we currently have eight periods.

CAPTAIN BEACH: Does that include the LOFT and the check?

CAPTAIN TRAUB: It includes the LOFT and the check.

CAPTAIN HARDY: In the LOFT check, as you call it, for a type rating; you mentioned that the candidate will be getting information 24 hours in advance. What type of information do you give him 24 hours ahead of his check? Do you furnish the scenario to the individual getting the check, or just what type of information do you provide?

CAPTAIN TRAUB: For safety reasons, a "semi-retired" reservist on assignment as a line pilot is generally given a flight assignment 24 hours in advance. So, we give him the departure station and where he is going, obviously. We do not give them a copy of the scenario, but we do give them a copy of the weight manifest, the weather briefing, and the dispatch release. Obviously, they would not have the weather 24 hours in advance, but in this case, we do give them that.

CAPTAIN BEACH: These scenarios for type rating--are they prepared by United or by the ACI's, or how were they specifically structured?

CAPTAIN TRAUB: The scenarios that we developed for the type-rating were prepared by United Airlines in cooperation with the FAA. The FAA test flew all the scenarios along with us. Our POI asked that we have four different scenarios available, but they choose them. The FAA picks the scenario given on that particular check ride.

CAPTAIN ESTRIDGE: Can you comment on the average rating ride time due to changes in LOFT and completing the Appendix A requirement?

CAPTAIN TRAUB: Walt, the time has been about the same as running a straight Appendix A type rating ride. We actually block the simulator for three hours. I guess that I would estimate that our average time on the rating ride is around two and a half hours.

CAPTAIN FRINK: You have said that in your recurrent training program you have an hour and a half or so remaining after you complete the required Appendix F maneuvers. Do you do Appendix F required maneuvers for both pilots during that session?

CAPTAIN TRAUB: I'll let Dale answer that.

CAPTAIN CAVANAGH: We have always given the first officer, as part of a PT, the maneuvers that are required under Appendix F, and it takes about the same length of time to do as a proficiency check--roughly two and a half hours for captains and first officers. With the introduction of LOFT, we are still doing the same maneuvers that we had done before. Anything done during a LOFT segment, however, we obviously take credit for. If we had a normal takeoff, then we don't need to do another takeoff. If we had an engine failure or an engine-out approach, then we take credit for that as well. We have tried to keep our LOFT within the basic hour and a half that we had previously used for emergencies and irregularities in order to give us adequate time to cover the balance of Appendix F maneuvers.

CAPTAIN BEACH: One more question. I was curious about whether you had any difficulties with the ACI's for United trying to go into business for themselves once they had the typewritten script.

CAPTAIN TRAUB: Not so far. We have provided suggested irregularity and emergency procedures at various segments in the profile similar to what John showed on the graph (NASA LOFT presentation). We do draw profiles similar to what John showed, and so far, they stick to the script. It works quite well.

CAPTAIN CAVANAGH: I would like to comment on the advance notice that we give to crew members. In some of our early conversations with ACI's and the POI, the suggestion had been made that we should have more than one script and that there ought to be a last minute selection by the check airman or ACI as to what route they were going to operate on so there could not be any advance preparation. I suggested--and they accepted--that as unrealistic. You do not go out to fly an airplane from A to B without knowing until 15 minutes beforehand

where you are going. You know at least a couple of hours ahead, and very commonly, if you are on reserve, you may know as much as 24 hours ahead. We think that it is completely realistic to tell them where they are going and give them an opportunity to review charts or anything they think is appropriate to the flight that they are going to operate the next day. We think that it is an essential ingredient of LOFT, where you are going to operate over several different routes, for them to have some advance opportunity to know where they are going so they can prepare just as they would do on the line.

CAPTAIN SMITH: Do the ACI's conduct your rating scenarios or does the check airman?

CAPTAIN TRAUB: The ACI's.

CAPTAIN SMITH: What is your objective in using a LOFT scenario--a conceptual approach--for a rating ride versus the prescriptive approach (which has usually been associated with the latter)? Why not use a regular rating ride as has been done in the past? What are the advantages? How is that ACI capable of using the conceptual approach (LOFT), in your opinion?

CAPTAIN CAVANAGH: Those are good points that you made. I think one of the things it does is point toward the need for training of the FAA and ACI's in how to conduct a check along those lines. We have had good cooperation from the leading ACI's in monitoring the performance of their individual inspectors so that they are basically following the scenario that has been agreed upon--that it will follow the route that has been prescribed. They are not given much latitude to branch out. I think the advantage, from the crew's standpoint, is that it gives them a better idea, before they get into the simulator, what route they will proceed on. If the first 30 to 45 minutes have gone with some degree of ease, and they know basically where they are going, it builds the confidence necessary to handle the balance of the maneuvers that are going to be required. I think they can approach the whole thing a bit more comfortably. You have a better basis on which to start. It probably gives us a better way to handle the individual eccentricities, if you will, of the ACI conducting the check--not that airline check airmen don't have eccentricities.

CAPTAIN SMITH: A further comment--if I understand your approach to LOFT in a checking situation, you are utilizing LOFT in a way other than what we have had previously described as our objective in this workshop. You are using LOFT in a checking environment, and it was my understanding that LOFT was a training concept, period. When you put a pilot in a checking situation, I fail to understand how you can expect that crew, that pilot, to exercise judgement on his part other than to try

and attempt to arrive at the decisions he expects the ACI wants to see. It is not spontaneous judgement, they are trying to do what the ACI wants them to do. Are we not talking about two uses of LOFT?

DR. LAUBER: I think I will respond to that. Yes, indeed we are. The area we are discussing right now is certainly another application of LOFT, but I do not even want to call it LOFT because LOFT, by definition, means training. It is another application of full-mission simulation in a checking situation. That very definitely falls into another category, or the "other applications. . ." category. It is an simulation approach which happens to share something in common with LOFT. However, your point is a good one, and we want to make sure to keep it in mind.

CAPTAIN SMITH: Are we going to concern ourselves, in this workshop, with that implementation of LOFT, or are we going to consider, in our discussions, only the utilization of LOFT as a training and developmental device?

DR. LAUBER: Well, once again, I am going to be very literal with regard to what you just said. The focus of this workshop is on LOFT, line-oriented flight training. We are dealing with a training operation, not the checking situation. We do, however, have to remember that we will deal with other uses of LOFT, but now, we are getting into a rather gray area. We are dealing with other uses of full-mission simulation. I do not see that as the focus of this workshop, but I also do not see how we can possibly ignore some of the issues involved in the checking application as well. We should not avoid them, although it certainly is not the focus. We will have an opportunity for further discussion of these issues later. It seems to me, upon reflection, that one of the most important things that we need to achieve is some consensus on the nomenclature for LOFT or line- oriented flight training, or line-oriented checking, or whatever. We must seek to avoid the potential confusion or misunderstanding of these concepts. Rather than do it now, I think the appropriate way to handle this is for you all to consider it in the working group meetings. If you have suggestions with regard to terminology, this workshop is the place to make them.